Report on the 2023 Perimeter Monitoring Program and Perimeter Extraction System

Parkland Burnaby Refinery

Parkland Refining (B.C.) Ltd.

Project number: 60704333

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Executive Summary

On behalf of Parkland Refining (B.C.) Ltd. (Parkland), AECOM Canada Ltd. (AECOM) completed monitoring and sampling as part of the Perimeter Monitoring Program (PMP) and performed operations, maintenance, and monitoring of the Perimeter Extraction System (PES), at the Burnaby Refinery (Refinery) throughout 2023. The PMP and PES are performed under the oversight of the British Columbia Ministry of Environment and Climate Change Strategy (ENV). This report summarizes the activities associated with the 2023 PMP and PES programs.

The Refinery is composed of three areas which are collectively known as the "Site":

1. Area 1: Located at the northern terminus of Willingdon Avenue, this area functions primarily as a tank farm and blending facility
2. Area 2: Located near the end of Penzance Drive, this area contains the refining process units
3. Area 3: Located north of Area 1, this area is leased from the Port of Vancouver, and contains the wharf and some rail loading facilities

Perimeter Monitoring Program

The purpose of the PMP is to monitor groundwater environmental conditions along the down-gradient boundary of the Refinery. The PMP is executed once in the wet season (high groundwater table) and once in the dry season (low groundwater table). The two events in 2023 were completed over the following periods:

- Wet Season Event – March 6 to April 12, 2023
- Dry Season Event – August 14 to August 29, 2023

The results of the PMP groundwater samples are compared to the Contaminated Sites Regulation (CSR) standards for the "protection of marine aquatic life" (AW) (CSR standards) and the Site-Specific Screening Levels (SSSLs). SSSLs for select parameters were developed to evaluate potential risks to Burrard Inlet resulting from impacted Site groundwater. The CSR Standards are used as trigger concentrations which indicate the need for further focused investigation/evaluation or remedial action. The SSSLs are used as an extra layer of assessment to identify areas of greater environmental concern and are used in conjunction with the applicable CSR standards.

Areas 1 and 3 Perimeter Monitoring Program Summary

The sampling program and results for Areas 1 and 3 PMP for 2023 are summarized in the table below.

Total number of monitoring wells included in the PMP for Areas 1 and 3:	32
Total number of monitoring wells sampled during the wet event:	31*
Total number of monitoring wells sampled during the dry event:	28*
Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for petroleum hydrocarbons (PHCs[1]) and/or polycyclic aromatic hydrocarbons (PAHs) parameters:	28 (wet event) 24 (dry event)
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs, but above the CSR AW standards for PHCs and/or PAHs:	2 (wet event) 3 (dry event)
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs and/or PAHs parameters:	1 (wet event) 1 (dry event)

** - discrepancies in the number of monitoring wells sampled are due to dry or blocked monitoring wells; see report for details*

[1] PHCs including one or more of light and heavy extractable petroleum hydrocarbons in water (LEPHw/HEPHw), extractable petroleum hydrocarbons in water ($EPHw_{C10-C19}$/$EPHw_{C19-C32}$), volatile petroleum hydrocarbons in water (VPHw), and/or benzene/toluene/ethylbenzene/xylenes (BTEX).

The samples collected from a single well in Area 3 (U07-10S) contained reported concentrations of both PHCs and PAHs above the SSSLs and CSR standards. U07-10S represents a previously investigated area of isolated contamination where PHC and PAH concentrations have exceeded the SSSLs. Nearby monitoring wells laterally bound the footprint providing a rough horizontal delineation. The deep screened well in this area provides vertical delineation.

There were three additional sample locations with reported concentrations above the CSR but below the SSSLs. Samples were collected from monitoring wells A3MW02-07, U07-10I, and A3MW03-02. Samples collected from A3MW02-07 and U07-10I (dry season only) contained reported concentrations of pyrene above the CSR Standards. The samples collected from A3MW03-02 contained concentrations of LEPHw above the CSR Standards.

In October 2015, the air sparge system located in Area 3 was turned off to assess whether further active remediation in the area was required. Concentration trends of evaluated PAH parameters in A3MW02-07 appear to increase between 2015 and 2018 when concentrations stabilized. The increasing concentration trends before 2019 may be attributed to a rebound following the dormancy of the Area 3 Air Sparge (AS) system. In 2023 concentrations of evaluated PAH parameters and total PAHs in A3MW02-07 were generally stable to decreasing and within their historical range. The AS system remained on permanent standby throughout 2023.

The concentrations of contaminants of concern in samples collected as part of the 2023 PMP for Areas 1 and 3 are generally within historical ranges. The Area 1 and 3 PMP will therefore continue in 2024 with a similar scope of work as completed in 2023, field turbidity measurement will continue to be measured for wells in Area 3 as part of the Perimeter Monitoring Program. This alternate line of evidence will allow for additional evaluation of a possible correlation between turbidity and sample concentration.

Ongoing monitoring of Area 3 will continue without the influence of the AS system in 2024.

Area 2 Perimeter Monitoring Program Summary

The sampling program and results for the Area 2 PMP for 2023 are summarized in the table below.

Total number of monitoring wells included in the PMP for Area 2:	43
Total number of monitoring wells sampled during the wet event:	42*
Total number of monitoring wells sampled during the dry event:	21*
Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for PHCs, PAHs, and/or dissolved metal parameters for both events:	38 (wet event) 20 (dry event)
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs, but above the CSR AW standards PHCs, PAHs, and/or dissolved metal parameters for either one or both events:	3 (wet event) 1 (dry event)
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs and/or PAHs parameters for either one or both events	1 (wet event) 0 (dry event)

** - discrepancies in the number of monitoring wells sampled are due to dry or blocked monitoring wells; see report for details*

The sample collected from well A2MW09-11 (wet season only) in Area 2 contained reported concentrations of PHCs and PAHs above the SSSLs and the CSR standards. The reported concentrations were within historical ranges for these parameters.

There were three additional sample locations with reported concentrations above the CSR standards in wells A2MW09-10, G2-3B, and MW11-4S. The sample collected from A2MW09-10 (wet season only) contained reported concentrations of PHCs and PAHs parameters above the applicable CSR Standards. The reported concentrations were generally similar to previously reported concentrations.

The reported concentration of dissolved copper collected from MW11-4S (wet and dry season) and pyrene from G2-3B (wet season) exceeded the CSR Standards. The reported concentrations were within historical ranges for these parameters.

The results of the 2023 PMP for Area 2 do not indicate an immediate need for additional investigation or remediation other than the continued operation of the PES and ongoing collection of field turbidity. The Area 2 PMP will therefore continue in 2024 with a similar scope of work as completed in 2023.

Area 2 Perimeter Extraction System

The PES is a line of closely spaced extraction wells along the Area 2 northern fence line of the Refinery. The pumps in the PES wells extract total fluids to depress the groundwater table and preclude the off-site migration of light non-aqueous phase liquid (LNAPL) and dissolved phase petroleum hydrocarbons (PHCs) in groundwater that originate from Area 2.

Throughout 2023, the PES was operated similar to 2022 where a water column measuring one meter or more above the pump intake during pump operation was used as a trigger for troubleshooting and/or replacement of a groundwater extraction pump. Maintenance was completed by Q3-2023 and adjustments to the preventative maintenance program were made to prevent re-occurrence.

An annual average water column of less than one meter was sustained at 33 of the 40 extraction wells, indicating satisfactory performance. Of the seven extraction wells with average water columns greater than one meter, four demonstrated an annual average of less than three meters which represents the target drawdown for the system.

The majority (six of the seven locations) where un-reliable drawdown was measured are located in the eastern PES section; The remaining one is located in the western PES section. All the extraction wells located in the portion of the PES that intersects the known LNAPL footprint had an annual average water column of 1 m or less as this section of the PES is prioritized over all other areas.

In 2023, the PES collected a total fluid volume of 32,796 cubic meters. Of that volume, 227 liters are estimated to represent LNAPL.

In 2023, the PES controlled potential off-site migration of LNAPL and dissolved phase PHCs based on:

- reliable hydraulic drawdown in extraction wells across the entire PES;
- comparison of groundwater elevations in monitoring wells near the PES against reference static groundwater elevations collected before the PES operation;
- groundwater contouring (including particle path evaluations) performed quarterly; and,
- general stability of the groundwater quality down gradient of the PES.

It is recommended that the PES continue to be operated in 2024 in a similar manner as 2023, including ongoing improvements to the preventative maintenance program.

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1. Introduction

AECOM Canada Ltd. (AECOM) has prepared this report on behalf of Parkland Refining (B.C.) Ltd. (Parkland). The objective of this report is to document the following information to the British Columbia (BC) Ministry of Environment and Climate Change Strategy (ENV):

- 2023 groundwater results from the Refinery Perimeter Monitoring Program (PMP) (wet and dry season events), and
- 2023 performance of the Refinery Area 2 Perimeter Extraction System (PES) located along the downgradient perimeter of the Parkland Burnaby Refinery (Refinery).

The Parkland Burnaby Refinery is located on the south side of Burrard Inlet. The Refinery is composed of three areas which are collectively known as the "Site" (**Figure 1**).

1. Area 1: Located at the northern terminus of Willingdon Avenue, this area functions primarily as a tank farm and blending facility (**Figure 2**).
2. Area 2: Located near the end of Penzance Drive, this area contains the refining process units (**Figure 3,** and **Figure 4**).
3. Area 3: Located north of Area 1, this area contains the wharf and some rail loading facilities (**Figure 2**). This area is leased from the Port of Vancouver and is further divided into two portions:
   - 3.1 Land reclaimed from Burrard Inlet, and
   - 3.2 Burrard Inlet water lot, including the wharf.

2. Geology and Hydrogeology Overview

The surficial geology of the Site is generally characterized by varying depths of Pleistocene age glacial till overlying Tertiary bedrock composed of mudstone with minor interbeds of fine-grained sandstone. Soil conditions encountered during drilling programs conducted by AECOM over the years are generally consistent with published surficial geology maps (Holocene sediments) (URS 2012). Fill materials are also encountered in some locations above the glacially consolidated materials. Soil that is close to the foreshore contains marine-type sediments with entrained shells.

In Area 2, the topography consists of a flat central portion where most of the Refinery infrastructure is located. To the north, there is a short slope down to a benched area where the water treatment plant and associated impoundments are located. This first bench is called the Upper Bench and is bounded to the north by the Area 2 fence line. Just beyond the fence line, there is another drop in elevation to a second narrow bench at the Refinery property line, referred to as the Lower Bench. The elevation continues to drop to the Canadian Pacific Railway (CPR) right-of-way (ROW) and afterward, to the foreshore of Burrard Inlet.

Consistent with the steep northward slope of the ground surface, groundwater flows northward from the central upland areas of the Refinery towards Burrard Inlet. Low permeability soil and bedrock restrict groundwater flow and contaminant migration.

Monitoring wells on-site have a total depth ranging between 1.3 meters (m) and 26.7 m below the top of the monitoring well casing. Groundwater depths vary with land surface elevation. In general, the depth of groundwater is shallower near the Foreshore and deeper in upland areas (URS 2012).

The hydraulic conductivities for the PES area range from 5×10^{6} meters per second (m/s) to 1×10^{10} m/s (URS 2013a). The estimated time required for groundwater to travel from the PES to the Parkland

property boundary under non-pumping conditions is six months (URS 2013b). This was calculated using the following assumptions.

- Hydraulic conductivity of 1.1 x 10^{-6} m/s. This represents the highest measured conductivity from the central section of the PES where most of the light non-aqueous phase liquid (LNAPL) is encountered. This conductivity was measured at well MW10-2D that is screened entirely within the till.
- Calculated groundwater velocity of 30.5 meters/year (m/yr.) under non-pumping conditions.
- The distance from the PES extraction wells on the Upper Bench to the Refinery property line is approximately 15 m.

The groundwater table in Area 3, like the topography, is relatively flat with a gentle slope northward to Burrard Inlet. Groundwater flows northward from Area 1 towards Area 3 and Burrard Inlet. Groundwater elevations near the shoreline are tidally influenced. Siltstone and sandstone bedrock in Area 1 have a hydraulic conductivity of less than 10^{6} m/s and yield less than 1 litre/minute (Morrow, 2001).

3. Background

3.1 Perimeter Monitoring Program Background

The purpose of the PMP is to monitor groundwater environmental conditions along the down-gradient boundary of the Refinery. The following provides relevant program background since the initiation of the PMP in 2004.

- The scope of the original semi-annual groundwater monitoring and sampling program was outlined to the British Columbia (BC) Ministry of Environment (ENV) by Chevron Canada Limited (CCL) in their letter entitled, Chevron Refinery Well Monitoring Program, dated October 31, 2003.
- Sentry wells are monitoring wells typically located outside of known Areas of Environmental Concern (AECs).
- Monitoring wells located in the AECs are monitored as part of a separate investigation, mitigation, and/or remediation programs. Several of the Area 2 Sentry wells are within the influence of remedial activities.
- Following the 2016 PMP, the monitoring and sampling of the methyl tert-butyl ether (MTBE) AEC was reduced from 22 monitoring wells to five monitoring wells in 2017. Based on the evaluation of the groundwater quality in the Report on the 2015 and 2016 PMP and PES (AECOM 2017), the remediation in the MTBE AEC is considered complete. The MTBE extraction system status was changed to dormant, and the area is no longer considered an AEC.
- On March 8, 2021, ENV accepted Parkland's request to cancel permit PR-7112 associated with past landfarming operations west of the main process area in Area 2. Four monitoring wells located along the northern fence line of Area 2 formerly monitored as part of PR-7112 were integrated into the PMP program going forward.
- Consistent with the intent of the PMP, AECOM monitored 75 sentry monitoring wells at the Refinery perimeter in 2023.

3.2 Perimeter Extraction System Background

The purpose of the PES is to provide a hydraulic barrier to intercept and preclude the off-site migration of LNAPL and dissolved phase petroleum hydrocarbons (PHCs) in groundwater originating from the LNAPL present in Area 2.

The following bullets are intended to provide relevant system background since the initiation of the PES in 2010:

- In the summer of 2010, the initial portion of the PES was installed along the northern perimeter of Area 2 consisting of 10 total fluid pumps and associated extraction wells. This installation is currently referred to as the central section (**Figure 5**). Since 2010, all these extraction wells have been replaced with deeper extraction wells to improve the hydraulic capture in this area.
- In the summer of 2011, the PES was expanded to the east to include the Flare Stack Area. The expansion included the installation of an additional 17 pumping locations and associated infrastructure. This installation is currently referred to as the eastern section (**Figure 5**).
- In the summer of 2012, the PES was expanded to the west to the edge of the ponds area. The expansion included the installation of an additional 13 pumping locations and associated infrastructure. This installation is currently referred to as the western section (**Figure 5**).
- In 2015, the common header of the eastern section of the PES was enlarged.
- In 2016, the common header of the western and central sections of the PES was enlarged.
- In 2017, the PES process was expanded to include an effluent oil water separator (OWS), an LNAPL storage container, and a sequestering agent dosing system.

3.3 Air Sparge and MTBE Systems Summary

To improve the reliability of perimeter compliance, groundwater extraction and treatment systems have been installed and operated at the Refinery at various times in the past. **Table 1** summarizes these systems and their current status.

Table 1 Summary of Air Sparge and MTBE Systems

System Name	Location	Status	Figure Reference
Area 3 Air Sparge System	Area 3	Standby since 2015	Figure 2
Area 2 Air Sparge System	Area 2	Standby since 2012	Figure 3
Area 2 MTBE Extraction System	Area 2	Standby since 2014 Dormant since 2015	NA*

Notes:

NA - Not applicable

* *Figures and additional evaluation of the MTBE Extraction system are provided in the Report on the 2015 and 2016 PMP and PES (AECOM, 2017).*

4. Regulatory Context

The Environmental Management Act (EMA) was brought into force on July 8, 2004. The applicable regulation under the EMA is the Contaminated Sites Regulation (CSR). The CSR came into effect on April 1, 1997 and provides a framework to investigate, assess, and remediate contaminated sites in BC. fourteen amendments to the CSR have been completed since 1997, with the most recent being Stage 14 effective March 1, 2023, Ministerial Order No. M164 also took effect which included amendments to select sections of the CSR.

Federal environmental legislation applicable to Burrard Inlet adjacent to the Site includes the Canada Fisheries Act. A summary of the applicable regulatory context is provided in **Appendix A**.

4.1 Groundwater Site-Specific Screening Levels

Site-Specific Screening Levels (SSSLs) for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of Parkland and AECOM, to evaluate potential risks to Burrard Inlet

resulting from impacted Site groundwater. The SSSLs were based on the CSR Stage 10 Omnibus Amendments in addition to the Updated Screening Levels (USLs) and Risk-Based Management Targets (RBMTs) developed for application along the Foreshore downslope of Area 2 of the Refinery. Upon the release of subsequent CSR amendments, these SSSLs were verified, and no updates were warranted.

The SSSLs are listed in **Table 2** below, and the basis for their development is presented in Appendix A. The SSSLs were first introduced in the Report on the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System, Chevron Burnaby Refinery, Burnaby British Columbia (AECOM 2017).

Table 2 Site-Specific Screening Levels

PHCs	
PCOC	**SSSL (µg/L)**
LEPHw	3000
VPHw	15000
Benzene	21000
Ethylbenzene	3200
Toluene	7700
Xylenes	3300

PAHs	
PCOC	**SSSL (µg/L)**
Acridine	30
Anthracene	40
Benzo(a)pyrene	2.8
Fluoranthene	40
Naphthalene	440
Pyrene	40

Metals	
PCOC	**SSSL (µg/L)**
Cadmium	90
Chromium	500
Cobalt	1100
Copper	62
Lead	1400
Nickel	750
Uranium	1000
Zinc	900

Notes:
PHC – Petroleum Hydrocarbon Concentrations
PAH – Polycyclic Aromatic Hydrocarbons
PCOC – Potential Contaminants of Concern
µg/L – micrograms per litre

In December 2020, ENV provided comments by e-mail that recognized that Parkland had prepared SSSLs as “threshold” concentrations for evaluation but re-enforced that they do not replace the CSR standards unless formally approved by ENV. Parkland is using the SSSLs as an extra layer of assessment to identify areas of greater environmental concern. The SSSLs are being used to target investigation and monitoring activities on the site. They are used in conjunction with the applicable CSR standards.

4.2 Applicable Standards and Screening Levels

The Site is zoned for heavy industrial use. The nearest surface water downgradient of the Site is Burrard Inlet, located approximately 15 m to the north of portions of Area 1, and 40 m north of Area 2. Area 3 borders Burrard Inlet and includes a water lot within the inlet. This results in the application of the CSR standards for the protection of marine aquatic life (AW) based on the assessment of the Site’s hydrogeology and potential pathways using available data from numerous soil and groundwater investigations[2]. In addition to Burrard Inlet, Rainbow Creek is located within close vicinity to MW17-04 resulting in the application of the freshwater (FW) aquatic life standards to groundwater samples collected from this sample location.

The results of the PMP groundwater samples were compared to the CSR AW standards and SSSLs. Exceedances of either the CSR AW or SSSLs indicate the need for further assessment/evaluation or remedial action if warranted.

Under ENV guidance, drinking water (DW) standards are applicable at all sites unless they can be removed using Protocol 21 (ENV 2017), or an exemption is granted by the ENV. Drinking water is not applicable at the Site for the following reasons.

[2] Protocol#21_2017 (gov.bc.ca)

- A drinking water exemption was provided by ENV for Area 2 on May 15, 2017. A copy of the letter is included in **Appendix A**.
- Completed CSR Protocol 21 drinking water flowcharts (Figures 1 and 4 in Protocol 21) for Areas 1 and 3 indicate the drinking water standard is not applicable; therefore, direct approval from ENV is not required. The completed flow charts are included in **Appendix A**.

5. Scope of Work

The 2023 scope of work included:

- Updating and following the Refinery-wide AECOM Health and Safety Plan (HASP).
- Completion of the 2023 PMP in accordance with the work plan submitted to ENV on October 31, 2003, and AECOM's work plan dated February 17, 2023. In general, this work included:
  - Completion of two groundwater monitoring and sampling events per year, one during the wet season (high water table) and the other during the dry season (low water table);
  - Submission of groundwater samples for laboratory chemical analysis of petroleum hydrocarbon (PHC) related parameters (refer to Section 6.1 and Section 7.1), polycyclic aromatic hydrocarbons (PAHs), and dissolved metals; and,
  - Comparison of the analytical results to applicable standards.
- Operating, monitoring, and maintaining the PES in accordance with the PES Operations, Monitoring, and Maintenance Plan (AECOM 2016), which consisted of monitoring pump operation twice a month and quarterly pump performance testing (i.e., drum tests).

The 2023 monitoring programs were completed by Raymund Sampaga, EIT, Alberto Garcia Espinosa, and Han Yan. The report was led by Alberto Garcia Espinosa. Senior review was conducted by Johnny Au, P.Eng. and Lesley Reid, M.Eng., P.Eng., CSAP.

6. Areas 1 And 3 Perimeter Monitoring Results

In 2023, PMP groundwater monitoring and sampling events for Areas 1 and 3 of the Refinery were completed over the following two periods.

- Wet Season – March 6 to April 12, 2023
- Dry Season – August 14 – 29, 2023

The monitoring wells included in the 2023 PMP for Areas 1 and 3 are provided in **Table 3** and their locations are shown in **Figure 2**.

Table 3 Area 1 and 3 Monitoring Wells Included in the 2023 PMP

A3MW02-05	A1-12S	G1-7B
A3MW02-06	A1-12D	G1-8
A3MW02-07	A1-12C	MW17-4
A3MW02-08	G1-1A	NDM97-2
A3MW03-01	G1-1B	NDM97-3[2]
A3MW03-02	G1-1C	U6[3]
A3MW03-03[1]	G1-2A	U7
MW03-04	G1-2B	U07-10S
MW03-07	G1-5	U07-10I
A1-3S[1]	G1-6	U07-10D
A1-3D	G1-7A	

Notes:

1. *Well could not be sampled during the Dry Season Sampling Event due to insufficient groundwater.*
2. *Well could not be sampled during the Wet and Dry Seasons Sampling Event because it was blocked by a CP office trailer.*
3. *Well could not be sampled during the Dry Season Sampling Event as it could not be located after the CPR work carried out in the area.*

The PMP completed in Area 1 and Area 3 includes the monitoring and sampling (when sufficient water is present) of 32 groundwater monitoring wells. Each well is monitored and sampled in accordance with the field program methods (**Appendix B**). An overview of the completed program for each semi-annual event is summarized in **Table 4**.

Table 4 Summary of 2023 PMP Sampling Program for Area 1 and 3

Total number of monitoring wells included in the PMP for Area 1 and 3:	32
Wet Season Event	
- Total number of monitoring wells sampled during the wet event:	31
- Total number of dry monitoring wells monitored during the wet event:	0
- Total number of monitoring wells not sampled due to other reasons:	1
Dry Season Event	
- Total number of monitoring wells sampled during the dry event:	28
- Total number of dry monitoring wells monitored during the dry event:	2
- Total number of monitoring wells that were not sampled due to other reasons:	2

During the 2023 PMP, 2 wells (A3MW03-03 and A1-3S) were not sampled during the dry season event because they were dry. Monitoring well NDM97-3 was not sampled during the wet and dry season events because it was blocked by a CP office trailer. Monitoring well U6 was not sampled during the dry season event as it could not be located after the CPR work carried out in the area. Further attempts were made to locate it using site plans, a survey, and a pin finder, but were unsuccessful in locating monitoring well U6.

A summary of the 2023 monitoring data along with historical monitoring data for the Area 1 and 3 PMP locations are provided in **Table 1-1a – Summary of Water Level Measurements** and **Table 1-1b – Summary of Field Parameters**.

6.1 Groundwater Analytical Results

Groundwater samples collected as part of the 2023 PMP were analyzed for one or more of the following parameters of concern:

- Petroleum hydrocarbons (PHCs) including one or more light and heavy extractable petroleum hydrocarbons in water (LEPHw/HEPHw) and/or extractable petroleum hydrocarbons in water ($EPHw_{C10-C19}$/$EPHw_{C19-C32}$),
- Volatile hydrocarbons in water (VHw_{C6-C10}),
- Volatile petroleum hydrocarbons in water (VPHw),
- Benzene/toluene/ethylbenzene/xylenes (BTEX),
- Methyl tert-butyl ether (MTBE)
- Styrene, and
- Polycyclic aromatic hydrocarbons (PAHs).

The current reported analytical results for groundwater samples from these monitoring wells are presented in **Table 1-2** and **Table 1-3** along with available historical data from the preceding 10-year period. The laboratory Certificates of Analysis for the 2023 PMP data are provided in **Appendix C**. A summary of the quality assurance and quality control (QA/QC) evaluation performed on the data set, which determined that the data could be relied on, is provided in **Appendix D.**

The completed 2023 PMP analytical program for Areas 1 and 3 is summarized in **Table 5**.

Table 5 Area 1 and 3 PMP Analytical Program Summary

	Number of Monitoring Wells Sampled	
Parameter	**Wet Event**	**Dry Event**
LEPHw/HEPHw	14	12
EPHw	17	16
BTEX/VPHw/MTBE/Styrene	31	28
PAHs	14	12

The analytical results of the PMP groundwater samples are compared to the applicable CSR Standards as well as the SSSLs. Reported concentrations above these limits indicate the need for further assessment/evaluation or remedial action. An overview of the reported sample concentrations against the reported detection limits, CSR Standards, and SSSLs, by parameter, is summarized in **Table 6** and **Figure 2**.

Table 6 Overview of Area 1 and 3 Groundwater Results

Parameter	Wet Event				Dry Event			
	Results Below RDL	Detectable Results Below CSR AW	Results Above CSR AW and Below SSSLs	Results Above SSSLs	Results Below RDL	Detectable Results Below CSR AW	Results Above CSR AW and Below SSSLs	Results Above SSSLs
LEPHw	11	1	1	1	9	1	1	1
EPHw (C10-C19)	14	2	0	1	12	3	0	1
PAHs	3	9	1	1	2	7	2	1
BTEX	29	2	0	0	23	5	0	0
VHw (C6-C10)	26	5	0	0	23	5	0	0
VPHw	27	4	0	0	23	5	0	0
Styrene	31	0	0	0	28	0	0	0
MTBE	16	15	0	0	12	16	0	0

Notes:
RDL= Reported Detection Limit
Sample count excludes field duplicates

The overview of the groundwater results in **Table 6** indicates that the reported groundwater sample concentrations at 27 of the 31 sample locations are below the CSR standards with many of them also below the reported detection limit. Reported concentrations for groundwater samples above the CSR AW and SSSLs are summarized, by monitoring well, in **Table 7**.

Table 7 Summary of Area 1 and 3 Samples with Concentrations above the Site Standards

Monitoring Well ID	Parameter Greater Than the CSR AW Standards but Below the SSSLs	Parameters Greater Than the SSSLs and the CSR AW Standards
A3MW03-02	Wet and Dry Season: LEPHw	---
A3MW02-07	Wet and Dry Season: Pyrene	---
U07-10I	Dry Season: Pyrene	---
U07-10S	Wet Season: Acridine, Anthracene, Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, Pyrene Dry Season: Benzo(a)pyrene, Fluoranthene, Pyrene	Wet Season: LEPHw, EPHw (C10-C19), Acenaphthene, Fluorene, Naphthalene, Phenanthrene Dry Season: LEPHw, EPHw (C10-C19), Acenaphthene, Chrysene, Fluorene, Naphthalene, Phenanthrene

Reported concentrations above the applicable CSR standards and the SSSLs were from the samples collected from only one monitoring well (U07-10S) in Area 1 and 3. Additional evaluation for this sample location is summarized below.

- A subset of analytes is plotted with groundwater electrical conductivity in **Graph 1** to illustrate concentration trends for samples collected from U07-10S. The parameters on **Graph 1** include LEPHw, acridine, acenaphthene, and benzo(a)pyrene.
- In this tidal influence area of the refinery, groundwater samples are collected on an ebb tide when groundwater is more likely to be dominant in the wells. The tidal influence will affect both gradient and groundwater elevation which may contribute to variability in sample results at this location. As the groundwater elevation is expected to be variable due to the tidal influence the concentrations are

plotted against electrical conductivity instead. The rationale is that a lower relative conductivity would be indicative of a groundwater dominant sample. Over recent sampling events, the groundwater electrical conductivity at the time of sampling has been relatively consistent and falls within the range of 0.530 mS/cm to 1.040 mS/cm.

- Reported concentrations of petroleum hydrocarbons and PAHs in U07-10S were generally similar to past sampling events and are within the historical ranges reported for samples from this location apart from the August 2020 sampling event where recent peak elevations were noted. The concentration of Acridine was reported with Detection Limit raised due to co-eluting interference in the 2023 dry season event.
- U07-10S is part of a nested installation near the wharf approach in Area 3 of the Refinery. The two other nested monitoring wells in this cluster (U07-10I and U07-10D) are screened at deeper intervals. The concentrations of parameters exceeding CSR AW standards (and SSSL) in samples from U07-10S are below the CSR AW standards in samples collected from U07-10I and U07-10D, except for U07-10I where the Pyrene concentration for the dry season sample was above the CSR AW standard (and below the SSSL). The Pyrene concentration in the sample collected from U07-10I was similar to past sampling events (August 2020 and 2021) within the historical ranges reported for samples from this location.
- Samples collected from monitoring wells (A3MW03-01, A3MW03-03, and A3MW02-05) located adjacent and downgradient to U07-10S contained concentrations below the CSR AW standards providing rough horizontal delineation between U07-10S and waters of Burrard Inlet.

Samples collected from three additional monitoring wells (A3MW03-02, A3MW02-07, and U07-10I) contained concentrations of PHCs and/or PAHs above the CSR AW standards but below the SSSLs. For reference, the Area 3 AS system commissioning (October 2010) and system standby (August 2015) dates have been represented as vertical black lines in the pertinent graphs. An evaluation, by monitoring well, is provided in the bullets below.

- The reported Pyrene concentration in the sample collected from U07-10I during the dry season sampling event was 0.318 µg/L. This concentration is above the CSR AW standard and below the SSSL. The reported Pyrene concentration in the wet season sample was 0.073 µg/L, which is below the CSR AW standard. The pyrene concentration at this location has been oscillating above and below the CSR AW standard during the dry season event in recent years (2020, to 2023) and the detected concentration in August 2023 is within the general ranges detected historically. The sample was noted as clear and had a measured field turbidity of 10.92 NTU which corroborated the visual observation. Reported Pyrene concentrations in the samples collected from U07-10D, and other nearby monitoring well locations (A3MW03-03, A3MW03-02, and A3MW02-05) provide lateral boundaries to these localized exceedances as the reported Pyrene concentrations in these samples were below the applicable CSR standard.
- The time-series graph (**Graph 2**) illustrates acenaphthene, anthracene, fluoranthene, and pyrene concentrations for samples collected from A3MW02-07. In 2023, the reported concentrations of analyzed parameters were below the applicable CSR AW standards in all cases, except for pyrene. Following the cessation of the AS system in 2015, an increasing concentration trend for this parameter was noted in samples collected between 2015 and 2018. Since 2018, reported concentrations of pyrene, fluoranthene, anthracene, and acenaphthene appear to be generally stable to decreasing. The concentration of pyrene is generally above the applicable CSR standard whereas concentrations of anthracene and acenaphthene are generally below the applicable CSR standard. The dry season sampled was noted as clear with measured field turbidity of 3.11 NTU (**Table 1-1b**).
- The time-series graph (**Graph 3**) illustrates pyrene concentrations for samples collected from A3MW02-08. In 2023, the reported pyrene concentrations were below the CSR standards in the samples collected during both season events. The results of both sampling events were within the historical range of concentrations reported for this monitoring well.
- The time-series graph (**Graph 4**) illustrates LEPHw and pyrene concentrations for samples collected from A3MW03-02. The reported LEPHw sample concentrations are generally stable and above the

CSR AW standards while staying below the SSSLs. Concentrations are within the historical range for this monitoring well. The dry season sample was noted as clear with a measured field turbidity of 27.8 NTU.

Based on the above evaluation, the increasing concentration trends of evaluated PAH parameters in A3MW02-07 from 2015 to 2018 may be attributed to a rebound following the cessation of the Area 3 AS system. Between 2019 to 2023 PAH sample concentrations appear to be generally stabilizing at this location with select parameters reported at concentrations above the applicable CSR standards (i.e., pyrene) or oscillation near (and in some instances above) the applicable CSR standards.

The historical influence of the Area 3 AS system is less evident in the trend evaluation for U07-10S and A3MW03-02. Based on trend graphs the reported concentrations in samples from these locations are generally stable and do not indicate a change in site condition. Vertical delineation is maintained by U07-10D.

6.2 Area 1 and 3 PMP Summary

The semi-annual PMP was completed in Areas 1 and 3 of the Refinery. There was one sample location (U07-10S) with reported concentrations above the SSSLs and CSR AW standards. Concentrations in this well will continue to be monitored in 2024.

Concentrations of select parameters above the applicable CSR AW standards but below the SSSLs were reported for samples collected from three monitoring wells (A3MW03-02, A3MW02-07, and U07-10I). All these monitoring well locations are within the footprint of the Air Sparge System remedial footprint.

Based on a comparison of analytical results collected during the 2023 PMP to recent historical data, the Site perimeter groundwater quality conditions are generally similar to historical concentrations. In a few other instances the persistent concentrations near and above the applicable CSR Standards, particularly of PAH parameters (i.e., pyrene) may be cause for additional evaluation.

The measurement of field turbidity, since the 2022 dry season event, at the time of sampling, will add a quantitative measurement to the field program. Once an adequate dataset is available a correlation will be prepared to evaluate whether sample turbidity is a contributing factor in samples where CSR exceedances are being reported. It is recommended that the Air Sparge System remain off while sufficient sample turbidity data is being collected.

7. Area 2 Perimeter Monitoring Results

In 2023, the groundwater monitoring and sampling events for Area 2 of the Refinery were completed over the following periods:

- Wet Season Event – March 6 to April 12, 2023
- Dry Season Event – August 14 to August 29, 2023

The monitoring wells included in the 2023 PMP for Area 2 are included in **Table 8** and their locations are shown in **Figure 3** and **Figure 4**.

Table 8 Area 2 Monitoring Wells Included in the 2023 PMP

G2-3B	PW03-1B[2]	U9[2]	A2MW09-05I	A2MW09-15[2]	MW5
G2-3C	PW03-2A[2]	WS2-D	A2MW09-06I	MW11-3S	U4-1
G2-9A	PW03-2B[2]	WS2-D2	A2MW09-06S[2]	MW11-3I	U4-3
G2-9B	PW03-3[2]	MW02-02[2]	A2MW09-10[2]	MW11-3D	
G2-10	PW03-4[2]	MW02-03[2]	A2MW09-11[2]	MW11-4S	
G2-11A	PW03-5[2]	MW02-04[2]	A2MW09-12[2]	MW11-4I	
G2-11B	PW03-6[2]	MW03-02[2]	A2MW09-13[2]	MW11-4D	
PW03-1A[2]	U8[2]	MW03-03[1,2]	A2MW09-14[2]	MW3	

Notes:

1. *Well could not be sampled during the Wet Season Sampling Event due to insufficient groundwater.*
2. *Well could not be sampled during the Dry Season Sampling Event due to insufficient groundwater.*

CCL historically operated a permitted landfarming facility in Area 2 west of the main refining process area. The landfarm was operated under a permit (PR-7112) and included a dedicated environmental monitoring program completed on a quarterly interval. The landfarm operation was suspended and the facility was decommissioned circa 2008 but the monitoring program continued for regulatory compliance purposes. When Parkland purchased the refinery in 2017, they assumed the monitoring obligation. On March 8, 2021, ENV accepted Parkland's request to cancel the permit, which included the on-going environmental monitoring obligation. However, to maintain the spirit of the PMP as outlined in the Chevron Refinery Well Monitoring Program letter dated October 31, 2003, four of the monitoring wells (MW3, MW5, U4-1, and U4-3) located along the northern fence line of Area 2 that were formerly monitored as part of PR-7112, were integrated into the PMP and monitored on a semi-annual basis throughout 2023.

The Area 2 PMP includes the monitoring and sampling (when sufficient water is present) of 43 groundwater monitoring wells. Each well is monitored and sampled in accordance with the field program methods for this program (**Appendix B**). An overview of the completed program for each semi-annual event is summarized in **Table 9**.

Table 9 Summary of 2023 PMP Sampling Program for Area 2

Total number of monitoring wells included in the PMP for Area 2:	43
Wet Season Event	
- Total number of monitoring wells sampled during the wet event:	42
- Total number of dry monitoring wells monitored during the wet event:	1
- Total number of monitoring wells not sampled due to other reasons:	0
Dry Season Event	
- Total number of monitoring wells sampled during the dry event:	21
- Total number of dry monitoring wells monitored during the dry event:	22
- Total number of monitoring wells that were not sampled due to other reasons:	0

All wells not sampled during the 2023 PMP program in Area 2 during both dry and wet sampling events were due to insufficient water present in the well casing. MW03-03 was dry since it is located downgradient and within the influence of the PES.

A summary of the 2023 monitoring data along with the historical monitoring data over the last 10 years for the Area 2 PMP locations are provided in **Table 2-1a – Summary of Water Level Measurements** and **Table 2-1b – Summary of Field Parameters**.

7.1 Groundwater Analytical Results

Groundwater samples collected as part of the 2023 PMP were analyzed for one or more of the following parameters of concern:

- Petroleum hydrocarbons (PHCs) including one or more light and heavy extractable petroleum hydrocarbons in water (LEPHw/HEPHw) and extractable petroleum hydrocarbons in water ($EPHw_{C10-C19}$/$EPHw_{C19-C32}$),
- Volatile hydrocarbons in water (VHw_{C6-C10}),
- Volatile petroleum hydrocarbons in water (VPHw),
- Benzene/toluene/ethylbenzene/xylenes (BTEX),
- Styrene,
- Methyl tert-butyl ether (MTBE),
- Polycyclic aromatic hydrocarbons (PAHs), and
- Dissolved metals (MW11-3S, MW11-4S, MW11-4I, MW3, MW5, U4-1, and U4-3).

The current and historical reported analytical results for groundwater samples from these monitoring wells are presented in **Table 2-2** through **Table 2-4**. For reference, the 2023 laboratory Certificates of Analysis for the 2023 PMP data are provided in **Appendix C**. A summary of the QA/QC evaluation performed on the data set, which determined that the data could be relied on, is provided in **Appendix D.**

The completed 2023 PMP analytical program for Area 2 is summarized in **Table 10**.

Table 10 Area 2 PMP Analytical Program Summary

	Number of Monitoring Wells Sampled	
Parameter	**Wet Event**	**Dry Event**
LEPHw/HEPHw	42	21
BTEX/VPHw/MTBE/Styrene	42	21
PAHs	42	21
Dissolved Metals	7	7

The analytical results of the PMP groundwater samples are compared to the applicable CSR Standards as well as the SSSLs. Reported concentrations above these limits indicate the need for further assessment/evaluation or remedial action. An overview of the reported sample concentrations against the reported detection limits, CSR Standards, and SSSLs, by parameter, is summarized in **Table 11** and **Figure 3**.

Table 11 Overview of Area 2 Groundwater Results

Parameter	Wet Event				Dry Event			
	Results Below RDL	Detectable Results Below CSR AW	Results Above CSR AW and Below SSSLs	Results Above SSSLs	Results Below RDL	Detectable Results Below CSR AW	Results Above CSR AW and Below SSSLs	Results Above SSSLs
LEPHw	38	2	2	0	20	1	0	0
EPHw (C10-C19)	38	4	0	0	20	1	0	0
PAHs	25	14	3	0	2	19	0	0
BTEX	38	3	0	1	11	10	0	0
VHw (C6-C10)	39	3	0	0	19	2	0	0
VPHw	39	2	1	0	19	2	0	0
Styrene	42	0	0	0	21	0	0	0
MTBE	33	9	0	0	12	9	0	0
Dissolved Metals	0	6	1	0	0	6	1	0

Notes:
RDL= Reported Detection Limit

The overview of the groundwater results in **Table 11** indicates that the reported groundwater sample concentrations at 38 of the 42 sample locations are below the CSR standards with many of them also below the reported detection limit. Reported concentrations for groundwater samples above the CSR AW and SSSLs are summarized, by monitoring well, in **Table 12**.

Table 12 Summary of Area 2 Samples with Concentrations above the Site Standards

Monitoring Well ID	Parameter Greater Than the CSR AW Standards but Below the SSSLs	Parameters Greater Than the SSSLs and the CSR AW Standards
A2MW09-10	Wet Season: LEPHw, Naphthalene	---
A2MW09-11	Wet Season: LEPHw, VPHw, Naphthalene	Wet Season: Xylenes
G2-3B	Wet Season: Pyrene	---
MW11-4S	Wet and Dry Season: Copper	---

Reported concentrations above the applicable CSR standards and the SSSLs were from the sample collected from one monitoring well (A2MW09-11) in Area 2. Additional evaluation for this sample location is summarized below.

Concentrations of select parameters above the applicable CSR AW standards but below the SSSLs were reported for samples collected from three monitoring wells (A2MW09-10, G2-3B, and MW11-4S). Of the four monitoring wells, two monitoring wells (A2MW09-10, and A2MW09-11) are located down-gradient of the PES. The other two locations (G2-3B and MW11-4S) are outside of the capture of the PES. Additional evaluation for 4 these locations and A2MW09-05I is provided below.

- The reported concentrations for LEPHw and Naphthalene at A2MW09-10 were greater than the CSR AW standard and below the SSSLs. The reported concentrations were within historical concentrations for these parameters and generally similar to recent samples collected from this location. A sample was not collected during the 2023 dry season due to insufficient water. A trend

graph has not been prepared for this report due to gaps in the sample period for this well from insufficient water.

- The time-series graph (**Graph 5**) illustrates LEPHw concentrations for samples collected from A2MW09-05I. In 2023, the reported LEPHw concentrations were below the CSR standards in the samples collected during both season events. The results of both sampling events were within the historical range of concentrations reported for this monitoring well.
- The time-series graph (**Graph 6**) illustrates LEPHw, VPHw, xylenes, and naphthalene concentrations for samples collected from A2MW09-11 as well as groundwater and historical LNAPL elevations. LNAPL was consistently detected in this well until 2012 when the PES was commissioned. LNAPL was then detected sporadically until May 2015. The reported concentrations of LEPHw, VPHw, xylene, and Naphthalene in samples at this well appear to be increasing slightly. The reported concentration of xylenes in this well during the 2023 wet season was greater than the CSR AW standard and the SSSLs and the reported concentration of naphthalene in this well during the same wet season was greater than the CSR AW standard. However, similar concentrations above the CSR AW standard and/or SSSLs have been observed in this well since before 2021. A2MW09-11 was not sampled during the dry season sampling event due to insufficient water in the well. This well is located down-gradient of the central section of the PES in the vicinity of UEIB-46.
- The time-series graph (**Graph 7**) illustrates pyrene concentrations for samples collected from G2-3B. In 2023, G2-3B was sampled during both the wet and dry PMP events. In the wet event, the reported concentration of pyrene was 0.302 µg/L which exceeds the applicable CSR standard of 0.2 µg/L. During the 2023 dry event, the reported concentrations of pyrene was 0.181 µg/L which is below the CSR standard. Both the wet and dry events in 2023 concentrations remain two orders of magnitude below the SSSL. The reported pyrene concentration in the sample collected in April 2023 was generally consistent, when compared to concentrations reported for this location in recent years but still lower than the concentration reported in August 2022 which was the historical maximum. All other reported parameters were below the CSR AW standards. G2-3B is located west of the PES and outside of its capture.
- The time-series graph (**Graph 8**) illustrates dissolved copper concentrations for samples collected from MW11-4S. In 2023, MW11-4S was sampled during both wet and dry events with a concentration of dissolved copper above the CSR AW standards reported in both events. All other reported concentrations of dissolved metals were below the CSR AW standards. The reported concentrations of dissolved copper were 21.5 µg/L and 21.2 µg/L for the samples collected in March and August 2023, respectively; This exceeds the CSR AW standard of 20.0 µg/L. Both results are within the historical ranges observed from this well. MW11-4S is in the Flare Zone east of the PES.

7.2 Area 2 PMP Summary

The semi-annual PMP was completed in Area 2 of the Refinery. There was one sample location (A2MW09-11) with reported concentrations above the SSSLs and CSR AW standards. Concentrations in this well will continue to be monitored in 2024.

Concentrations of select parameters above the applicable CSR AW standards but below the SSSLs were reported for samples collected from four monitoring wells (A2MW09-10, G2-3B, and MW11-4S). In the last few years, the reported concentrations for dissolved copper in samples collected from MW11-4S, located outside of the PES capture, have remained just above the CSR standard. For G2-3B, also located outside of the PES capture, the reported concentrations for pyrene have historically fluctuated above and below the CSR standard.

Based on a comparison of analytical results collected during the 2023 PMP to recent historical data, the Site perimeter groundwater quality conditions are generally similar to historical concentrations. The results of the 2023 PMP for Area 2 do not indicate an immediate need for additional investigation or remediation other than:

- Continued operation of the PES

- Continued monitoring of A2MW09-10, A2MW09-11, MW11-4S and G2-3B for ongoing trend development.
- Continued measurement of field turbidity to improve the evaluation of groundwater trends and understand whether bias may be a result of sample turbidity.

The Area 2 PMP will therefore continue in 2024 with a similar scope of work as completed in 2023.

8. PES Operations and Performance

8.1 Overview

The Perimeter Extraction System (PES) is a line of closely spaced extraction wells along the Area 2 northern fence line of the Refinery. The pumps located in PES wells extract total fluids with the intent to depress the groundwater table and preclude the off-site migration of LNAPL and dissolved phase PHCs in groundwater that originate from the LNAPL in Area 2. The total fluids are collected by a network of top-loading pneumatic pumps to ensure that LNAPL is preferentially collected and removed from each extraction well. The PES and inferred footprint of LNAPL in Area 2 based on a detectable LNAPL thickness in monitoring wells are shown in **Figure 5**.

The PES consists of pneumatic pumps each equipped with an internal float which provides on-demand extraction of total fluids from the well. Compressed air is supplied to the PES pumps by a dedicated air compressor equipped with a dryer unit. The discharge of each pump is connected to a common discharge header by flexible nylon tubing. Each pump cycle is recorded by a cycle counter affixed to the pump's dedicated air supply. The discharge header drains to a centralized oil water separator (OWS) and eventually to the Refinery process water treatment system. To control biofoul accumulation, the PES includes a chemical dosing system that delivers a sequestering agent to each pump intake through pressure compensating drippers. A list of major PES components is provided in **Appendix E**.

8.2 Summary of Operation and Monitoring Data

In 2023, the system was operated in accordance with the PES Operation Maintenance and Monitoring (OM&M) Plan (AECOM, 2016). This included the completion of:

- Semi-monthly system monitoring
- Quarterly performance assessments
- Quarterly groundwater monitoring
- Quarterly effluent characterization
- Pump replacement and performance troubleshooting (in place of the semi-annual maintenance event)
- Coordination of the preventative maintenance program

In addition to the requirements of the OM&M Plan, an effluent sample was collected from each of the active PES wells in April 2023 and September 2023 and monthly effluent samples were collected from the oil-water separator (OWS). The OWS effluent samples characterize the blended flows from all active PES wells after LNAPL is removed. A summary of the observations and activities is provided in the following sections.

8.2.1 Semi-Monthly Extraction Pump Monitoring

Semi-monthly monitoring was completed throughout 2023.

On a semi-monthly basis, the depth to pump intake and the depth to water were monitored at each active extraction well to monitor drawdown in the well as the key indicator of PES performance and reliability. Since 2018, a water column greater than one meter above any pump intake was the trigger for troubleshooting and/or replacement, before 2018 the trigger was 3 m. A water column of less than 3 m remains as the performance target for the PES. The response trigger was adjusted in 2018 to improve field response to underperforming pumps to therefore improve the PES performance.

If the pump does not function following troubleshooting it is removed and replaced with a working pump from the spare pump inventory. If the pump functions following troubleshooting but subsequent monitoring demonstrated poor reliability, the pump was also replaced with a functioning spare pump. As an indicator of PES reliability, the average water column above a pump's intake was evaluated over each quarter and on an annual basis in **Table 13** below.

Table 13 Summary of Average Water Column Above Active Extraction Pumps

Average Water Column Above Pump Intake	Number of Extraction Wells*				
	January -March	April - June	July-September	October - December	January - December (Annual Average)
	(Q1)	(Q2)	(Q3)	(Q4)	
>3m	6	3	2	5	3
<3m to >1m	2	2	2	4	4
<1m	32	35	36	31	33

Notes:

** Indicates the number of PES extraction wells with the average water column height calculated over the period indicated.*

Despite instances throughout each quarter where an average water column of greater than three meters was observed due to reduced pump performance, the pump replacement approach was effective at maintaining the average annual water column less than 3m above the pump at 37 of the 40 extraction wells throughout 2023.

The three extraction wells where the average annual water column was greater than 3 meters above the pump intake were UEIB-21, UEIB-55, and UEIB-56. The three locations are within the eastern section of the PES. None of these locations are within the portion of the PES that intersects with the known LNAPL footprint in Area 2. Additional information is provided for each of these wells, below.

UEIB-21

- A water column of >3m was measured during ten of the twenty-four monitoring events in 2023. This resulted in the annual average water column being >3m.
- Continual troubleshooting during this period identified an accumulation of fouling in the check valve and pump that was contributing to poor drawdown at this location. Cleaning the check valve and replacing the pump in May and November improved pump reliability.

UEIB-55

- This pump is stuck in the well and has not been removed for maintenance since October 2019.
- The well is the eastern-most extraction location and a replacement for the original well (UEIB-31) which was decommissioned after a pump was stuck in this well.
- The adjacent well (UEIB-30) had an average water column of <1m above the pump intake. UEIB-29 had an average water column >1m above the pump intake but is still below the <3m water column target for the eastern section and is therefore acceptable.

	• Parkland intends to remove this well from the PES as part of future operation monitoring and maintenance plan updates.
UEIB-56	• This pump has been stuck in the well and has not been removed for maintenance since January 2021. • This well is a replacement for the original well (UEIB-20) which was decommissioned after a pump was stuck in this well. • A water column of >3m was measured 24 times in 2023. This resulted in the average water column >3m.

The reliability of the entire PES is further evaluated by a review of the four locations with an average annual water column between 1-3 m above the pump intake. These locations include UEIB-16, UEIB-26, UEIB-29, and UEIB-34. Of these four locations, three are in the eastern section and one is in the western section. An average annual water column of less than 1m was maintained across the central section of the PES where it intersects the known LNAPL footprint.

An annual average water column of less than 1m above the pump intake was observed at 33 of the 40 PES wells. Underperforming pumps located in PES extraction wells that intersect the LNAPL footprint are generally replaced immediately with a refurbished spare pump when underperforming. This response resulted in a reliable drawdown maintained between UEIB-44 and UEIB-47 throughout 2023. Underperforming pumps located in extraction wells outside of the LNAPL plume are candidates for field troubleshooting/repair if the AECOM field technician can identify a likely cause for the reduced pump performance. This may result in raised water columns while pump reliability is being assessed.

Based on troubleshooting activities, reduced reliability is generally attributed to a combination of factors including insufficient compressed air supply, biofouling, and pump wear and tear. Ongoing troubleshooting efforts and maintenance activities are summarized in **Section 8.3**.

8.2.2 Quarterly Monitoring

Groundwater levels in monitoring wells near active PES wells were monitored quarterly throughout 2023. The water level measurements along with semi-monthly extraction well data were used to evaluate the influence of the hydraulic barrier along the northern perimeter of the Refinery. The quarterly monitoring events were completed in February, May, August, and November 2023. Extraction pump data is also measured during quarterly events to monitor individual PES pump extraction rates. At this time effluent collected at each active PES well is qualitatively evaluated for the presence of hydrocarbons (i.e., sheen, globules). See **Section 8.2.3** for additional details on effluent extraction rates.

The quarterly monitoring data and extraction pump data measured along the upper bench are illustrated in **Figure 6** through **Figure 9**.

The following bullets summarize key groundwater level observations and include a relevant comparison to PES operational performance or modifications.

- In 2023, groundwater elevations along the Upper and Lower Benches remained generally below the 2012 baseline elevations across the entire PES. This provides one line of evidence that the limited periods of individual pump underperformance summarized in **Table 13** are not anticipated to have a widespread effect on the PES performance.
- It is typical during wet periods of the year (e.g., first and fourth quarters) to see a perched water table in the overlying alluvium/colluvium while underlying wells screened in the till are more stable throughout the year. In both quarters, the contouring and particle path analyses based on the well network screening in the till layer indicate hydraulic capture is generally maintained across the PES.

8.2.3 Total Fluid and Effluent Extraction Rates

The PES collected an estimated 32,796 cubic meters (m^3) of total fluid in 2023.

As described previously, extraction rates and volume of effluent extracted at each active PES well are determined during each quarterly event. This is completed by monitoring the volume of effluent collected in a drum of known volume for each PES well. Semi-annual effluent characterization was performed to evaluate the total fluid extracted by the PES as well as the total volume of LNAPL collected. The estimated extraction rates are summarized in **Table 2-5**. The method used to estimate total fluid and calculate effluent extraction rates is provided in **Appendix E**.

In addition to verifying the volume, the surface of the water in each drum is visually inspected for the presence of LNAPL or sheen. In 2023, measurable levels of LNAPL were not observed in the drums during these tests.

To support LNAPL collection estimation, it was assumed that the presence of sheen or globules in a drum test represents 0.01% LNAPL, by volume, of total fluids collected by that pump over the quarter (AECOM 2016). Note that before November 22, 2012, this observation was estimated to represent 0.1% NAPL. A summary of the total fluids and LNAPL removed by the PES, by year using this approach, is listed in **Table 14**.

Table 14 Summary of Total Fluids and LNAPL Removed by the PES

Year	Total Fluids Collected	Estimated LNAPL Collected
2023	32,796 m^3	~ 227L*
2022	31,600 m^3	~ 277L*
2021	36,318 m^3	~ 237L*
2020	32,269 m^3	~ 211L*
2019	40,544 m^3	~ 167L*
2018	32,402 m^3	~ 190 L*
2017	38,642 m^3	~ 210 L*
2016[1]	33,369 m^3	~ 200 L*
2015[1]	43,218 m^3	~ 240 L*
2014[1]	54,213 m^3	~ 500 L*
2013[1]	48,491 m^3	~ 300 L*
2012[1]	40,159m^3	~ 500 L*

Notes:

1 - Historically reported volumes have been corrected in this report to include only the total fluids collected by the PES. Previous totals also include total fluids collected by pumps located in EX-1 to EX-4 and U2-4.

** - NAPL Extracted = 0.01% x the total volume of water collected from an extraction well during a quarter where NAPL or sheen was observed during the drum test for that extraction well (AECOM 2016).*

Estimated flow rates and LNAPL collection rates for all active extraction wells since 2014 are provided in **Table 2-5** at the back of the report.

8.3 Maintenance

Pump maintenance was reduced from a semi-annual to an annual maintenance program in 2018. In place of the spring preventative maintenance program, a standard operating procedure (SOP) for pump removal was developed and a spare pump inventory was maintained. The SOP permitted the removal of the pumps by AECOM field representatives rather than coordinating with a pump maintenance sub-contractor. This reduced the period of underperforming pumps remaining in service, thereby improving PES effectiveness while reducing maintenance labour costs. Once removed, the pumps were sent off-site for refurbishment and returned to the Refinery to replenish the spare pump inventory. Pump refurbishment typically includes the inspection and cleaning of the pneumatic pump and the replacement of worn parts as needed to maintain reliable pump operation.

In addition to pump maintenance, the extraction wells are redeveloped, and the header line is flushed on an annual and semi-annual schedule respectively. The extraction wells are flushed by introducing clean water from a nearby hydrant into the top of the well casing while simultaneously removing water from the bottom of the well to collect sediment and sludge that may accumulate in the well and sand annulus. This is completed to maintain good hydraulic communication between the extraction well and the surrounding subsurface. The header line is flushed with potable water and drained to the Refinery's water treatment system.

A summary of the major maintenance and notable troubleshooting activities performed in 2023 is provided in the bulleted list below.

- A total of eighteen pumps were removed during 2023 and replaced with refurbished spare pumps apart from the annual maintenance program completed in October 2023.
- On April 2023, AECOM returned the chemical dosing system to operation, after being dormant through the winter. This system was not designed to operate through the winter months as cooler temperatures already limit the development of biofouling through the system.
- In July 2023 and October 2023, AECOM completed the semi-annual flush of the PES header line.
- Annual well redevelopment of the PES extraction wells was completed in September of 2023. This is performed to maintain the hydraulic connection between the well screen and the surrounding stratigraphy.
- In October 2023, the annual pump maintenance program was performed on all pumps except those located in extraction wells UEIB-17, UEIB-28, UEIB-43, UEIB-55, and UEIB-56. These pumps could not be removed for maintenance. Pumps located in extraction wells UEIB-55 and UEIB-56 have been stuck in their wells since October 2019 and January 2021 respectively despite numerous attempts to remove them. Likewise, pumps located in extraction wells UEIB-17, UEIB-28, and UEIB-43 have been stuck in their wells since October 2023, July 2023 and August 2023, respectively; these pumps are still in operation and further attempts will be made to address the stuck pumps. Four of the wells with stuck pumps are located in the eastern section of the PES in areas where LNAPL has not been observed, and UEIB-43 is located in the western section of the PES. To proactively identify stuck pumps when their removal may still be possible, each extraction pump is slightly raised and lowered monthly to confirm they can be removed from the well if required. Further efforts will be made to address these pumps to bring them into full operation in the future.
- In 2023, three cycle counters were replaced.

8.4 Performance Assessment

The performance of the PES is evaluated using the data collected from the semi-monthly system monitoring events, quarterly groundwater monitoring programs, effluent characterization activities, and system maintenance. Part of the performance evaluation includes the preparation of groundwater contour drawings and particle flow paths. These contours are developed using Surfer 13 by Golden Software. The groundwater data and contour maps are then reviewed to assess the performance of the PES in conjunction with the PES pump operating data. The groundwater contour drawings are provided in **Figure 10** through **Figure 13**.

The following notes justify the contours, data selection, and flow path interpretation:

- Information resolution is based on the available monitoring points. In some areas, there is a denser well network than others. Overall, the monitoring well locations are generally sufficient to interpret flow and capture.
- A steady-state constant head boundary of 28.8 m (Parkland Datum) has been added to the contour to represent Burrard Inlet. As Burrard Inlet is tidally influenced the steady-state elevation represents a mid-tide constant head boundary within the intertidal shoreline. (*Note Parkland Datum = Geodetic Datum + 27.895m*).

- Monitoring wells that are suspected to be seasonally dry (less than 0.1m water column) have been removed from the contour.
- In areas with a dense well network, preference is given to monitoring wells screened in the till layer during the winter months. The monitoring wells screened in the till layer will be less susceptible to the presence of a seasonal perched water table than the overlying material. The till represents the stratigraphic layer where LNAPL has been historically encountered. As a result, there are groundwater elevations shown in **Figure 10** through **Figure 13** that were measured as part of the monitoring program, but not included in the development of the groundwater contours because they are screened in a different stratigraphic layer.
- The groundwater flow paths are initiated from approximately 35 m upgradient of the PES and generally orthogonal to the groundwater potentiometric contours. In some instances, the flow paths were smoothed based on the interpretation of an AECOM engineer/hydrogeologist.
- Using a combination of contouring, particle flow path analysis, and the review of drawdown in both extraction wells and nearby monitoring wells, the PES performance is summarized quarterly, below.

First Quarter (Q1) February 15, 2023 **Figures 6 and 10**	Contouring and particle path analysis demonstrated that hydraulic control was generally maintained from the upgradient area of the refinery. During this quarter, target drawdown (water column of <3m above pump intake) was not achieved at six extraction well locations (UEIB-15, UEIB-16, UEIB- 21, UEIB-29, UEIB-55, and UEIB-56). Groundwater extraction from the remaining system and adjacent monitoring wells appears to have generally maintained capture based on the particle path evaluation and drawdown observed in nearby monitoring wells. Groundwater extraction from the remaining system and adjacent monitoring wells generally appears to have maintained good capture based on the particle path evaluation and drawdown observed in nearby monitoring wells.
Second Quarter (Q2) June 6, 2023 **Figures 7 and 11**	Contouring and particle path analysis demonstrated that hydraulic control was maintained. During this quarter, target drawdown was not achieved at three extraction well locations (UEIB-21, UEIB-55, and UEIB-56). Groundwater extraction from the remaining system and adjacent monitoring wells appears to have maintained good capture based on the particle path evaluation and drawdown observed in nearby monitoring wells.
Third Quarter (Q3) August 9, 2023 **Figures 8 and 12**	Contouring and particle path analysis demonstrated hydraulic control was maintained. During this quarter, target drawdown was not achieved at two extraction well locations (UEIB-55, and UEIB-56). Groundwater extraction from the remaining system and adjacent monitoring wells appears to have maintained good capture based on the particle path evaluation and drawdown observed in nearby monitoring wells.
Fourth Quarter (Q4) November 15, 2023 **Figures 9 and 13**	Although contouring and particle path analyses generally demonstrated hydraulic control was maintained across the length of the PES, the PES experienced high levels of underperforming extraction pumps. During this quarter, target drawdown was not achieved at five extraction wells (UEIB-21, UEIB-26, UEIB-29, UEIB-55, and UEIB-56) with all 5 wells located in the eastern section of the PES. The contouring and groundwater elevation near the section between UEIB-19 to UEIB-21 is one area where the effect on target drawdown is sub-optimal. Up gradient particle

flow lines still suggest containment is likely, but some uncertainty should be noted.

Despite the documented instances where drawdown was not maintained at a single extraction well, the preparation and review of the quarterly figures suggest that the PES precluded any off-site migration of LNAPL from the refinery as a result of prioritizing the section of the PES which intersects the known LNAPL footprint. This was achieved by:

- Flagged underperforming pumps and extraction wells during routine system monitoring. These pumps are removed for inspection and replaced to minimize the duration of reduced drawdown. Areas of the PES which intersect the LNAPL footprint are given a higher priority.
- The response to these high-priority areas is evident as the average water column above the extraction wells between UEIB-44 and UEIB-47 (refer to **Figure 5**) was less than 1m.

Throughout 2023, there was a disruption which affected individual extraction wells, and stuck pumps that are unable to be removed for maintenance (UEIB-55 and UEIB-56). Since 2021, Parkland integrated the PES preventative maintenance program into the refinery-wide maintenance program to automate routine maintenance events and improve reliable performance. As maintenance items are identified, such as the fouling in the check valves, the preventative maintenance program is updated with a task and maintenance interval to improve PES reliability going forward.

Based on the annual and quarterly performance assessments conducted throughout 2023, the PES continued to operate generally as designed with very reliable drawdown maintained throughout the portion of the PES where it intersects the LNAPL footprint. Where disruptions affected reliable operation, improvements to the preventative maintenance program were made to prevent reoccurrence. This includes check valve maintenance, an extraction pump replacement program, and an established compressor maintenance schedule.

8.5 Capture Assessment

The capture zone assessment is based on:

- data collected during the quarterly monitoring programs in 2023;
- groundwater contouring/flow paths presented in **Figure 10** through **Figure 13**; and
- groundwater sampling and analysis down-gradient of the PES from other Refinery monitoring programs.

Hydraulic conductivities for the PES area range from 5×10^{-6} meters per second (m/s) to 1×10^{-10} m/s (URS 2013a). Based on this information, the estimated time required for groundwater to travel from the PES to the Parkland property boundary under non-pumping conditions was six months (URS 2013b).

Groundwater quality downgradient of the PES provides secondary information on the PES's long-term effectiveness. However, the presence of residual contamination downgradient of the PES and other industrial activities (e.g., active railway) prevents a direct correlation of the PES performance with downgradient water quality. For example, an anomalous spike of a PHC-related parameter observed in a groundwater sample collected from a well within the influence of the PES could be unrelated to the performance of the PES. Instead, such a spike could be attributed to the mobilization of residual PHC contamination resulting from the fluctuating groundwater level, infiltration of precipitation, or the presence of contaminated sediment in a sample.

Although there is uncertainty inherent in the following evaluation for the reasons previously stated, the following water quality discussion provides a secondary line of evidence on PES performance in 2023.

Western PES Section

The PMP groundwater elevations measured in wells downgradient of the western section of the PES generally indicated that hydraulic control was maintained across this section throughout 2023. Available

laboratory analytical results indicated no CSR exceedances in groundwater samples collected from downgradient wells for the parameters analyzed.

Down gradient wells, PW03-1A, PW03-1B, PW03-2A, PW03-2B, PW03-3, PW03-4, PW03-5, PW03-06, and A2MW09-06S remained under the drawdown influence of the PES as indicated by limited water for sampling purposes, particularly during the dry season sampling event. During the wet season sampling event, multiple visits were required in some instances before sufficient water was present for sampling. When samples were collected, no samples below the western section of the PES exceeded the CSR AW standards in 2023.

UEIB-34 was an active PES well with an annual average water column greater than 1m in the western section of the PES. Despite having an average annual water column greater than 1m, the reported concentrations in the sample collected from the closest down-gradient well (PW03-3) were below the applicable CSR standards.

Central PES Section

A2MW09-05I was the only PMP well sampled during the dry season. The lack of water for sampling purposes downgradient of the central section of the PES during the dry season sampling event suggests that hydraulic control was maintained across this section throughout 2023.

A2MW09-10 and A2MW09-11 were the only PMP monitoring wells, below the central section of the PES, that had concentrations of hydrocarbon parameters greater than the CSR AW in 2023. These two wells were situated within (or in proximity to) the historical LNAPL footprint as indicated by the past LNAPL detected in A2MW09-11 (**Graph 6**). The extraction wells UEIB-46 and UEIB-54 are located upgradient of A2MW09-11 and A2MW09-10 respectively and operated efficiently throughout 2023.

Samples from these two wells contain elevated concentrations of one or more of the following parameters: LEPHw, VPHw, xylenes, and naphthalene. Reported sample concentrations are generally similar to historical values observed.

Eastern PES Section

Historically, biofouling has been more prevalent in the eastern section of the PES. The accumulation of biofouling on the internal pump controls results in reduced pump performance and reliability in the eastern section of the PES when compared to the other sections. This continues to be the trend as six of the seven wells that had an average annual water column greater than 1m are located in the eastern section of the PES. Despite the instances of below target drawdown, the reported concentrations of hydrocarbon parameters in samples down-gradient of the eastern section were below the CSR standards.

During the wet season event, five of the seven wells down-gradient of the eastern PES section (MW02-02, MW02-03, A2MW09-13, A2MW09-14, and A2MW09-15) had sufficient water for samples to be collected. For the dry season event, all the down- gradient wells had insufficient water. Due to insufficient water during both events, no sample was collected from down-gradient well MW03-03 in 2023. The continued presence of dry wells down-gradient of the PES across this section are attributed to the maintained PES reliability and sustained drawdown across this section in 2023 despite many of the underperforming wells located in this area.

8.6 Summary

Based on groundwater monitoring data and system operational data, the PES continued to intercept and prevent the off-site migration of LNAPL and dissolved phase hydrocarbons despite the instances where target drawdown was not sustained at individual wells for portions of 2023. Pump replacement will be prioritized in these areas.

9. Air Sparge and MTBE Systems

A brief status of other remedial systems at the Refinery is summarized in the following subsections.

9.1 Area 3 Air Sparge System

In October 2015, the AS system was turned off to assess the need for further remediation in the area. Based on the assessment provided in the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System Report (AECOM, 2017), the AS system remained on permanent standby throughout 2023 to facilitate ongoing monitoring of Area 3 without the influence of the AS system.

The Area 3 AS system will remain off but on standby through 2024 to allow continued monitoring of groundwater trends without the influence of the AS system. The location of the Area 3 AS is shown in **Figure 2**.

9.2 Area 2 Air Sparge System

Due to the up-gradient influence of the PES system, the Area 2 AS system is no longer required and will be decommissioned. The location of the Area 2 AS is shown in **Figure 3**.

9.3 Area 2 MTBE Remediation Area

The remediation of MTBE in Area 2 north of the Remote Impoundment Basin is considered complete (AECOM, 2017). In 2017, sampling activities in the vicinity of this dormant system were reduced to five groundwater monitoring wells (G2-9A, G2-9B, G2-10, WS2-D, and WS2-D2). Ongoing sampling of the five wells continues to support MTBE (and PHC) monitoring of the area. An additional two wells (G2-3B and G2-3C), were added as part of the 2018 PMP, including MTBE analysis due to their proximity to the remediated MTBE area. Beginning in 2021, all wells that are part of the PMP are analyzed for MTBE. Concentrations of MTBE reported in samples collected during the 2023 PMP were generally consistent with concentrations reported in the previous five years of samples. None of the MTBE reported concentrations were greater than the CSR AW standard in 2023. The Area 2 MTBE remediation was in the approximate location of well WS2-D shown in **Figure 3**.

10. Conclusions and Recommendations

Perimeter Monitoring Program

Areas 1 and 3

The semi-annual PMP was completed in Areas 1 and 3 of the Parkland Burnaby Refinery in 2023. Reported concentrations above the SSSLs established for the Refinery were reported in the sample collected from one of the 32 monitoring wells (U07-10S), while reported sample concentrations in an additional three wells (A3MW03-02, A3MW02-07, and U07-10I) were higher than the CSR AW Standards.

Based on a comparison of analytical results collected during the 2023 PMP to recent historical data, the site perimeter groundwater quality conditions are generally similar to historical concentrations in the samples collected from U07-10I. The LEPHw, EPHw (C10-C19), and various PAH concentrations above the SSSLs at U07-10S had been previously detected in this well and are within historical ranges reported at this location and do not indicate a change in site condition at this time. Continued monitoring of these wells and concentrations will be completed in 2024. Results from nearby monitoring wells have continued to demonstrate that this contamination is highly localized. Adjacent wells laterally bound the footprint providing a rough horizontal delineation. The deep screened well in this area provides vertical delineation.

One monitoring well (A3MW02-07) located within the historical influence of the Area 3 AS system, contained concentrations of pyrene above the CSR AW standards, but below the SSSLs in 2023. In October 2015, the AS system located in Area 3 was temporarily turned off to assess whether further active remediation in the area was required. Concentration trends of evaluated PAH parameters in A3MW02-07 subsequently increased until September 2018, when concentrations stabilized. The increasing concentration trends up until September 2018 are attributed to a rebound following shut down of the Area 3 AS system. Although concentrations of PAHs are elevated, they remain orders of magnitude below the SSSLs and are stable to decreasing as shown on **Graph 2**.

One additional sample location (A3MW03-02) contained reported concentrations of LEPHw greater than the applicable CSR standards but within the historical range observed at this location.

AECOM recommends that the AS system remain off (but on standby) through 2024 and monitoring of Area 3 continues without the influence of the AS system. The Area 1 and 3 PMP should continue in 2024 with a similar scope of work as completed in 2023, including the measurement of field turbidity for wells in Area 3 which was initiated in the 2022 dry season sampling event to develop correlations between sample turbidity and reported concentration of key parameters of concern.

Area 2

Forty-three monitoring wells were monitored as part of the 2023 Area 2 PMP. During the wet season, 42 monitoring wells were sampled; during the dry season, 21 monitoring wells were sampled. Samples collected from three wells (A2MW09-10, G2-3B, and MW11-4S) have exceeded the CSR AW standards but were below the SSSLs; only one sample collected from A2MW09-11 had reported concentrations above the SSSLs. Samples from A2MW09-10, and A2MW09-11 exceeded the LEPHw and naphthalene CSR AW standards. In addition, samples from A2MW09-11 also exceeded the VPHw CSR AW standard. Samples collected from G2-3B exceeded the pyrene CSR AW standard and samples from MW11-4S exceeded the dissolved copper CSR AW standard. Samples from A2MW09-11 exceeded the xylenes CSR AW standard and the SSSLs. Concentrations reported in samples collected during 2023 were within historical ranges for select parameters.

The results of the 2023 PMP for Area 2 do not indicate an immediate need for additional investigation or remediation other than the continued operation of the PES and continue with the field turbidity measurements. AECOM recommends that the Area 2 PMP continue in 2024 with a similar scope of work as completed in 2023.

Perimeter Extraction System (PES) Operation

To evaluate the influence of the PES hydraulic barrier along the northern perimeter of the Refinery, semi-monthly and quarterly system monitoring activities were completed for 2023. This included:

a) verification of consistent groundwater drawdown in active extraction wells,

b) collection of groundwater extraction data,

c) collection of surrounding groundwater elevation data.

Throughout 2023, the PES was operated similar to 2022 where a water column measuring one meter above the pump intake during pump operation was used as a trigger for troubleshooting and/or replacement of a groundwater extraction pump. Maintenance was completed by Q3-2023 and adjustments to the preventative maintenance program were made to prevent re-occurrence.

An annual average water column of less than one meter was sustained at 33 of the 40 extraction wells, indicating satisfactory performance. Of the seven extraction wells with average water columns greater than one meter, four demonstrated an average annual water column less than three meters which represents the target drawdown for the system.

The majority (six of the seven locations) where the un-reliable drawdown was measured are located in the eastern PES section. The remaining one is located in the western PES section. All the extraction wells

located in the portion of the PES that intersect the known LNAPL footprint had an annual average water column of 1 m or less as this section of the PES is prioritized over all other areas.

Based on groundwater monitoring data and system operational data, the PES continued to intercept and prevent the off-site migration of LNAPL and dissolved phase hydrocarbons despite the instances where target drawdown was not sustained at individual wells for portions of 2023. Maintenance will be prioritized for those six wells where reliable drawdown was not maintained for an extended duration.

In 2023, the PES operated within acceptable limits for controlling the off-site migration of LNAPL and dissolved phase PHC concentrations based on:

- adequate water table drawdown compared to reference elevations collected before the PES operation;
- the groundwater contouring (including particle path evaluations) performed quarterly; and,
- general stability of the groundwater quality downgradient of the PES.

AECOM recommends that the PES continue to be operated in 2024 in a similar manner to 2023.

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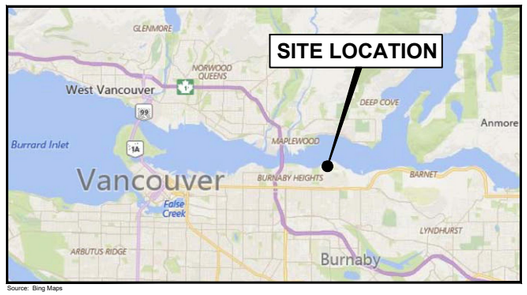
URS 2013a. *Status Report Addendum - Area 2 Eastern Impounding Basin Groundwater Extraction System*, Chevron Burnaby Refinery, BC, March 1.

URS 2013b. *Response to Ministry Comments to Perimeter Extraction System Update Addendum*, Chevron Burnaby Refinery, BC, December 19, 2013.

FIGURES



Source: Bing Maps

BURRARD INLET

PARKLAND REFINERY AREA 2

Parkland Wharf

AREA 3

CP Rail

Rainbow Creek

Parkland Right-of-Way

PARKLAND REFINERY AREA 1

Trib 1

CONFEDERATION PARK

Carleton Avenue

McGill Street

Madison Avenue

Rosser Avenue

Eton Street

Willingdon Avenue

Penzance Drive

LEGEND:

- Property Line
- Contour Line (contour interval 2 feet) — 50'
- Zoning Boundary
- Approximate Location of Parkland Pipeline
- Park and Public Use District
- Residential District
- Industrial

NOTE: Zoning information taken from City of Burnaby website, BurnabyMap. (January 21, 2021)

N W E S

metres 0 150 300

AECOM

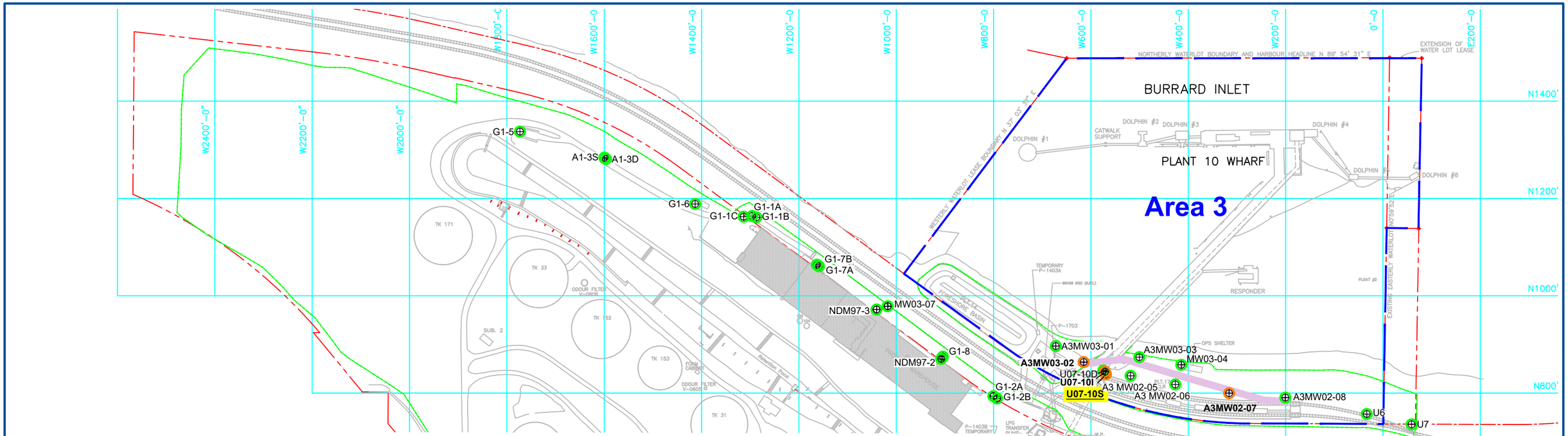
REFINERY SITE PLAN AND LOCATION MAP AREAS 1, 2 AND 3

Report on the 2023 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704333	RS	0	FIGURE 1

FILE NAME: L:\Legacy\cabny\1fp001\prod\1686\Projects\URS-CHEVRON\60704333 Parkland PMP_2023\500- Deliverables\501 Annual PMP Report\2 - Figures\FIG_01-Site Plan - 20240502-60704333-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Sentry Monitoring Well
- Sparge Well System
- Concentration Exceeding Applicable CSR Standards — **A3MW03-02**
- Concentration Exceeding SSSL — **U07-10S**
- Concentration Below Applicable CSR Standards — A3MW03-03

ABBREVIATIONS:

CSR	Contaminated Sites Regulation
AW	Aquatic Life
SSSL	Site-Specific Screening Level

GRID NORTH

N, W, E, S

0 50 100 m

AREAS 1 AND 3 SENTRY WELLS

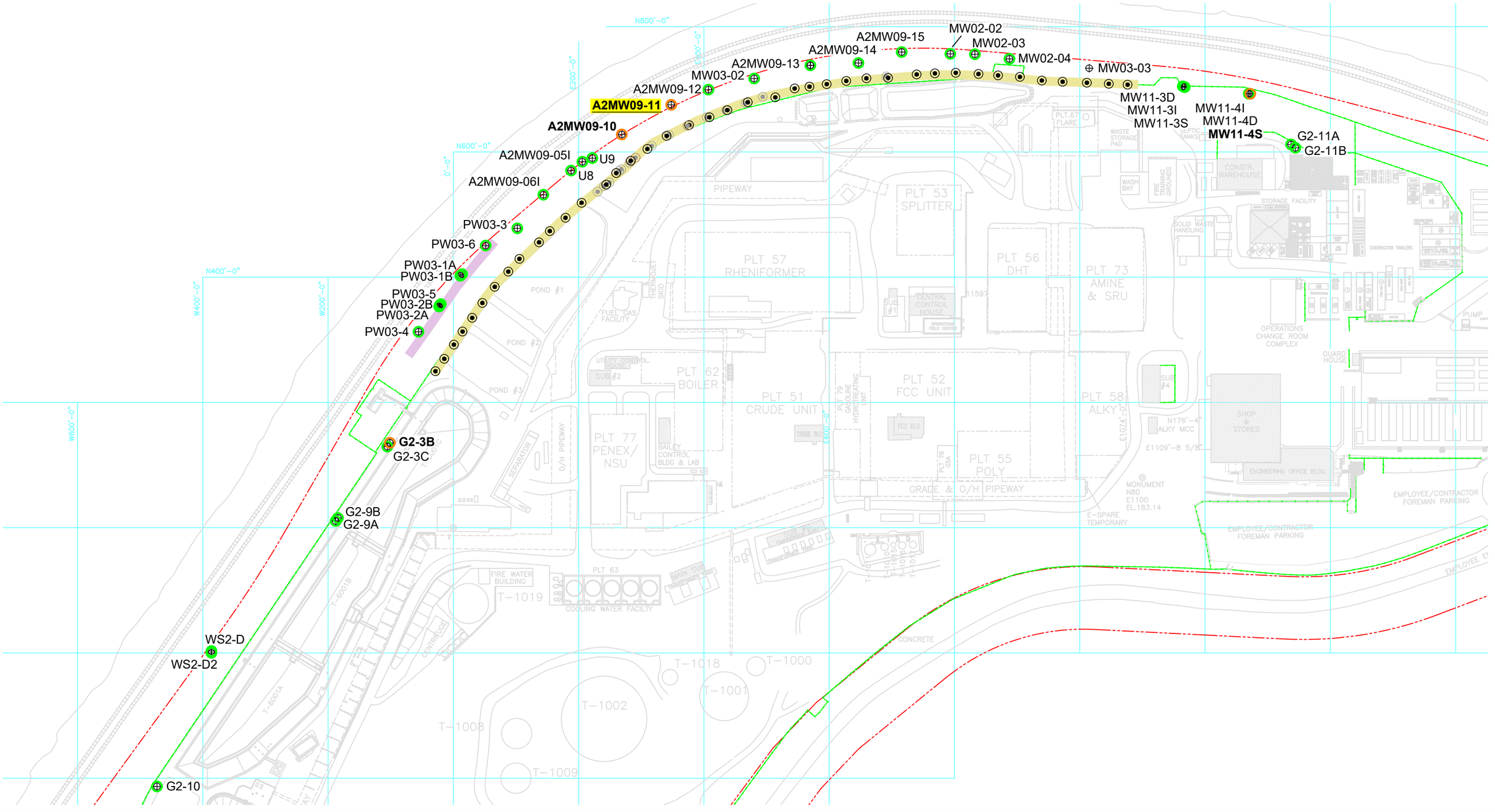
The 2023 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704333	RS	0	FIGURE 2

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_02 - Area 1 and 3 Sentry Wells - 20240508-60704333-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Sentry Monitoring Well
- Inactive Extraction Well
- Active Extraction Well
- Perimeter Extraction Well System
- Sparge Well System
- Concentration Exceeding Applicable CSR Standards — G2-3B
- Concentration Below Applicable CSR Standards — G2-10
- Concentration Exceeding SSSL — A2MW09-11

ABBREVIATIONS:

CSR	Contaminated Sites Regulation
AW	Aquatic Life
SSSL	Site -Specific Screening Level
PMP	Perimeter Monitoring Program

GRID NORTH

N W E S

metres 0 50 100

AREA 2 SENTRY WELLS

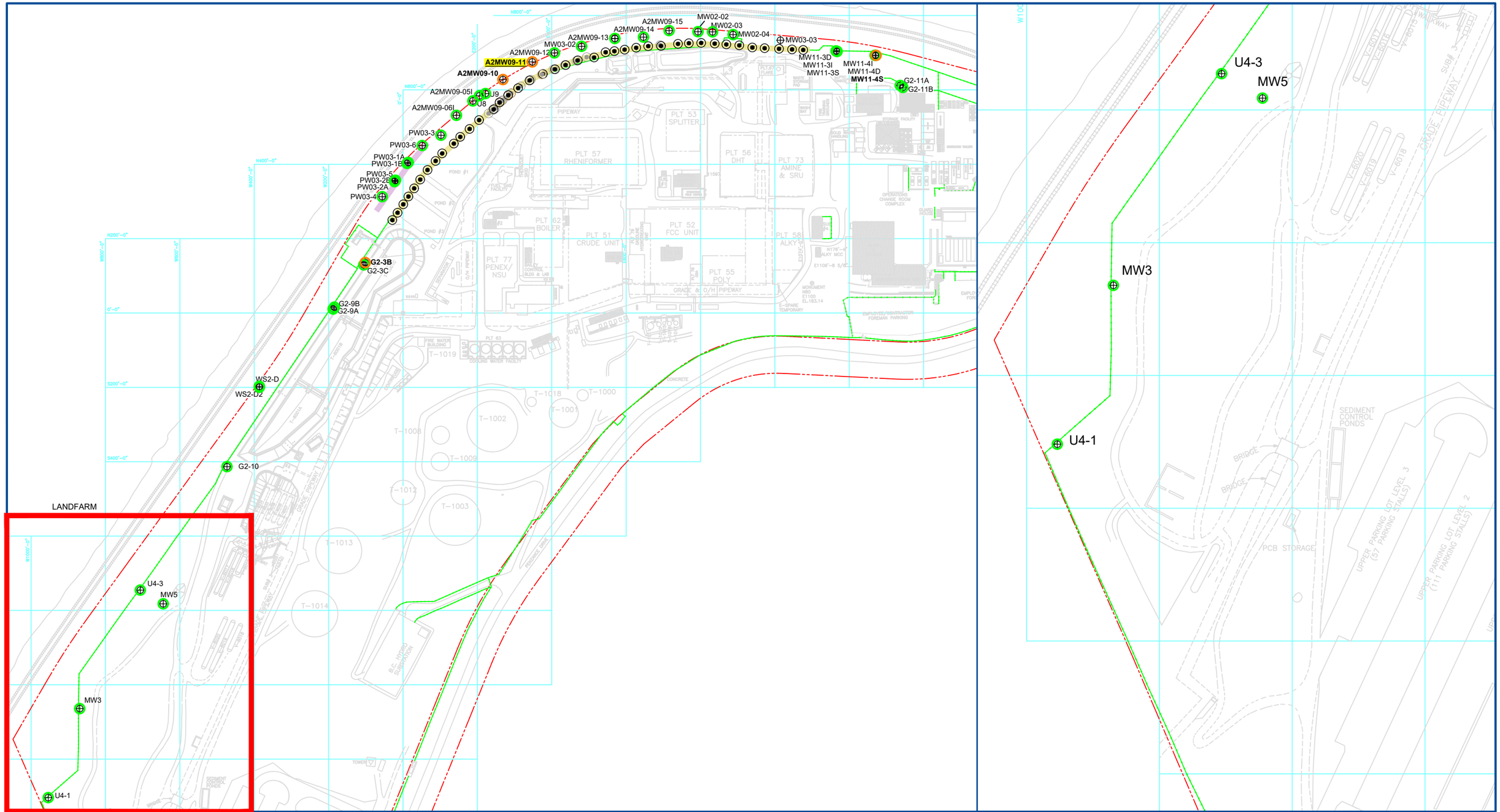
The 2023 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704333	RS	0	FIGURE 3

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_03 - Area 2 Sentry Wells - 20240508-60704333-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Sentry Monitoring Well
- Inactive Extraction Well
- Active Extraction Well
- Perimeter Extraction Well System
- Sparge Well System
- Concentration Exceeding Applicable CSR Standards — G2-3B
- Concentration Below Applicable CSR Standards — MW3
- Concentration Exceeding SSSL — A2MW09-11

ABBREVIATIONS:

CSR	Contaminated Sites Regulation
AW	Aquatic Life
SSSL	Site -Specific Screening Level
PMP	Perimeter Monitoring Program

GRID NORTH

N W E S

0 50 100 metres

(Scale for Landfarm Portrait Only)

AECOM

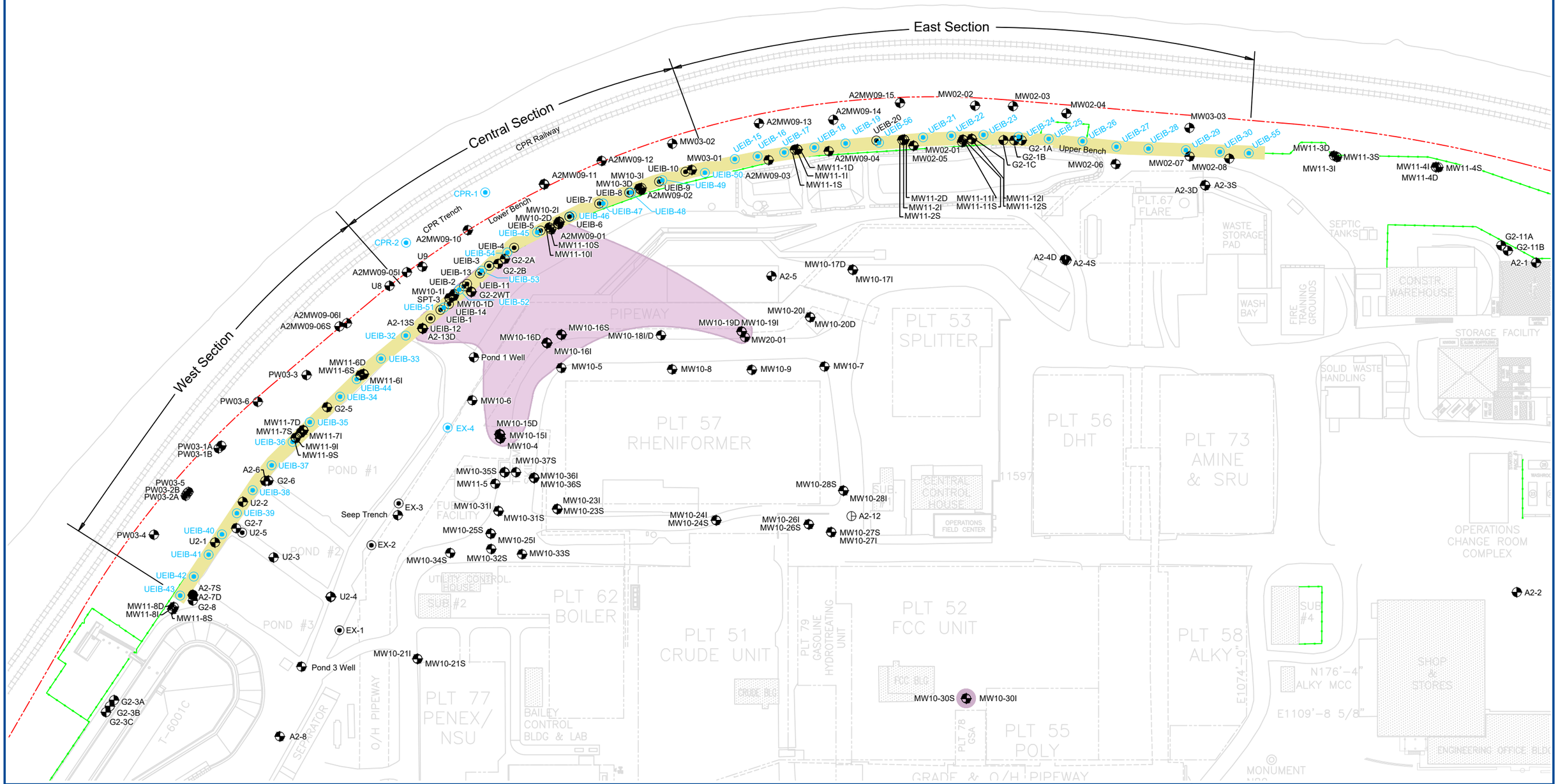
AREA 2
LANDFARM WELLS

The 2023 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704333	RS	0	FIGURE 4

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_04 - Landfarm Wells - 20240508-60704333-Parkland Ref.dwg



AREA 2 PERIMETER EXTRACTION SYSTEM

The 2023 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704333	RS	0	FIGURE 5

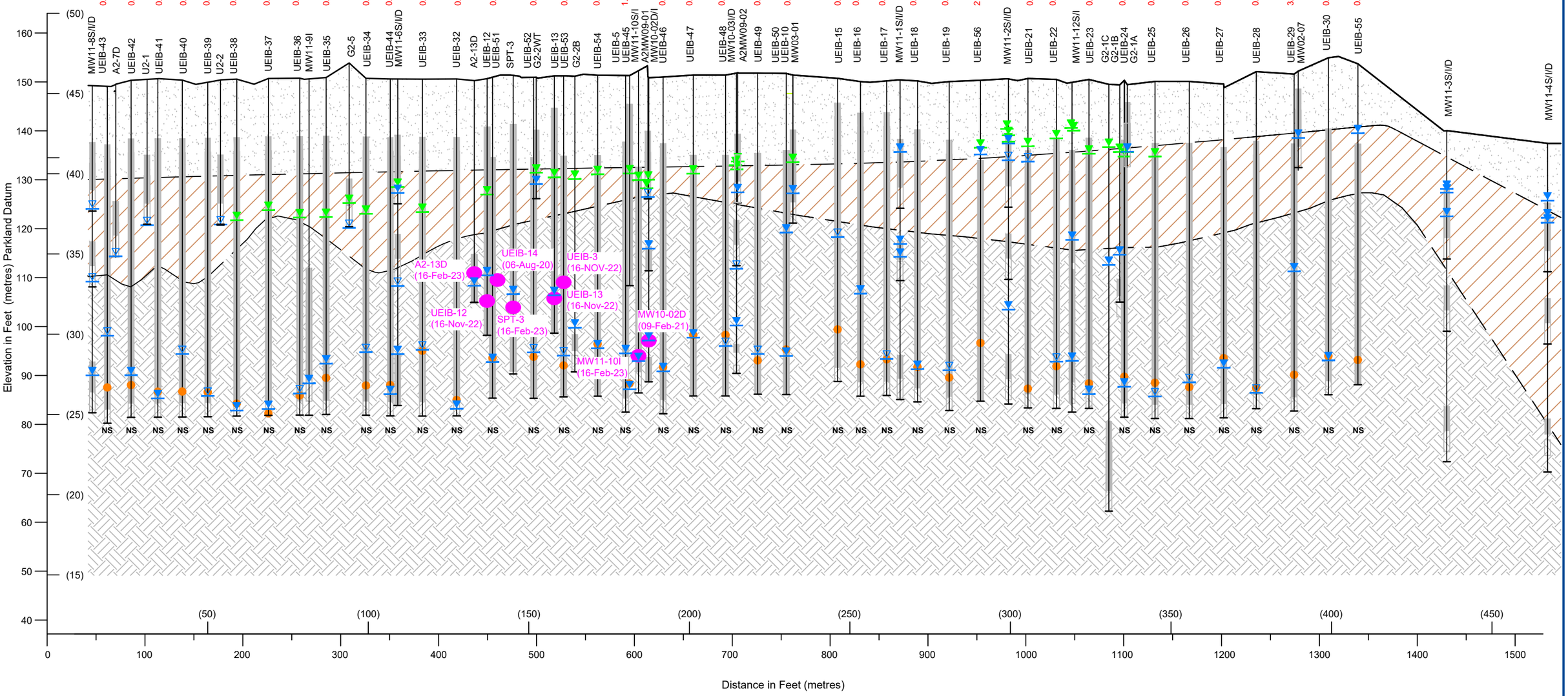
AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_05 - Area 2 Perimeter Extraction System - 20240508-60704333-Parkland Ref.dwg

A West — A' East

Upper Bench

West Section | Central Section | East Section



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, February 14,15,16 and ,23, 2023

Dry

Extraction Pump

Fluid Extraction Rate Average — 0.17 gpm

NAPL Detected in most recent date — Well ID

Reported Concentrations of EPH10-19, EPH19-32, and VPH based on effluent samples collected in January-March 2023:

ND = Below Detection

DC = Detectable Concentration below CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

DC = Detectable Concentration above CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

NS = No Sample

ABBREVATIONS:
gpm US gallons per minute

NOTE: NAPL not shown on the UEIB well was detected in the nearby monitoring well as indicated.

Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

Horizontal Scale
feet: 0 50 100
metres: 0 20 40

Vertical Scale
feet: 0 10 20
metres: 0 5 10

AECOM

UPPER BENCH EXTRACTION WELL LOCATIONS AND GROUNDWATER ELEVATIONS FOR FEBRUARY 2023

Perimeter Extraction System - First Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

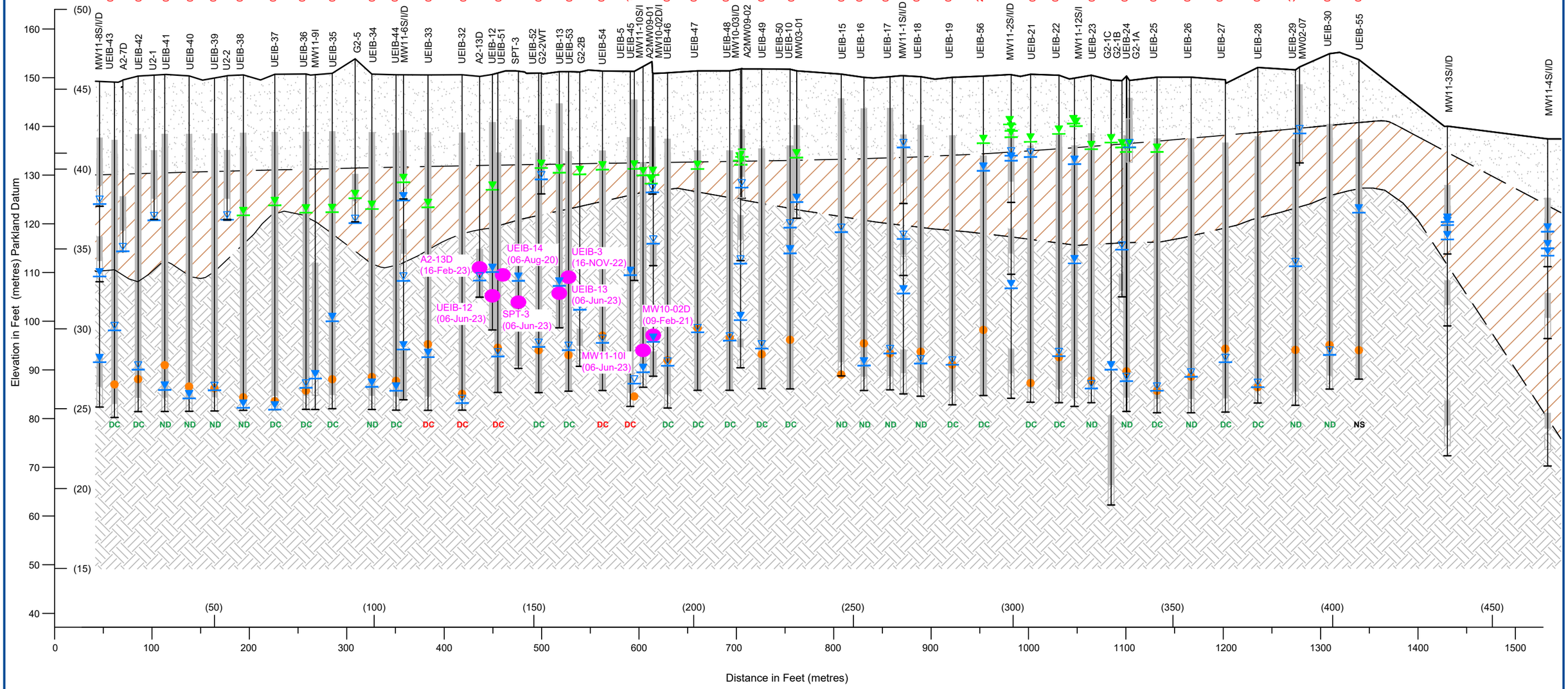
DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2024	60704780	NT	0	FIGURE 6

FILE NAME: C:\Users\DobreR\OneDrive - AECOM\General\60704780 PES 2023\Q1\Return to Server\S\FIG_01-Q1_UP Mon Well Loc & GW Elv FEB 2023 60704780-Parkland Ref.dwg

A West — A' East

Upper Bench

West Section | Central Section | East Section



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, June 06 and 07, 2023

Dry

Extraction Pump

Fluid Extraction Rate Average 0.17 gpm

NAPL Detected in most recent date — Well ID

Reported Concentrations of EPH10-19, EPH19-32, and VPH based on effluent samples collected in April 2023:

ND = Below Detection

DC = Detectable Concentration below CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

DC = Detectable Concentration above CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

NS = No Sample

ABBREVIATIONS:
gpm US gallons per minute

NOTE: NAPL not shown on the UEIB well was detected in the nearby monitoring well as indicated.

Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

Horizontal Scale
feet 0 50 100
metres 0 20 40

Vertical Scale
feet 0 10 20
metres 0 5 10

AECOM

UPPER BENCH EXTRACTION WELL LOCATIONS AND GROUNDWATER ELEVATIONS FOR JUNE 2023

Perimeter Extraction System - Second Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2024	60704780	NT	0	FIGURE 7

FILE NAME: C:\Users\DobreR\OneDrive - AECOM\General\60704780 PES 2023\Q2\Return to server\S\FIG_01-Q2_UP Mon Well Loc & GW Elv JUN 2023 60704780-Parkland Ref.dwg

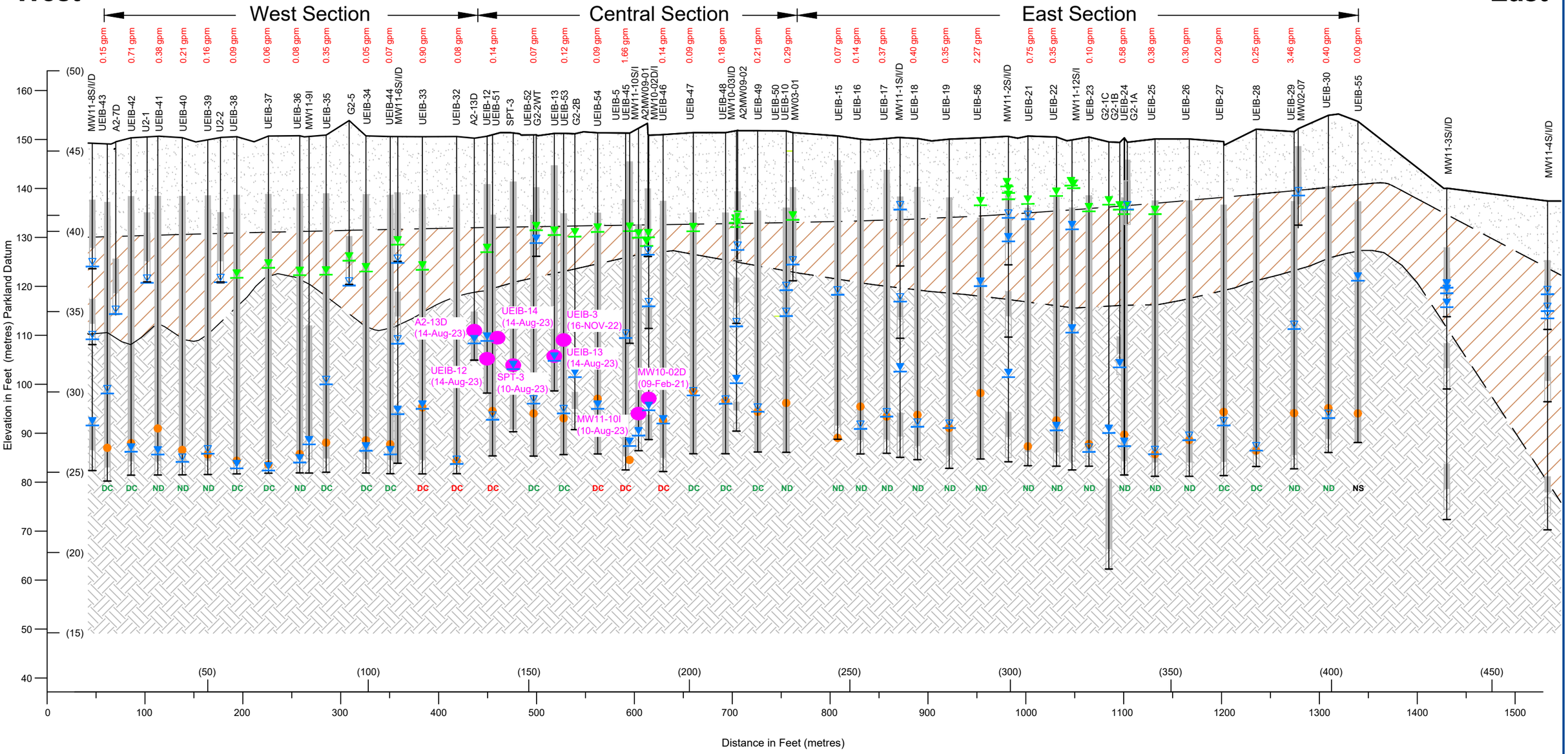
A West — A' East

Upper Bench

West Section | Central Section | East Section

Elevation in Feet (metres) Parkland Datum

Distance in Feet (metres)



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, August 09, 10, 14 and 17, 2023

Dry

Extraction Pump

Fluid Extraction Rate Average 0.17 gpm

NAPL Detected in most recent date

Well ID

Reported Concentrations of EPH10-19, EPH19-32, and VPH based on effluent samples collected in September 2023:

ND = Below Detection

DC = Detectable Concentration below CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

DC = Detectable Concentration above CSR Standards for LEPH/VPH/Benzene for the protection of aquatic

NS = No Sample

ABBREVATIONS:
gpm US gallons per minute

NOTE: NAPL not shown on the UEIB well was detected in the nearby monitoring well as indicated.

Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

Horizontal Scale
feet 0 50 100
metres 0 20 40

Vertical Scale
feet 0 10 20
metres 0 5 10

AECOM

UPPER BENCH EXTRACTION WELL LOCATIONS AND GROUNDWATER ELEVATIONS FOR AUGUST 2023

Perimeter Extraction System - Third Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

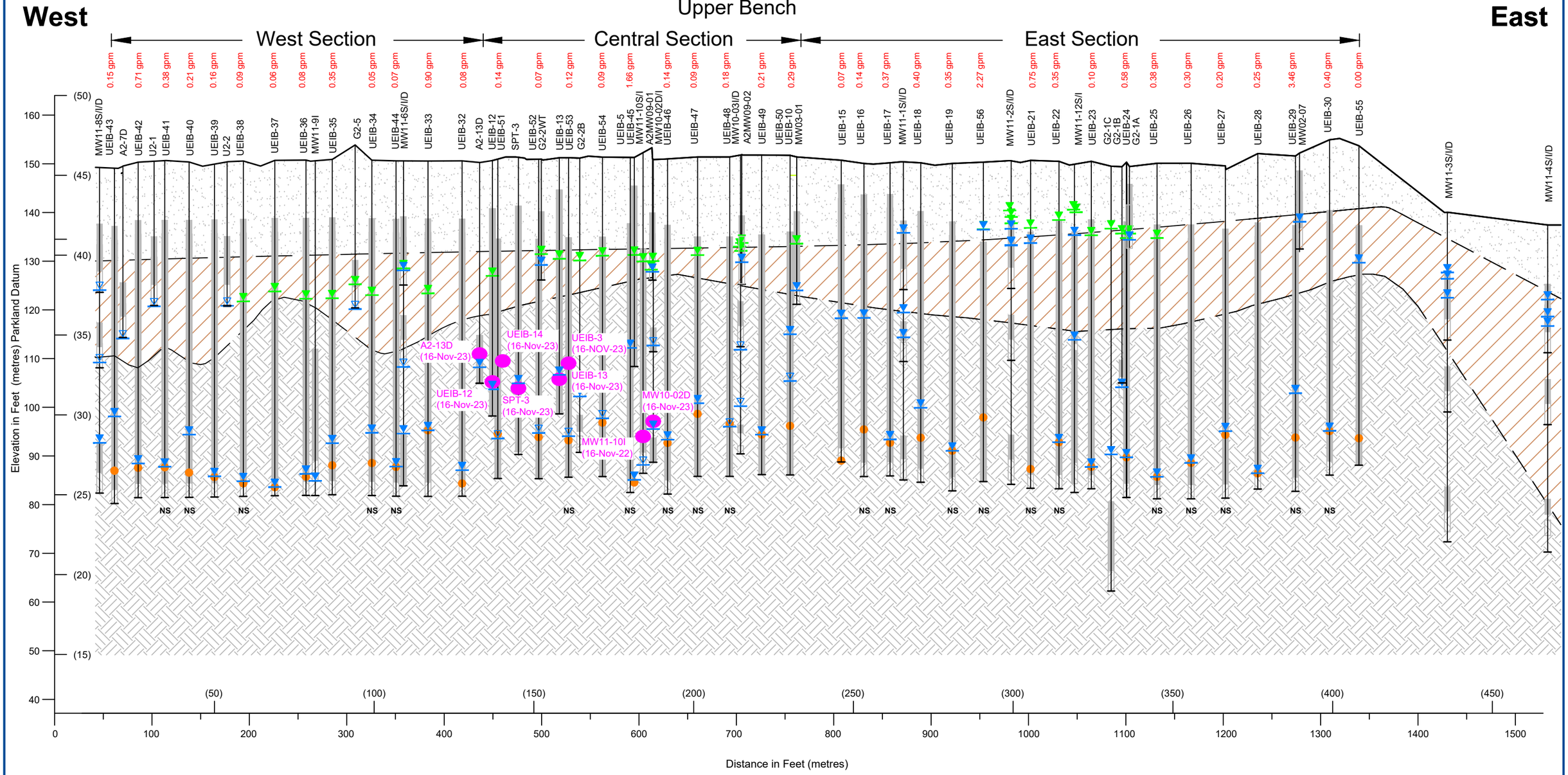
DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2024	60704780	NT	0	FIGURE 8

FILE NAME: C:\Users\DobreR\OneDrive - AECOM\General\60704780 PES 2023\Q3\Return to server\S\FIG_01-Q3_UP Mon Well Loc & GW Elv AUG 2023 - 60704780-Parkland Ref.dwg

A West — A' East

Upper Bench

West Section | Central Section | East Section



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, November 15,16, 2023

Dry

Extraction Pump

Fluid Extraction Rate Average 0.17 gpm

NAPL Detected in most recent date — Well ID

Reported Concentrations of EPH10-19, EPH19-32, and VPH based on effluent samples collected in October-December 2023:

ND = Below Detection

DC = Detectable Concentration below CSR Standards for LEPH/VPH/Benzene for the protection of aquatic life

DC = Detectable Concentration above CSR Standards for the protection of aquatic life

NS = No Sample

ABBREVIATIONS:
gpm US gallons per minute

NOTE: NAPL not shown on the UEIB well was detected in the nearby monitoring well as indicated.

Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

Horizontal Scale
feet 0 50 100
metres 0 20 40

Vertical Scale
feet 0 10 20
metres 0 5 10

AECOM

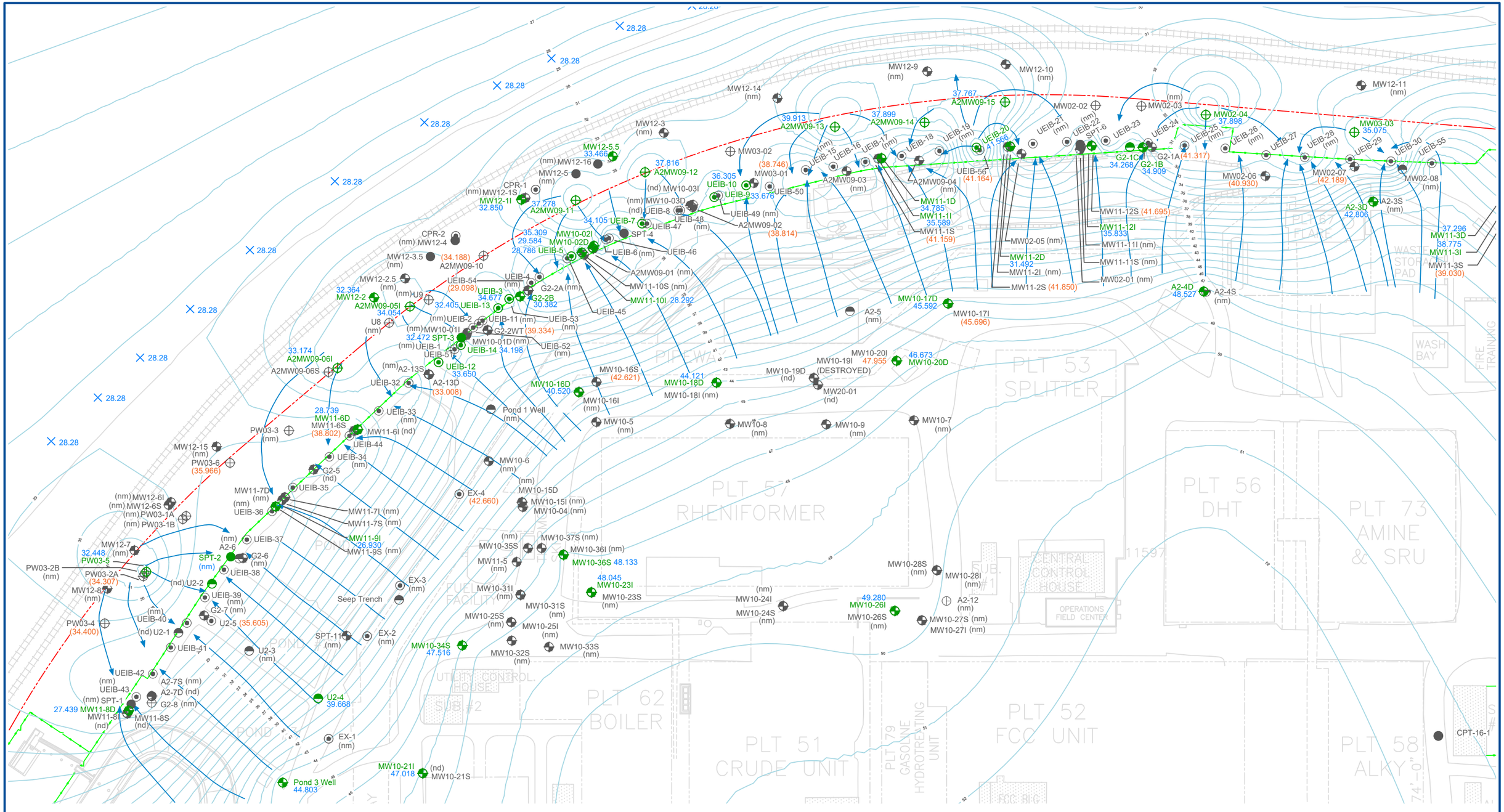
UPPER BENCH EXTRACTION WELL LOCATIONS AND GROUNDWATER ELEVATIONS FOR NOVEMBER 2023

Perimeter Extraction System - Fourth Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2024	60704780	NT	0	FIGURE 9

FILE NAME: C:\Users\DobreR\OneDrive - AECOM\General\60704780 PES 2023\Q4\Return to Server\S\FIG_01-Q4_UP Mon Well Loc & GW Elv NOV2023 -20231213-60704780-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) Feb 2023 used to extrapolate contours — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

ABBREVIATIONS:
na not available
nd non-detect (dry well)
nm not measured/not in program

NOTE: Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

GRID NORTH

metres 0 20 40

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - FEBRUARY 2023

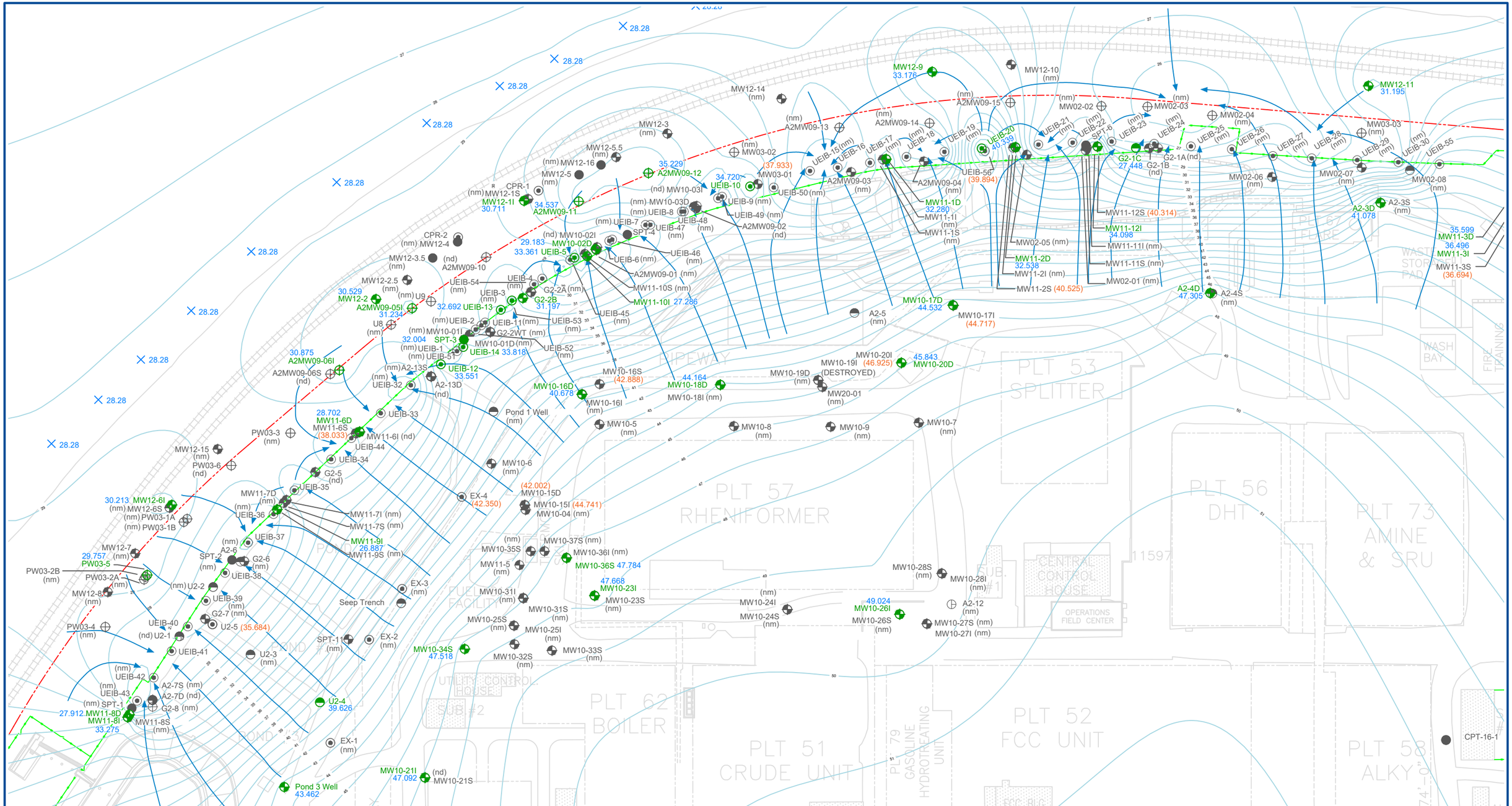
Perimeter Extraction System - First Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704780	SGC	0	FIGURE 10

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_10-Q1_Perimeter Ex System & GW Elv FEB 2023 60704780-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) Jun 2023 used to extrapolate contours — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

ABBREVIATIONS:
- na not available
- nd non-detect (dry well)
- nm not measured/not in program

NOTE: Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

GRID NORTH

N W E S

metres
0 20 40

AECOM

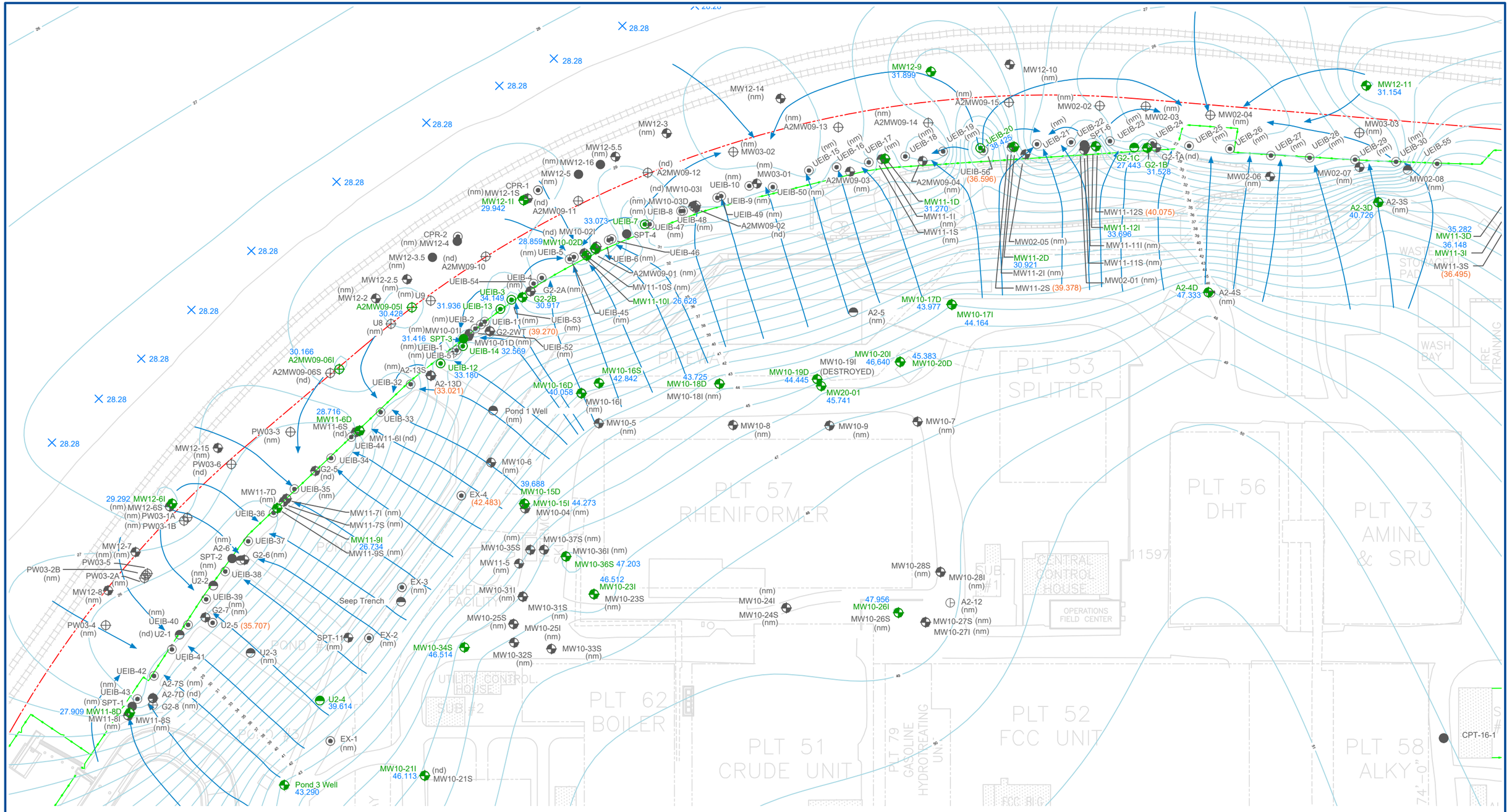
PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - JUNE 2023

Perimeter Extraction System - Second Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704780	SGC	0	FIGURE 11

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_11-Q2_Perimeter Ex System & GW Elv JUN 2023 -60704780-Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) Aug 2023 used to extrapolate contours — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

ABBREVIATIONS:
- na not available
- nd non-detect (dry well)
- nm not measured/not in program

NOTE: Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

GRID NORTH

metres: 0, 20, 40

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - AUGUST 2023

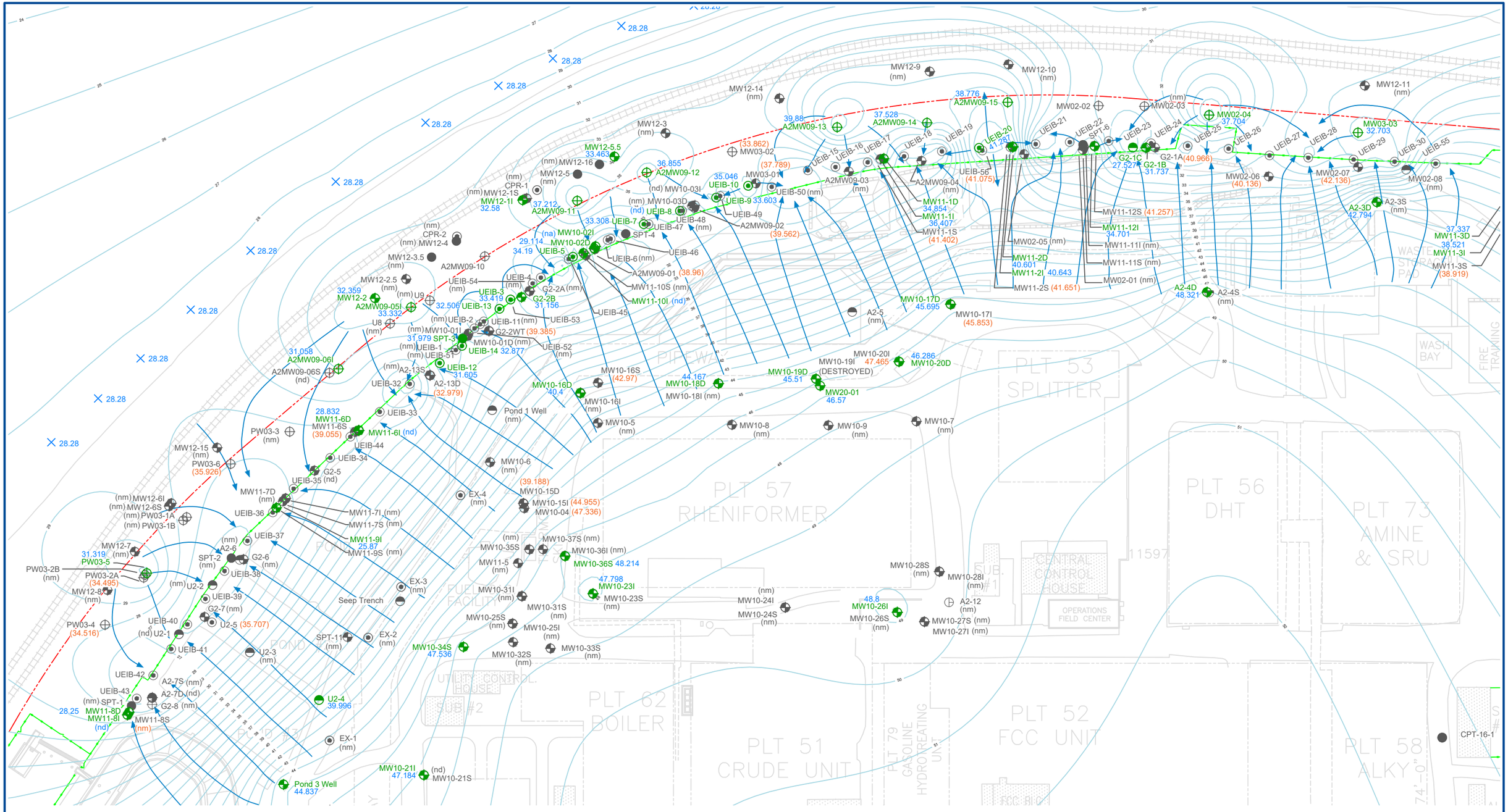
Perimeter Extraction System - Third Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704780	SGC	0	FIGURE 12

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_12-Q3_Perimeter Ex System & GW Elv AUG 2023 - 60704780 Parkland Ref.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) Nov 2023 used to extrapolate contours — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

ABBREVIATIONS:

na	not available
nd	non-detect (dry well)
nm	not measured/not in program

NOTE: Elevations are based on an arbitrary Chevron bench mark and require a sub-traction of 27.9m tor geodetic elevations.

GRID NORTH

N W E S

metres

0 20 40

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - NOVEMBER 2023

Perimeter Extraction System - Fourth Quarter 2023 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2024	60704780	SGC	0	FIGURE 13

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM\Parkland Burnaby Refinery - CAD Support - Documents\General\2023 PMP 60704333\Return to Server\FIG_13-Q4_Perimeter Ex System & GW Elv NOV2023 -20231213-60704780-Parkland Ref.dwg

TABLES

AECOM

TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A1-3S	6/2/2014	3.360	46.121	ND	NA	ND	NA	Dry
A1-3S	9/22/2014	3.355	46.121	ND	NA	ND	NA	Dry; Biofoul on probe.
A1-3S	5/13/2015	3.370	46.121	ND	NA	ND	NA	Dry; Silt on the probe
A1-3S	9/23/2015	3.360	46.121	ND	NA	ND	NA	Dry; Silt on the probe
A1-3S	4/4/2016	3.360	46.121	ND	NA	ND	NA	Dry
A1-3S	9/22/2016	3.360	46.121	ND	NA	ND	NA	Dry
A1-3S	4/15/2017	3.260	46.121	2.760	43.361	ND	NA	Clear
A1-3S	8/30/2017	3.380	46.121	ND	NA	ND	NA	Dry
A1-3S	4/10/2018	3.372	46.121	2.515	43.606	ND	NA	Clear
A1-3S	5/3/2018	3.373	46.121	ND	NA	ND	NA	Dry, say bottom, brown
A1-3S	9/5/2018	3.360	46.121	ND	NA	ND	NA	Dry
A1-3S	4/2/2019	3.362	46.121	ND	NA	ND	NA	Dry; silt at bottom of interface probe
A1-3S	4/10/2019	3.365	46.121	3.116	43.005	ND	NA	clear
A1-3S	9/19/2019	3.371	46.121	3.343	42.778	ND	NA	Insufficient water column to sample
A1-3S	3/18/2020	3.361	46.121	ND	NA	ND	NA	Dry, silt on probe
A1-3S	8/17/2020	3.357	46.121	ND	NA	ND	NA	Dry
A1-3S	3/18/2021	3.389	46.121	ND	NA	ND	NA	Dry, silt on probe
A1-3S	3/30/2021	3.371	46.121	3.039	43.082	ND	NA	Clear
A1-3S	8/26/2021	3.364	46.121	ND	NA	ND	NA	Dry
A1-3S	3/22/2022	3.361	46.121	2.338	43.783	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A1-3S	8/23/2022	3.360	46.121	ND	NA	ND	NA	Dry
A1-3S	3/8/2023	3.384	46.121	3.105	43.016	ND	NA	Water level meter: Solinst 122Serial: 31334
A1-3S	8/14/2023	3.369	46.121	ND	NA	ND	NA	Dry
A1-3D	6/2/2014	15.190	45.948	8.350	37.598	ND	NA	Purged dry at 42 L; DUP-30
A1-3D	9/22/2014	15.190	45.948	8.425	37.523	ND	NA	Purged dry at 25 L on Sept.23; Sampled on Sept.23
A1-3D	5/13/2015	15.120	45.948	8.360	37.588	ND	NA	Slightly turbid
A1-3D	9/23/2015	15.150	45.948	7.075	38.873	ND	NA	Silty; J-plug missing
A1-3D	4/4/2016	15.130	45.948	6.870	39.078	ND	NA	Purged dry at 35L on Apr.4; Sample collected on Apr.5; Clear
A1-3D	9/22/2016	15.170	45.948	7.850	38.098	ND	NA	Clear
A1-3D	4/15/2017	15.100	45.948	7.780	38.168	ND	NA	Clear
A1-3D	8/30/2017	15.120	45.948	8.460	37.488	ND	NA	Turbid
A1-3D	4/10/2018	12.620	45.948	6.002	39.946	ND	NA	Cloudy grey; bailed & waterra
A1-3D	5/3/2018	15.117	45.948	7.327	38.621	ND	NA	Purged dry; waterra; sampled
A1-3D	9/5/2018	15.118	45.948	8.750	37.198	ND	NA	Sampled; DUP-5
A1-3D	4/2/2019	15.105	45.948	8.484	37.464	ND	NA	clear with silty particles; sampled on next day, purged + sampled using watera
A1-3D	9/19/2019	15.185	45.948	8.583	37.365	ND	NA	Slightly cloudy (grey); slightly silty
A1-3D	3/19/2020	15.118	45.948	8.259	37.689	ND	NA	Purged dry at 36L on 03/18/20, sampled next day on recharge
A1-3D	8/25/2020	15.114	45.948	8.694	37.254	ND	NA	Purged dry at 34L, sampled on recharge on 24/8/20, first sample too cloudy. Sampled following day, slightly cloudy, grey, submitted
A1-3D	3/18/2021	15.137	45.948	8.656	37.292	ND	NA	Slightly turbid, grey
A1-3D	8/26/2021	15.118	45.948	9.722	36.226	ND	NA	Cloudy grey, sampled with bailer
A1-3D	8/26/2021	15.118	45.948	9.722	36.226	ND	NA	Water level meter: Heron Dipper-TSerial:
A1-3D	4/6/2022	15.116	45.948	7.620	38.328	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A1-3D	8/23/2022	15.071	45.948	8.985	36.963	ND	NA	sampled, very turbid
A1-3D	3/8/2023	15.139	45.948	8.610	37.338	ND	NA	Cloudy, light grey; no odour
A1-3D	8/14/2023	15.103	45.948	9.703	36.245	ND	NA	Slightly cloudy to clear; no odour
G1-1A	6/2/2014	6.000	39.765	4.270	35.495	ND	NA	Clear
G1-1A	9/23/2014	6.000	39.765	5.150	34.615	ND	NA	Clear
G1-1A	5/4/2015	6.000	39.765	4.380	35.385	ND	NA	Clear
G1-1A	9/3/2015	6.000	39.765	4.820	34.945	ND	NA	Clear
G1-1A	4/4/2016	6.020	39.765	3.640	36.125	ND	NA	Clear
G1-1A	9/22/2016	6.000	39.765	4.910	34.855	ND	NA	
G1-1A	4/15/2017	6.000	39.765	3.100	36.665	ND	NA	Clear; DUP-7
G1-1A	8/30/2017	6.020	39.765	5.070	34.695	ND	NA	Clear; DUP-3
G1-1A	4/10/2018	6.010	39.765	3.110	36.655	ND	NA	Clear
G1-1A	5/7/2018	6.012	39.765	3.803	35.962	ND	NA	Clear; sampled
G1-1A	9/5/2018	6.015	39.765	4.956	34.809	ND	NA	Sampled
G1-1A	4/4/2019	6.004	39.765	4.076	35.689	ND	NA	cloudy/opaque a silty
G1-1A	9/23/2019	6.008	39.765	3.944	35.821	ND	NA	Clear
G1-1A	3/25/2020	6.002	39.765	3.920	35.845	ND	NA	Clear
G1-1A	8/25/2020	6.002	39.765	4.675	35.090	ND	NA	Clear
G1-1A	3/18/2021	6.013	39.765	3.611	36.154	ND	NA	Clear
G1-1A	8/30/2021	6.004	39.765	4.784	34.981	ND	NA	Clear
G1-1A	8/30/2021	6.004	39.765	4.784	34.981	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-1A	3/22/2022	6.002	39.765	3.133	36.632	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-1A	8/23/2022	6.009	39.765	4.683	35.082	ND	NA	clear, no odor
G1-1A	3/14/2023	6.022	39.765	3.226	36.539	ND	NA	Clear; no odour
G1-1A	8/15/2023	5.999	39.765	4.583	35.182	ND	NA	Clear, no odour
G1-1B	6/2/2014	12.490	39.512	8.300	31.212	ND	NA	Clear
G1-1B	9/23/2014	12.490	39.512	8.460	31.052	ND	NA	Clear
G1-1B	5/4/2015	12.480	39.512	3.350	36.162	ND	NA	Clear; Roadbox needs replacement
G1-1B	9/3/2015	12.490	39.512	8.440	31.072	ND	NA	Clear
G1-1B	4/4/2016	12.500	39.512	8.270	31.242	ND	NA	Clear; Roadbox needs replacement
G1-1B	9/22/2016	12.500	39.512	8.440	31.072	ND	NA	purged dry; collected sample on recharge
G1-1B	4/15/2017	12.490	39.512	8.260	31.252	ND	NA	Clear
G1-1B	8/30/2017	10.870	39.512	8.720	30.792	ND	NA	
G1-1B	4/10/2018	12.400	39.512	8.274	31.238	ND	NA	Purged dry at 5 L; cloudy (yellow/orange); sampled on recharge
G1-1B	5/7/2018	12.440	39.512	8.418	31.094	ND	NA	Silty; sampled on recharge
G1-1B	9/5/2018	12.440	39.512	8.825	30.687	ND	NA	Sampled
G1-1B	4/4/2019	12.454	39.512	8.393	31.119	ND	NA	Cloudy/opaque a silty
G1-1B	9/23/2019	12.440	39.512	8.375	31.137	ND	NA	Clear
G1-1B	3/25/2020	12.436	39.512	8.453	31.059	ND	NA	Clear, YSI possibly malfunctioning (DO)
G1-1B	8/25/2020	12.441	39.512	8.418	31.094	ND	NA	Clear
G1-1B	3/18/2021	12.434	39.512	9.130	30.382	ND	NA	Purged dry at 16L, sampled on recharge same day, sample clear with trace sediments
G1-1B	8/30/2021	12.436	39.512	9.411	30.101	ND	NA	Clear
G1-1B	8/30/2021	12.436	39.512	9.411	30.101	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-1B	3/22/2022	12.432	39.512	8.976	30.536	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-1B	8/23/2022	12.445	39.512	9.330	30.182	ND	NA	clear, no odor
G1-1B	3/14/2023	12.456	39.512	8.946	30.566	ND	NA	Clear; no odour
G1-1B	8/15/2023	12.430	39.512	9.267	30.245	ND	NA	Clear; no odour
G1-1C	6/2/2014	21.170	40.405	9.820	30.585	ND	NA	Clear
G1-1C	9/23/2014	21.170	40.405	9.890	30.515	ND	NA	Clear
G1-1C	5/4/2015	21.185	40.405	9.865	30.540	ND	NA	Turbid; DUP-11
G1-1C	9/3/2015	21.150	40.405	9.900	30.505	ND	NA	Clear
G1-1C	4/4/2016	21.120	40.405	9.760	30.645	ND	NA	Purged dry at 40 L on Apr.4; Parameters a sample collected on Apr.5; Clear
G1-1C	9/22/2016	21.210	40.405	9.930	30.475	ND	NA	turbid; DUP-8
G1-1C	4/15/2017	21.340	40.405	9.760	30.645	ND	NA	Clear
G1-1C	8/30/2017	21.220	40.405	10.060	30.345	ND	NA	Turbid
G1-1C	4/10/2018	21.383	40.405	9.847	30.558	ND	NA	Cloudy/grey; bailed; sampled
G1-1C	5/3/2018	21.357	40.405	9.917	30.488	ND	NA	Cloudy/grey; bailed; sampled
G1-1C	9/5/2018	21.330	40.405	10.193	30.212	ND	NA	Sampled
G1-1C	4/4/2019	21.333	40.405	9.779	30.626	ND	NA	cloudy/opaque a silty
G1-1C	9/23/2019	21.327	40.405	9.956	30.449	ND	NA	Purged dry at 40L; sampled on recharge; Clear
G1-1C	3/25/2020	21.319	40.405	9.835	30.570	ND	NA	Well cap off on arrival, sampled on recharge, sample cloudy
G1-1C	8/25/2020	21.311	40.405	9.865	30.540	ND	NA	sampled on recharge same day; slightly cloudy, grey
G1-1C	3/18/2021	21.308	40.405	12.378	28.027	ND	NA	Slightly turbid, grey
G1-1C	8/30/2021	21.322	40.405	11.734	28.671	ND	NA	Turbid, waited to settle before sampling
G1-1C	8/30/2021	21.322	40.405	11.734	28.671	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-1C	3/22/2022	21.311	40.405	11.638	28.767	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-1C	8/23/2022	21.333	40.405	11.595	28.810	ND	NA	clear, no odor
G1-1C	3/14/2023	21.534	40.405	11.393	29.012	ND	NA	
G1-1C	8/14/2023	21.391	40.405	11.613	28.792	ND	NA	Clear; no odour
G1-2A	6/5/2014	3.150	34.352	1.035	33.317	ND	NA	
G1-2A	9/3/2014	3.145	34.352	1.630	32.722	ND	NA	Clear
G1-2A	4/21/2015	3.180	34.352	1.075	33.277	ND	NA	Clear
G1-2A	9/1/2015	3.145	34.352	1.580	32.772	ND	NA	Clear
G1-2A	3/15/2016	3.190	34.352	0.990	33.362	ND	NA	Clear
G1-2A	9/21/2016	3.190	34.352	1.180	33.172	ND	NA	Clear
G1-2A	4/19/2017	3.200	34.352	1.900	32.452	ND	NA	Clear
G1-2A	8/31/2017	3.200	34.352	1.720	32.632	ND	NA	Silty, grey/brown
G1-2A	4/16/2018	3.200	34.352	1.120	33.232	ND	NA	Clear
G1-2A	9/6/2018	3.235	34.352	1.712	32.640	ND	NA	Silty; sampled
G1-2A	3/28/2019	3.201	34.352	1.371	32.981	ND	NA	slightly silty (grey)
G1-2A	9/24/2019	3.220	34.352	1.585	32.767	ND	NA	Clear
G1-2A	3/18/2020	3.201	34.352	1.547	32.805	ND	NA	Clear
G1-2A	8/26/2020	3.207	34.352	1.306	33.046	ND	NA	Clear
G1-2A	3/23/2021	3.221	34.352	0.925	33.427	ND	NA	Biofoul on probe, sample clear
G1-2A	8/12/2021	3.098	34.352	2.941	31.411	ND	NA	insufficient water for sample
G1-2A	8/26/2021	3.208	34.352	1.122	33.230	ND	NA	Clear
G1-2A	8/26/2021	3.208	34.352	1.122	33.230	ND	NA	Water level meter: Heron Dipper-TSerial:
G1-2A	3/28/2022	3.202	34.352	0.308	34.044	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-2A	8/23/2022	3.203	34.352	1.103	33.249	ND	NA	cloudy, no odor
G1-2A	3/7/2023	3.229	34.352	1.242	33.110	ND	NA	Clear; none odour
G1-2A	8/15/2023	3.214	34.352	1.205	33.147	ND	NA	Clear, no odour.
G1-2B	6/5/2014	6.260	34.255	1.365	32.890	ND	NA	Clear; DUP-34
G1-2B	9/3/2014	6.260	34.255	1.300	32.955	ND	NA	Clear
G1-2B	4/21/2015	6.260	34.255	1.270	32.985	ND	NA	Clear
G1-2B	9/1/2015	6.260	34.255	1.320	32.935	ND	NA	Clear
G1-2B	3/15/2016	6.240	34.255	1.160	33.095	ND	NA	Clear
G1-2B	9/26/2016	6.190	34.255	1.230	33.025	ND	NA	Clear
G1-2B	4/19/2017	6.260	34.255	1.280	32.975	ND	NA	Clear
G1-2B	8/31/2017	6.270	34.255	1.290	32.965	ND	NA	Clear
G1-2B	4/16/2018	6.260	34.255	1.320	32.935	ND	NA	Clear
G1-2B	9/6/2018	6.270	34.255	1.235	33.020	ND	NA	Clear; sampled; DUP-6
G1-2B	3/28/2019	6.259	34.255	1.203	33.052	ND	NA	Slighltly silty (brown/orange)
G1-2B	9/24/2019	6.271	34.255	1.203	33.052	ND	NA	Clear
G1-2B	3/18/2020	6.257	34.255	1.321	32.934	ND	NA	Clear, possible DO probe malfunction, DUP-2
G1-2B	8/26/2020	6.255	34.255	1.253	33.002	ND	NA	Clear, DUP-5
G1-2B	3/23/2021	6.271	34.255	1.160	33.095	ND	NA	Clear
G1-2B	8/26/2021	6.255	34.255	1.291	32.964	ND	NA	Clear
G1-2B	8/26/2021	6.255	34.255	1.291	32.964	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-2B	3/28/2022	6.255	34.255	1.186	33.069	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-2B	8/24/2022	6.260	34.255	1.302	32.953	ND	NA	clear, no odor
G1-2B	3/7/2023	6.195	34.255	1.250	33.005	ND	NA	Clear; no odour

AECOM

TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
G1-2B	8/15/2023	6.263	34.255	1.183	33.072	ND	NA	Clear; no odour
G1-5	6/2/2014	12.610	51.740	6.620	45.120	ND	NA	Clear
G1-5	9/2/2014	12.630	51.740	7.390	44.350	ND	NA	Turbid; DUP-21
G1-5	5/13/2015	12.640	51.740	6.650	45.090	ND	NA	Clear; DUP-14
G1-5	9/23/2015	12.655	51.740	7.180	44.560	ND	NA	Slightly turbid; medium biofoul
G1-5	4/4/2016	12.530	51.740	6.390	45.350	ND	NA	Clear
G1-5	9/22/2016	12.530	51.740	7.060	44.680	ND	NA	Clear
G1-5	4/15/2017	12.610	51.740	6.110	45.630	ND	NA	Clear
G1-5	8/30/2017	12.640	51.740	7.200	44.540	ND	NA	Clear
G1-5	4/10/2018	15.140	51.740	7.503	44.237	ND	NA	Well purged dry after 12.5L; clear; sampled on recharge
G1-5	5/3/2018	12.623	51.740	6.580	45.160	ND	NA	Clear; sampled
G1-5	9/5/2018	12.612	51.740	7.358	44.382	ND	NA	Well purged dry after 17L; clear; sampled on recharge
G1-5	4/2/2019	12.608	51.740	6.752	44.988	ND	NA	clear; sampled on recharge
G1-5	9/19/2019	12.613	51.740	6.945	44.795	ND	NA	Slightly cloudy (grey); slightly silty
G1-5	3/19/2020	12.617	51.740	6.582	45.158	ND	NA	Bailed dry at 20L, clear sample with minor sediments
G1-5	8/17/2020	12.628	51.740	7.179	44.561	ND	NA	Bailed dry at 20L, could not sample, poor recharge
G1-5	8/25/2020	12.594	51.740	7.452	44.288	ND	NA	Bailed dry at 19L, sampled on recharge, sample taken on 24/8/20 too cloudy; sample taken on 25/8/20 clear, submitted
G1-5	3/18/2021	12.621	51.740	6.780	44.960	ND	NA	Clear
G1-5	8/26/2021	12.617	51.740	7.376	44.364	ND	NA	Clear, going dry at 5.5L
G1-5	8/26/2021	12.617	51.740	7.376	44.364	ND	NA	Water level meter: Heron Dipper-TSerial:
G1-5	3/22/2022	12.614	51.740	6.029	45.711	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-5	8/24/2022	10.612	51.740	7.090	44.650	ND	NA	slightly cloudy, some silt settling out, no odor
G1-5	3/8/2023	12.670	51.740	6.228	45.512	ND	NA	
G1-5	8/14/2023	12.613	51.740	7.162	44.578	ND	NA	Clear, no odour
G1-6	6/2/2014	10.795	42.179	5.585	36.594	ND	NA	Clear
G1-6	9/22/2014	10.795	42.179	6.040	36.139	ND	NA	Clear
G1-6	5/13/2015	10.810	42.179	5.840	36.339	ND	NA	Clear
G1-6	9/23/2015	10.840	42.179	5.790	36.389	ND	NA	Clear
G1-6	4/4/2016	10.730	42.179	5.250	36.929	ND	NA	Clear
G1-6	9/22/2016	10.750	42.179	5.810	36.369	ND	NA	
G1-6	4/15/2017	10.800	42.179	4.670	37.509	ND	NA	Clear
G1-6	4/10/2018	10.790	42.179	4.590	37.589	ND	NA	Clear
G1-6	5/3/2018	10.790	42.179	5.188	36.991	ND	NA	Clear; sampled
G1-6	9/5/2018	10.805	42.179	5.450	36.729	ND	NA	Sampled
G1-6	4/2/2019	10.803	42.179	5.469	36.710	ND	NA	Clear; sampled on recharge; DUP-09
G1-6	9/19/2019	10.811	42.179	5.244	36.935	ND	NA	Clear
G1-6	3/18/2020	10.754	42.179	5.219	36.960	ND	NA	Solid tone at surface, BC: clear; sample is clear
G1-6	8/24/2020	10.792	42.179	5.672	36.507	ND	NA	Clear
G1-6	3/18/2021	10.801	42.179	5.232	36.947	ND	NA	Clear
G1-6	8/26/2021	10.800	42.179	5.825	36.354	ND	NA	Clear
G1-6	8/26/2021	10.800	42.179	5.825	36.354	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-6	3/22/2022	10.771	42.179	4.499	37.680	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-6	8/24/2022	10.798	42.179	5.826	36.353	ND	NA	slightly white, no odor, no silt in sample or bailer, slightly cloudy
G1-6	3/20/2023	10.922	42.179	5.073	37.106	ND	NA	Clear; no odour
G1-6	8/23/2023	10.796	42.179	5.880	36.299	ND	NA	Clear, no odour
G1-6	8/29/2023	11.800	42.179	5.907	36.272	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
G1-7A	6/2/2014	2.710	34.913	1.500	33.413	ND	NA	Clear
G1-7A	9/22/2014	2.710	34.913	1.800	33.113	ND	NA	Clear
G1-7A	5/4/2015	2.700	34.913	1.550	33.363	ND	NA	Clear
G1-7A	9/23/2015	2.700	34.913	1.630	33.283	ND	NA	Clear; Purged dry at 2 L; Parameters a sample collected on recharge
G1-7A	3/17/2016	2.710	34.913	1.510	33.403	ND	NA	Clear; Purged dry at 5 L; Parameters a sample collected on recharge
G1-7A	9/22/2016	2.710	34.913	1.650	33.263	ND	NA	Clear
G1-7A	4/15/2017	2.710	34.913	1.470	33.443	ND	NA	Clear
G1-7A	8/30/2017	2.730	34.913	2.110	32.803	ND	NA	Clear; EPH collected Aug 31 at 9:30am
G1-7A	4/11/2018	2.703	34.913	1.500	33.413	ND	NA	Slightly cloudy (grey); sampled
G1-7A	5/7/2018	2.704	34.913	1.575	33.338	ND	NA	Slightly cloudy (grey); sampled
G1-7A	9/4/2018	2.620	34.913	2.142	32.771	ND	NA	Clear; sampled, no metals collected due to minimum water
G1-7A	4/4/2019	2.709	34.913	1.632	33.281	ND	NA	clear
G1-7A	9/23/2019	2.680	34.913	1.600	33.313	ND	NA	Plurged dry at 18L; sampled on recharge; Clear
G1-7A	3/19/2020	2.696	34.913	1.692	33.221	ND	NA	Clear
G1-7A	8/25/2020	2.709	34.913	1.743	33.170	ND	NA	Slightly cloudy (grey)
G1-7A	3/22/2021	2.712	34.913	1.658	33.255	ND	NA	Clear
G1-7A	8/26/2021	2.707	34.913	1.909	33.004	ND	NA	Clear
G1-7A	8/26/2021	2.707	34.913	1.909	33.004	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-7A	3/22/2022	2.701	34.913	1.562	33.351	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-7A	8/18/2022	2.703	34.913	1.947	32.966	ND	NA	clear, no odor
G1-7A	3/8/2023	2.712	34.913	1.333	33.580	ND	NA	
G1-7A	8/14/2023	2.706	34.913	1.631	33.282	ND	NA	Clear, no odour
G1-7B	6/2/2014	15.150	34.910	3.180	31.730	ND	NA	Clear
G1-7B	9/23/2014	15.160	34.910	3.220	31.690	ND	NA	Clear
G1-7B	5/4/2015	15.150	34.910	3.060	31.850	ND	NA	Clear
G1-7B	9/23/2015	15.190	34.910	3.160	31.750	ND	NA	Clear; DUP-16
G1-7B	3/17/2016	15.170	34.910	2.870	32.040	ND	NA	Clear
G1-7B	9/22/2016	15.170	34.910	2.930	31.980	ND	NA	
G1-7B	4/15/2017	15.230	34.910	3.100	31.810	ND	NA	Clear
G1-7B	8/31/2017	15.270	34.910	3.670	31.240	ND	NA	Clear
G1-7B	4/11/2018	15.418	34.910	4.760	30.150	ND	NA	Slightly cloudy (grey); sampled; DUP-3
G1-7B	5/7/2018	15.450	34.910	2.898	32.012	ND	NA	Slightly cloudy (grey); sampled; DUP-3
G1-7B	9/4/2018	15.430	34.910	3.535	31.375	ND	NA	Clear; sampled;
G1-7B	4/4/2019	15.420	34.910	3.407	31.503	ND	NA	Clear; sampled on recharge; DUP-11
G1-7B	9/23/2019	15.460	34.910	3.485	31.425	ND	NA	Clear; DUP-6
G1-7B	3/19/2020	15.424	34.910	3.291	31.619	ND	NA	Clear
G1-7B	8/26/2020	15.487	34.910	3.519	31.391	ND	NA	Clear
G1-7B	3/22/2021	15.715	34.910	3.921	30.989	ND	NA	Clear
G1-7B	8/26/2021	15.706	34.910	5.281	29.629	ND	NA	Clear
G1-7B	8/26/2021	15.706	34.910	5.281	29.629	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-7B	3/22/2022	15.701	34.910	5.187	29.723	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-7B	8/23/2022	15.950	34.910	5.083	29.827	ND	NA	sample clear
G1-7B	3/8/2023	16.073	34.910	4.302	30.608	ND	NA	
G1-7B	8/14/2023	16.069	34.910	4.731	30.179	ND	NA	Clear, no odour
G1-8	6/4/2014	13.745	34.663	3.205	31.458	ND	NA	Purged dry at 30 L; quick recharge
G1-8	9/23/2014	13.730	34.663	3.570	31.093	ND	NA	Clear; DUP-27
G1-8	5/13/2015	13.750	34.663	3.370	31.293	ND	NA	Clear
G1-8	9/23/2015	13.790	34.663	3.410	31.253	ND	NA	Clear; DUP-17
G1-8	3/21/2016	13.700	34.663	2.450	32.213	ND	NA	Clear
G1-8	9/26/2016	13.720	34.663	2.630	32.033	ND	NA	
G1-8	4/19/2017	13.750	34.663	2.100	32.563	ND	NA	Clear; DUP-12
G1-8	8/31/2017	13.770	34.663	2.330	32.333	ND	NA	Clear; DUP-5
G1-8	4/12/2018	13.735	34.663	2.050	32.613	ND	NA	Clear; sampled
G1-8	9/4/2018	13.718	34.663	2.247	32.416	ND	NA	sampled
G1-8	4/3/2019	13.736	34.663	2.146	32.517	ND	NA	Clear
G1-8	9/23/2019	13.750	34.663	2.080	32.583	ND	NA	Clear
G1-8	3/18/2020	13.734	34.663	3.156	31.507	ND	NA	Clear
G1-8	8/26/2020	13.738	34.663	2.984	31.679	ND	NA	Clear
G1-8	3/23/2021	13.748	34.663	3.137	31.526	ND	NA	Purged dry at 16L, sampled on recharge same day,
G1-8	8/30/2021	13.736	34.663	3.214	31.449	ND	NA	Clear
G1-8	8/30/2021	13.736	34.663	3.214	31.449	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G1-8	3/28/2022	13.734	34.663	2.841	31.822	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G1-8	8/22/2022	13.735	34.663	3.725	30.938	ND	NA	clear, no odor
G1-8	3/7/2023	13.750	34.663	3.583	31.080	ND	NA	Clear; no odour
G1-8	8/15/2023	13.741	34.663	3.715	30.948	ND	NA	Clear, no odour
NDM97-2	6/4/2014	4.980	34.701	0.000	34.701	ND	NA	J-plug off; redevelop with watera 5 times volume
NDM97-2	9/23/2014	5.030	34.701	1.100	33.601	ND	NA	Clear
NDM97-2	5/13/2015	5.040	34.701	1.170	33.531	ND	NA	Clear
NDM97-2	9/23/2015	5.040	34.701	0.580	34.121	ND	NA	Clear
NDM97-2	3/21/2016	5.050	34.701	0.420	34.281	ND	NA	Clear; DUP-10
NDM97-2	9/26/2016	5.050	34.701	0.530	34.171	ND	NA	
NDM97-2	4/19/2017	5.050	34.701	0.700	34.001	ND	NA	
NDM97-2	8/31/2017	5.060	34.701	0.960	33.741	ND	NA	Clear
NDM97-2	4/12/2018	5.062	34.701	0.427	34.274	ND	NA	Silty; clear
NDM97-2	9/4/2018	5.060	34.701	0.837	33.864	ND	NA	Clear; sampled
NDM97-2	3/28/2019	5.053	34.701	0.523	34.178	ND	NA	Clear
NDM97-2	9/23/2019	5.050	34.701	0.575	34.126	ND	NA	Clear
NDM97-2	3/18/2020	5.032	34.701	0.902	33.799	ND	NA	Clear
NDM97-2	8/26/2020	5.045	34.701	1.409	33.292	ND	NA	Clear
NDM97-2	3/23/2021	5.049	34.701	0.824	33.877	ND	NA	Clear
NDM97-2	8/20/2021	5.043	34.701	0.957	33.744	ND	NA	Clear
NDM97-2	8/30/2021	5.043	34.701	0.957	33.744	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
NDM97-2	3/28/2022	5.048	34.701	0.492	34.209	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
NDM97-2	8/22/2022	5.046	34.701	0.881	33.820	ND	NA	clear, no odor
NDM97-2	3/7/2023	5.064	34.701	0.735	33.966	ND	NA	Clear; no odour
NDM97-2	8/23/2023	5.052	34.701	0.929	33.772	ND	NA	Clear; no odour
A1-12S	5/23/2014	2.355	55.141	1.215	53.926	ND	NA	Clear
A1-12S	9/2/2014	2.355	55.141	1.390	53.751	ND	NA	Clear
A1-12S	4/1/2015	2.370	55.141	0.920	54.221	ND	NA	Clear
A1-12S	9/1/2015	2.355	55.141	1.040	54.101	ND	NA	Clear
A1-12S	3/16/2016	2.360	55.141	1.040	54.101	ND	NA	Clear
A1-12S	10/4/2016	2.360	55.141	1.160	53.981	ND	NA	Clear
A1-12S	4/28/2017	2.360	55.141	1.100	54.041	ND	NA	Clear
A1-12S	9/14/2017	2.360	55.141	1.290	53.851	ND	NA	Clear
A1-12S	4/9/2018	2.360	55.141	0.910	54.231	ND	NA	Purged dry at 3.5 L; sampled on the following day; clear
A1-12S	8/28/2018	2.360	55.141	1.543	53.598	ND	NA	Clear; sampled; DUP-3
A1-12S	3/27/2019	2.364	55.141	1.293	53.848	ND	NA	murky; brown colour, sampled on recharge
A1-12S	9/24/2019	2.360	55.141	0.758	54.383	ND	NA	Clear
A1-12S	3/17/2020	2.347	55.141	1.277	53.864	ND	NA	Clear
A1-12S	8/27/2020	2.372	55.141	1.336	53.805	ND	NA	Clear
A1-12S	3/25/2021	2.362	55.141	0.880	54.261	ND	NA	Clear
A1-12S	8/25/2021	2.366	55.141	1.455	53.686	ND	NA	clear
A1-12S	8/25/2021	2.366	55.141	1.437	53.704	ND	NA	
A1-12S	3/24/2022	2.352	55.141	0.834	54.307	ND	NA	
A1-12S	8/17/2022	2.356	55.141	1.034	54.107	ND	NA	clear, no odor
A1-12S	3/20/2023	2.359	55.141	1.173	53.968	ND	NA	Clear; no odour

AECOM

TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A1-12S	8/23/2023	2.358	55.141	1.418	53.723	ND	NA	Clear; no odour
A1-12D	5/23/2014	3.940	55.029	1.300	53.729	ND	NA	Clear, DUP-24
A1-12D	9/2/2014	3.950	55.029	1.420	53.609	ND	NA	Clear, DUP-20
A1-12D	4/1/2015	3.950	55.029	1.000	54.029	ND	NA	DUP-6
A1-12D	9/1/2015	3.940	55.029	1.150	53.879	ND	NA	Silt on probe; DUP-10
A1-12D	3/16/2016	3.960	55.029	1.030	53.999	ND	NA	Clear
A1-12D	10/4/2016	3.960	55.029	1.310	53.719	ND	NA	Clear; DUP-10
A1-12D	4/27/2017	3.950	55.029	1.250	53.779	ND	NA	Clear; DUP-15
A1-12D	9/14/2017	3.970	55.029	1.400	53.629	ND	NA	Clear
A1-12D	4/9/2018	6.549	55.029	3.243	51.786	ND	NA	Clear; DUP-2
A1-12D	8/28/2018	3.951	55.029	1.485	53.544	ND	NA	Clear; sampled
A1-12D	3/27/2019	3.952	55.029	1.382	53.647	ND	NA	slightly silty (brown); DUP-07
A1-12D	9/24/2019	3.960	55.029	1.070	53.959	ND	NA	Clear
A1-12D	3/17/2020	3.941	55.029	1.282	53.747	ND	NA	Clear sample, minor orange biofoul on probe
A1-12D	8/27/2020	3.962	55.029	1.439	53.590	ND	NA	Clear
A1-12D	3/25/2021	3.949	55.029	0.998	54.031	ND	NA	Slightly turbid, orange
A1-12D	8/25/2021	3.951	55.029	1.455	53.574	ND	NA	Clear,
A1-12D	8/25/2021	3.951	55.029	1.455	53.574	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A1-12D	3/24/2022	3.934	55.029	0.914	54.115	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A1-12D	8/17/2022	3.841	55.029	1.331	53.698	ND	NA	clear, no odor
A1-12D	3/20/2023	3.960	55.029	1.310	53.719	ND	NA	Clear; no odour
A1-12D	8/23/2023	3.945	55.029	1.458	53.571	ND	NA	Clear; no odour
A1-12C	5/23/2014	6.590	55.346	3.505	51.841	ND	NA	Well cap punctured on arrival
A1-12C	9/2/2014	6.600	55.346	3.670	51.676	ND	NA	Clear
A1-12C	4/1/2015	6.590	55.346	3.300	52.046	ND	NA	Clear
A1-12C	9/1/2015	6.585	55.346	3.480	51.866	ND	NA	Clear
A1-12C	3/16/2016	6.580	55.346	3.340	52.006	ND	NA	Clear; DUP-7
A1-12C	10/4/2016	6.620	55.346	3.630	51.716	ND	NA	Clear
A1-12C	4/27/2017	6.570	55.346	3.240	52.106	ND	NA	J-plug missing
A1-12C	9/14/2017	6.570	55.346	3.650	51.696	ND	NA	Clear
A1-12C	4/9/2018	3.952	55.346	0.979	54.367	ND	NA	Clear
A1-12C	8/30/2018	6.543	55.346	3.684	51.662	ND	NA	Clear; sampled
A1-12C	3/27/2019	6.550	55.346	3.480	51.866	ND	NA	Cloudy
A1-12C	9/24/2019	6.561	55.346	3.373	51.973	ND	NA	Clear
A1-12C	3/17/2020	6.531	55.346	3.294	52.052	ND	NA	Clear, well cap off on arrival
A1-12C	8/27/2020	6.586	55.346	3.559	51.787	ND	NA	Clear
A1-12C	3/25/2021	6.459	55.346	3.101	52.245	ND	NA	Clear, DUP-08
A1-12C	8/25/2021	6.554	55.346	3.661	51.685	ND	NA	DUP-05
A1-12C	8/25/2021	6.554	55.346	3.661	51.685	ND	NA	Water level meter: Heron Dipper-TSerial:
A1-12C	3/24/2022	6.438	55.346	2.936	52.410	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A1-12C	8/17/2022	6.433	55.346	3.392	51.954	ND	NA	grey
A1-12C	3/20/2023	6.465	55.346	2.986	52.360	ND	NA	
A1-12C	8/23/2023	6.431	55.346	3.535	51.811	ND	NA	Clear; no odour
MW17-4	7/17/2017	1.360	52.883	0.800	52.083	ND	NA	Clear
MW17-4	4/5/2018	1.283	52.883	0.756	52.127	ND	NA	Clear
MW17-4	8/30/2018	1.280	52.883	0.851	52.032	ND	NA	Clear; sampled
MW17-4	3/28/2019	1.360	52.883	0.823	52.060	ND	NA	Clear; sampled on recharge
MW17-4	9/24/2019	1.359	52.883	0.776	52.107	ND	NA	Clear
MW17-4	3/17/2020	1.358	52.883	0.807	52.076	ND	NA	Clear
MW17-4	8/19/2020	1.355	52.883	0.853	52.030	ND	NA	Clear
MW17-4	3/23/2021	1.370	52.883	0.751	52.132	ND	NA	Clear
MW17-4	8/24/2021	1.356	52.883	0.772	52.111	ND	NA	Clear
MW17-4	8/24/2021	1.356	52.883	0.772	52.111	ND	NA	Water level meter: Heron Dipper-TSerial:
MW17-4	3/24/2022	1.346	52.883	0.652	52.231	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW17-4	8/17/2022	1.354	52.883	0.726	52.157	ND	NA	clear
MW17-4	3/20/2023	1.277	52.883	0.677	52.206	ND	NA	
MW17-4	8/23/2023	1.282	52.883	0.725	52.158	ND	NA	Clear, no odour
A3MW02-05	5/28/2014	6.000	33.042	2.750	30.292	ND	NA	Orange biofouling; DUP-29
A3MW02-05	8/27/2014	6.010	33.042	3.200	29.842	ND	NA	Slight biofoul; DUP-19
A3MW02-05	4/9/2015	6.010	33.042	2.755	30.287	ND	NA	Clear; DUP-8
A3MW02-05	9/2/2015	5.990	33.042	3.500	29.542	ND	NA	Clear
A3MW02-05	9/14/2015	5.990	33.042	3.590	29.452	ND	NA	Clear
A3MW02-05	10/14/2015	6.020	33.042	3.330	29.712	ND	NA	Sediment on probe
A3MW02-05	3/15/2016	6.020	33.042	2.690	30.352	ND	NA	Minor biofouling on probe
A3MW02-05	9/19/2016	6.020	33.042	3.870	29.172	ND	NA	Clear
A3MW02-05	4/25/2017	6.040	33.042	1.810	31.232	ND	NA	Clear
A3MW02-05	9/21/2017	6.030	33.042	4.520	28.522	ND	NA	Clear
A3MW02-05	5/1/2018	6.032	33.042	1.893	31.149	ND	NA	Clear
A3MW02-05	9/13/2018	6.020	33.042	4.468	28.574	ND	NA	Clear
A3MW02-05	4/9/2019	6.033	33.042	2.074	30.968	ND	NA	Clear; slightly yellow tinged; minor orange sediment
A3MW02-05	9/26/2019	6.040	33.042	2.290	30.752	ND	NA	Clear
A3MW02-05	3/23/2020	6.031	33.042	2.301	30.741	ND	NA	BC: Clear; orange biofoul on probe, minor orange biofoul in sample
A3MW02-05	8/19/2020	6.023	33.042	3.510	29.532	ND	NA	Clear, DUP-04
A3MW02-05	3/25/2021	6.025	33.042	1.908	31.134	ND	NA	Clear
A3MW02-05	8/25/2021	6.040	33.042	3.408	29.634	ND	NA	Clear
A3MW02-05	8/25/2021	6.040	33.042	3.408	29.634	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A3MW02-05	3/24/2022	6.036	33.042	1.822	31.220	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW02-05	8/17/2022	6.045	33.042	3.150	29.892	ND	NA	cloudy
A3MW02-05	3/14/2023	6.090	33.042	1.959	31.083	ND	NA	
A3MW02-05	8/21/2023	6.037	33.042	3.633	29.409	ND	NA	Clear, no odour
A3MW02-06	5/28/2014	6.130	33.121	2.230	30.891	ND	NA	Slightly turbid
A3MW02-06	8/27/2014	6.200	33.121	3.880	29.241	ND	NA	
A3MW02-06	4/9/2015	6.165	33.121	2.370	30.751	ND	NA	
A3MW02-06	9/2/2015	6.180	33.121	3.220	29.901	ND	NA	Clear
A3MW02-06	9/14/2015	6.220	33.121	3.040	30.081	ND	NA	Clear
A3MW02-06	10/14/2015	6.250	33.121	2.620	30.501	ND	NA	Clear; Silt on probe
A3MW02-06	3/15/2016	6.220	33.121	2.100	31.021	ND	NA	Slight tubid; Minor biofoul in flow cell
A3MW02-06	9/19/2016	6.250	33.121	3.250	29.871	ND	NA	slight tubid;
A3MW02-06	4/25/2017	6.260	33.121	2.370	30.751	ND	NA	Clear
A3MW02-06	9/20/2017	6.200	33.121	3.880	29.241	ND	NA	Clear
A3MW02-06	4/17/2018	6.260	33.121	2.420	30.701	ND	NA	Clear
A3MW02-06	9/25/2018	6.260	33.121	3.150	29.971	ND	NA	Clear
A3MW02-06	4/8/2019	6.250	33.121	2.671	30.450	ND	NA	Cloudy; Yellow tinged; sediments present
A3MW02-06	9/26/2019	6.266	33.121	2.787	30.334	ND	NA	Clear
A3MW02-06	3/24/2020	6.256	33.121	2.928	30.193	ND	NA	Clear
A3MW02-06	8/19/2020	6.251	33.121	3.238	29.883	ND	NA	Clear
A3MW02-06	3/25/2021	6.275	33.121	2.614	30.507	ND	NA	Silt on probe, slightly turbid, yellow
A3MW02-06	8/25/2021	6.255	33.121	3.011	30.110	ND	NA	Clear
A3MW02-06	8/25/2021	6.255	33.121	3.011	30.110	ND	NA	Water level meter: Heron Dipper-TSerial:
A3MW02-06	3/23/2022	6.255	33.121	2.621	30.500	ND	NA	Some silt came through during sample collection towards the end of filling the vials
A3MW02-06	8/17/2022	6.284	33.121	2.968	30.153	ND	NA	clear, no odor
A3MW02-06	3/9/2023	6.262	33.121	2.896	30.225	ND	NA	Water level meter: Solinst 122Serial: 31334
A3MW02-06	8/21/2023	6.086	33.121	3.332	29.789	ND	NA	Clear, no odour
A3MW02-07	5/28/2014	5.430	33.371	2.620	30.751	ND	NA	Clear
A3MW02-07	8/27/2014	5.430	33.371	3.070	30.301	ND	NA	Clear
A3MW02-07	4/9/2015	5.440	33.371	2.250	31.121	ND	NA	Purged dry at 4 L; Clear
A3MW02-07	9/2/2015	5.430	33.371	3.330	30.041	ND	NA	Clear
A3MW02-07	9/14/2015	5.450	33.371	2.820	30.551	ND	NA	Clear
A3MW02-07	10/14/2015	5.440	33.371	2.430	30.941	ND	NA	Clear
A3MW02-07	3/15/2016	5.440	33.371	2.140	31.231	ND	NA	Clear
A3MW02-07	9/19/2016	5.450	33.371	3.100	30.271	ND	NA	
A3MW02-07	4/20/2017	5.440	33.371	2.220	31.151	ND	NA	Clear
A3MW02-07	9/20/2017	6.250	33.371	3.690	29.681	ND	NA	Clear
A3MW02-07	4/17/2018	5.460	33.371	2.140	31.231	ND	NA	Clear; DUP-6
A3MW02-07	9/25/2018	5.455	33.371	2.855	30.516	ND	NA	Clear
A3MW02-07	10/15/2018	5.455	33.371	2.855	30.516	ND	NA	Clear; sampled
A3MW02-07	4/9/2019	5.450	33.371	2.601	30.770	ND	NA	Clear
A3MW02-07	9/26/2019	5.481	33.371	2.702	30.669	ND	NA	Clear
A3MW02-07	3/24/2020	5.452	33.371	2.540	30.831	ND	NA	Clear, DUP-04
A3MW02-07	8/19/2020	5.463	33.371	3.023	30.348	ND	NA	Clear, DUP-03, trace suspeed sediment
A3MW02-07	3/29/2021	5.463	33.371	2.564	30.807	ND	NA	Clear, DUP-09
A3MW02-07	8/25/2021	5.444	33.371	2.889	30.482	ND	NA	Clear
A3MW02-07	8/25/2021	5.444	33.371	2.889	30.482	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A3MW02-07	3/23/2022	5.458	33.371	2.358	31.013	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW02-07	8/17/2022	5.457	33.371	2.773	30.598	ND	NA	clear, no odor
A3MW02-07	3/9/2023	5.465	33.371	2.499	30.872	ND	NA	Clear; no odour
A3MW02-07	8/21/2023	5.446	33.371	3.344	30.027	ND	NA	Clear, no odour
A3MW02-08	5/28/2014	4.540	33.072	1.530	31.542	ND	NA	Clear
A3MW02-08	8/27/2014	4.590	33.072	2.280	30.792	ND	NA	Clear
A3MW02-08	4/9/2015	4.620	33.072	1.535	31.537	ND	NA	Clear
A3MW02-08	9/12/2015	4.610	33.072	1.770	31.302	ND	NA	Slightly turbid
A3MW02-08	9/14/2015	4.750	33.072	1.910	31.162	ND	NA	Clear
A3MW02-08	10/14/2015	4.755	33.072	1.520	31.552	ND	NA	Slightly turbid
A3MW02-08	3/15/2016	4.780	33.072	1.190	31.882	ND	NA	Turbid
A3MW02-08	9/19/2016	4.830	33.072	1.700	31.372	ND	NA	Clear
A3MW02-08	4/20/2017	4.880	33.072	1.390	31.682	ND	NA	Clear
A3MW02-08	9/20/2017	5.400	33.072	3.890	29.182	ND	NA	Slightly turbid; DUP-9
A3MW02-08	4/17/2018	4.930	33.072	1.120	31.952	ND	NA	Turbid; sampled
A3MW02-08	9/25/2018	4.965	33.072	1.592	31.480	ND	NA	Clear; sampled
A3MW02-08	4/9/2019	4.948	33.072	1.215	31.857	ND	NA	silty/cloudy
A3MW02-08	9/26/2019	4.990	33.072	1.175	31.897	ND	NA	Clear, DUP-10
A3MW02-08	3/24/2020	4.994	33.072	1.648	31.424	ND	NA	slightly turbid, pumping out clear water, minor sediment, sample clear
A3MW02-08	8/19/2020	5.022	33.072	2.146	30.926	ND	NA	Cloudy grey, trace silt
A3MW02-08	3/29/2021	5.028	33.072	1.396	31.676	ND	NA	Clear
A3MW02-08	8/25/2021	4.992	33.072	2.152	30.920	ND	NA	Clear
A3MW02-08	8/25/2021	4.992	33.072	2.152	30.920	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A3MW02-08	3/23/2022	5.004	33.072	1.082	31.990	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW02-08	8/17/2022	4.993	33.072	1.928	31.144	ND	NA	cloudy
A3MW02-08	3/9/2023	4.998	33.072	1.304	31.768	ND	NA	
A3MW02-08	8/21/2023	5.000	33.072	2.065	31.007	ND	NA	Clear, no odour
A3MW03-01	5/29/2014	5.490	31.896	3.890	28.006	ND	NA	Clear; Heavy biofoul
A3MW03-01	8/27/2014	5.500	31.896	3.360	28.536	ND	NA	Clear; DUP-18

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TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A3MW03-01	4/10/2015	5.500	31.896	3.745	28.151	ND	NA	Clear
A3MW03-01	9/3/2015	5.490	31.896	3.030	28.866	ND	NA	Clear; Brackish
A3MW03-01	3/15/2016	5.490	31.896	2.720	29.176	ND	NA	Clear
A3MW03-01	9/21/2016	5.480	31.896	2.920	28.976	ND	NA	Clear
A3MW03-01	4/26/2017	5.500	31.896	3.410	28.486	ND	NA	Clear
A3MW03-01	9/21/2017	5.500	31.896	3.500	28.396	ND	NA	Clear
A3MW03-01	4/16/2018	5.500	31.896	4.780	27.116	ND	NA	Clear
A3MW03-01	9/10/2018	5.493	31.896	3.521	28.375	ND	NA	Sampled
A3MW03-01	4/9/2019	5.479	31.896	3.330	28.566	ND	NA	clear, minor sediments
A3MW03-01	9/25/2019	5.520	31.896	3.950	27.946	ND	NA	Clear
A3MW03-01	3/23/2020	5.488	31.896	3.846	28.050	ND	NA	Clear
A3MW03-01	8/20/2020	5.491	31.896	3.662	28.234	ND	NA	Clear; solid tone at surface, BC: no sheen/globules/NAPL, no odour, no signs of NAPL in purge water
A3MW03-01	3/25/2021	5.502	31.896	3.482	28.414	ND	NA	Clear
A3MW03-01	8/25/2021	5.481	31.896	3.862	28.034	ND	NA	Clear
A3MW03-01	8/25/2021	5.481	31.896	3.862	28.034	ND	NA	Water level meter: Heron Dipper-TSerial:
A3MW03-01	3/23/2022	5.476	31.896	2.642	29.254	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW03-01	8/16/2022	5.157	31.896	3.851	28.045	ND	NA	clear, no odor
A3MW03-01	8/16/2022	5.157	31.896	3.851	28.045	ND	NA	resample for eph only
A3MW03-01	8/23/2022	5.483	31.896	3.912	27.984	ND	NA	resample for eph only
A3MW03-01	3/14/2023	5.515	31.896	3.700	28.196	ND	NA	Water level meter: Solinst 122Serial: 31334
A3MW03-01	8/21/2023	5.477	31.896	3.622	28.274	ND	NA	Clear; no odour
A3MW03-02	5/29/2014	7.900	33.185	4.580	28.605	ND	NA	NAPL stained tubing (bottom), Hydrocarbon odour
A3MW03-02	8/27/2014	7.930	33.185	4.520	28.665	ND	NA	Clear
A3MW03-02	4/10/2015	7.920	33.185	4.350	28.835	ND	NA	Clear; DUP-9
A3MW03-02	9/3/2015	7.910	33.185	4.500	28.685	ND	NA	Clear
A3MW03-02	9/14/2015	7.910	33.185	4.870	28.315	ND	NA	Clear
A3MW03-02	10/15/2015	7.910	33.185	4.270	28.915	ND	NA	Clear; Chunky black particulate
A3MW03-02	3/15/2016	7.920	33.185	3.680	29.505	ND	NA	Clear; Minor biofoul
A3MW03-02	9/21/2016	7.920	33.185	4.460	28.725	ND	NA	DUP-7
A3MW03-02	4/26/2017	7.930	33.185	3.780	29.405	ND	NA	Clear
A3MW03-02	9/21/2017	7.930	33.185	4.580	28.605	ND	NA	Clear
A3MW03-02	4/12/2018	7.927	33.185	4.089	29.096	ND	NA	Clear
A3MW03-02	4/12/2018	7.927	33.185	4.089	29.096	ND	NA	Clear; DUP-5
A3MW03-02	9/10/2018	7.920	33.185	4.918	28.267	ND	NA	Clear
A3MW03-02	9/10/2018	7.920	33.185	4.918	28.267	ND	NA	Clear; sampled
A3MW03-02	4/9/2019	7.906	33.185	4.018	29.167	ND	NA	slightly cloudy/silty, some suspeed particles; globules present when purging; DUP-13
A3MW03-02	9/25/2019	7.928	33.185	4.635	28.550	ND	NA	Clear ; DUP-9
A3MW03-02	3/24/2020	7.908	33.185	4.313	28.872	ND	NA	Clear
A3MW03-02	8/20/2020	7.917	33.185	4.363	28.822	ND	NA	sample taken but too cloudy, will return to sample next week
A3MW03-02	8/25/2020	7.911	33.185	4.586	28.599	ND	NA	Clear with minor black floating particles; seco sampling attempt of 2020 dry season PMP
A3MW03-02	3/25/2021	7.931	33.185	4.059	29.126	ND	NA	Clear
A3MW03-02	8/25/2021	7.919	33.185	4.555	28.630	ND	NA	Clear
A3MW03-02	8/25/2021	7.919	33.185	4.555	28.630	ND	NA	Water level meter: Heron Dipper-TSerial:
A3MW03-02	3/23/2022	7.907	33.185	3.624	29.561	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW03-02	8/16/2022	7.908	33.185	4.569	28.616	ND	NA	clear
A3MW03-02	3/14/2023	7.919	33.185	4.126	29.059	ND	NA	Clear; no odour
A3MW03-02	8/21/2023	7.906	33.185	4.645	28.540	ND	NA	Clear; no odour
A3MW03-03	5/28/2014	6.460	32.868	4.560	28.308	ND	NA	Turbid
A3MW03-03	8/27/2014	6.560	32.868	4.650	28.218	ND	NA	Clear
A3MW03-03	4/9/2015	4.520	32.868	4.430	28.438	ND	NA	Well destroyed - infilled
A3MW03-03	7/8/2015	6.670	32.868	4.610	28.258	ND	NA	Clear; Well redeveloped successfully by Mac a Mac
A3MW03-03	9/2/2015	6.630	32.868	4.400	28.468	ND	NA	Clear
A3MW03-03	9/14/2015	6.640	32.868	4.620	28.248	ND	NA	Clear
A3MW03-03	10/14/2015	7.640	32.868	4.500	28.368	ND	NA	Clear
A3MW03-03	3/15/2016	6.650	32.868	3.950	28.918	ND	NA	Clear
A3MW03-03	10/12/2016	6.640	32.868	4.830	28.038	ND	NA	Clear
A3MW03-03	4/25/2017	6.660	32.868	4.340	28.528	ND	NA	Clear
A3MW03-03	9/20/2017	6.400	32.868	4.100	28.768	ND	NA	Clear
A3MW03-03	5/1/2018	6.650	32.868	4.255	28.613	ND	NA	Clear
A3MW03-03	9/25/2018	6.663	32.868	4.700	28.168	ND	NA	Clear; sampled
A3MW03-03	4/9/2019	4.157	32.868	3.952	28.916	ND	NA	clear; minor orange sediment; sample taken on recharge
A3MW03-03	9/26/2019	4.490	32.868	ND	NA	ND	NA	Dry
A3MW03-03	3/23/2020	6.194	32.868	4.556	28.312	ND	NA	Clear
A3MW03-03	8/19/2020	6.213	32.868	4.641	28.227	ND	NA	Clear
A3MW03-03	3/25/2021	4.427	32.868	4.299	28.569	ND	NA	Infilled, redevelopped on Mar 29 a 30
A3MW03-03	4/1/2021	6.698	32.868	4.234	28.634	ND	NA	Clear
A3MW03-03	8/25/2021	6.638	32.868	4.423	28.445	ND	NA	Clear
A3MW03-03	8/25/2021	6.638	32.868	4.423	28.445	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A3MW03-03	3/23/2022	6.637	32.868	3.755	29.113	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A3MW03-03	8/17/2022	6.638	32.868	4.528	28.340	ND	NA	clear
A3MW03-03	3/14/2023	4.306	32.868	3.883	28.985	ND	NA	Clear; no odour
A3MW03-03	8/21/2023	4.302	32.868	ND	NA	ND	NA	Dry
MW03-04	5/28/2014	6.630	33.316	4.970	28.346	ND	NA	Clear; DUP-28
MW03-04	8/27/2014	6.635	33.316	5.160	28.156	ND	NA	Clear
MW03-04	4/9/2015	6.630	33.316	4.885	28.431	ND	NA	Clear
MW03-04	9/2/2015	6.630	33.316	4.930	28.386	ND	NA	Clear; DUP-12
MW03-04	9/14/2015	6.630	33.316	5.100	28.216	ND	NA	Clear
MW03-04	10/14/2015	6.620	33.316	5.060	28.256	ND	NA	Clear
MW03-04	3/15/2016	6.640	33.316	4.410	28.906	ND	NA	Clear
MW03-04	9/19/2016	6.650	33.316	5.060	28.256	ND	NA	
MW03-04	4/25/2017	6.640	33.316	4.670	28.646	ND	NA	Clear; DUP-13
MW03-04	9/20/2017	6.600	33.316	3.880	29.436	ND	NA	Clear; DUP-10
MW03-04	4/18/2018	6.530	33.316	4.570	28.746	ND	NA	Clear; sampled
MW03-04	9/25/2018	6.675	33.316	5.046	28.270	ND	NA	Clear; sampled
MW03-04	4/8/2019	6.652	33.316	4.623	28.693	ND	NA	sampled on recharge
MW03-04	9/26/2019	6.655	33.316	4.885	28.431	ND	NA	Clear
MW03-04	3/23/2020	6.658	33.316	4.973	28.343	ND	NA	Clear
MW03-04	8/19/2020	6.650	33.316	4.877	28.439	ND	NA	Clear
MW03-04	3/29/2021	6.667	33.316	4.806	28.510	ND	NA	Clear
MW03-04	8/25/2021	6.663	33.316	4.878	28.438	ND	NA	Clear
MW03-04	8/17/2022	6.665	33.316	5.004	28.312	ND	NA	clear, no odor
MW03-04	3/14/2023	6.720	33.316	4.535	28.781	ND	NA	
MW03-04	8/21/2023	6.661	33.316	5.056	28.260	ND	NA	Clear, no odour
U6	5/28/2014	3.910	32.789	0.680	32.109	ND	NA	Clear
U6	8/27/2014	3.930	32.789	0.900	31.889	ND	NA	Clear
U6	4/9/2015	3.910	32.789	0.680	32.109	ND	NA	Clear
U6	9/2/2015	3.910	32.789	0.260	32.529	ND	NA	Clear
U6	3/15/2016	3.910	32.789	0.650	32.139	ND	NA	Clear
U6	9/19/2016	3.810	32.789	0.620	32.169	ND	NA	Clear
U6	4/20/2017	3.920	32.789	0.670	32.119	ND	NA	Clear
U6	9/14/2017	3.960	32.789	3.360	29.429	ND	NA	Clear
U6	4/17/2018	3.920	32.789	0.660	32.129	ND	NA	Clear
U6	9/25/2018	3.911	32.789	0.690	32.099	ND	NA	Clear
U6	4/8/2019	3.909	32.789	0.665	32.124	ND	NA	sediment; DUP-12
U6	9/26/2019	3.911	32.789	0.663	32.126	ND	NA	Clear
U6	3/24/2020	3.908	32.789	0.674	32.115	ND	NA	Clear
U6	8/19/2020	3.902	32.789	1.226	31.563	ND	NA	Clear
U6	3/29/2021	3.917	32.789	0.673	32.116	ND	NA	Clear
U6	8/25/2021	3.911	32.789	3.068	29.721	ND	NA	Clear
U6	8/25/2021	3.911	32.789	3.068	29.721	ND	NA	Water level meter: Heron Dipper-TSerial:
U6	3/23/2022	3.903	32.789	0.646	32.143	ND	NA	clear in tubing
U6	8/17/2022	3.924	32.789	1.850	30.939	ND	NA	clear
U6	3/9/2023	3.926	32.789	0.680	32.109	ND	NA	Clear; no odour
U6	8/21/2023	3.926	32.789	0.680	32.109	ND	NA	Unable to locate with pinfinder
U7	5/29/2014	5.550	32.618	2.050	30.568	ND	NA	Clear
U7	8/27/2014	5.570	32.618	2.700	29.918	ND	NA	Clear
U7	4/9/2015	5.540	32.618	1.860	30.758	ND	NA	Clear
U7	9/2/2015	5.500	32.618	2.580	30.038	ND	NA	Clear
U7	3/16/2016	5.560	32.618	0.650	31.968	ND	NA	Road box filled of water, J-plug off a well water compromised; Used riser pipe to purge 6 times well volume prior to collecting sample; Clea
U7	9/21/2016	5.540	32.618	2.280	30.338	ND	NA	Clear
U7	5/1/2017	5.580	32.618	1.530	31.088	ND	NA	Clear
U7	9/14/2017	6.520	32.618	4.380	28.238	ND	NA	Clear
U7	4/17/2018	6.540	32.618	1.060	31.558	ND	NA	Clear
U7	9/25/2018	6.540	32.618	3.114	29.504	ND	NA	Clear; sampled; DUP-8
U7	4/8/2019	6.515	32.618	1.692	30.926	ND	NA	clear, minor sediments
U7	9/26/2019	6.503	32.618	0.955	31.663	ND	NA	Clear
U7	3/24/2020	6.514	32.618	1.505	31.113	ND	NA	Clear
U7	8/19/2020	6.514	32.618	3.755	28.863	ND	NA	Went dry at 4L, sampled on recharge, clear
U7	3/29/2021	6.523	32.618	0.988	31.630	ND	NA	Clear
U7	8/25/2021	6.528	32.618	4.113	28.505	ND	NA	Clear
U7	8/25/2021	6.528	32.618	4.113	28.505	ND	NA	Water level meter: Heron Dipper-TSerial:
U7	3/23/2022	6.530	32.618	0.899	31.719	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
U7	8/17/2022	6.538	32.618	3.855	28.763	ND	NA	clear, no odor
U7	3/9/2023	6.550	32.618	1.692	30.926	ND	NA	Water level meter: Solinst 122Serial: 31334
U7	8/21/2023	6.546	32.618	4.061	28.557	ND	NA	Clear, no odour
U07-10S	2/25/2014	NM	32.950	4.340	28.610	ND	NA	Peristaltic pump confirmed DNAPL; Removed 5 mL NAPL using pump
U07-10S	3/24/2014	6.340	32.950	4.290	28.660	ND	NA	Peristaltic pump confirmed 2 mL of DNAPL; DNAPL on probe; Probe stoPassive skimmer beeping at 5.16m
U07-10S	5/29/2014	6.120	32.950	4.230	28.720	ND	NA	Purged dry at 4 L; DNAPL on e of tubing; sheen observed in purged water
U07-10S	7/4/2014	6.140	32.950	4.190	28.760	ND	NA	Purged <2 mm DNAPL from well
U07-10S	7/28/2014	6.140	32.950	4.235	28.715	ND	NA	Used peristaltic pump to bail well, fou DNAPL, DNAPL stuck on inside of tubing a visually spotted on the e of tubing; Slight hydrocarbon od
U07-10S	8/27/2014	6.140	32.950	4.500	28.450	ND	NA	Clear
U07-10S	9/22/2014	6.135	32.950	4.530	28.420	ND	NA	P.Pump: 5 mL; Used peristaltic pump to bail well, creosote odour a DNAPL pumped out of well; Black particulate on probe
U07-10S	10/29/2014	6.130	32.950	3.770	29.180	ND	NA	BC: Too shallow; DNAPL on e of probe
U07-10S	11/13/2014	6.135	32.950	4.180	28.770	ND	NA	BC: Too shallow; DNAPL on the bottom of well; DNAPL on probe.
U07-10S	12/18/2014	6.135	32.950	4.000	28.950	ND	NA	BC: DNAPL on the bottom of well; DNAPL on probe.
U07-10S	1/14/2015	6.140	32.950	4.270	28.680	ND	NA	BC: Clear; Dark coloured, heavy, fibrous a liquid substance on probe tip
U07-10S	4/10/2015	6.130	32.950	4.150	28.800	ND	NA	Sheen in water
U07-10S	9/2/2015	6.130	32.950	4.400	28.550	ND	NA	Clear; Dark coloured, heavy, fibrous a liquid substance on tubing; DUP-13
U07-10S	9/15/2015	6.150	32.950	4.340	28.610	ND	NA	Clear with sheen on sample; DUP-1
U07-10S	10/15/2015	6.130	32.950	4.450	28.500	ND	NA	Clear; Sheen
U07-10S	3/15/2016	6.130	32.950	3.810	29.140	ND	NA	Dark coloured, heavy, fibrous a liquid substance at the bottom; Hydro carbon odour
U07-10S	9/21/2016	6.130	32.950	4.590	28.360	ND	NA	Clear with creosoto odour

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TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
U07-10S	4/25/2017	6.150	32.950	3.920	29.030	ND	NA	Clear
U07-10S	9/21/2017	6.150	32.950	4.480	28.470	ND	NA	Clear
U07-10S	4/12/2018	6.157	32.950	4.004	28.946	ND	NA	Stong hydrocarbon odour; sheen; Brown globules present very small; Clear
U07-10S	9/10/2018	6.443	32.950	4.555	28.395	ND	NA	Solid tune at the bottom, sheen in the water
U07-10S	4/9/2019	6.132	32.950	4.078	28.872	ND	NA	DNAPL at bottom of well (purged);Slightly yellow tinged; minor sediment; sampled for BTEX/VPH, LEPH/HEPH a PAHs
U07-10S	4/10/2019	6.132	32.950	4.149	28.801	ND	NA	DNAPL at bottom of well (purged); water was clear; sheen; globules; sample for VOCs/SVOCs
U07-10S	9/25/2019	6.150	32.950	4.305	28.645	ND	NA	Clear, hc odour
U07-10S	3/24/2020	6.138	32.950	4.412	28.538	ND	NA	Sheen in purge water, HC odour, clear sample, DUP-5
U07-10S	8/20/2020	6.146	32.950	4.338	28.612	ND	NA	Sheen a HC odour in purge water, clear sample with sheen on surface
U07-10S	3/29/2021	6.145	32.950	4.251	28.699	ND	NA	Creosote/HC odour, clear sample, DUP-10
U07-10S	8/25/2021	6.130	32.950	4.294	28.656	ND	NA	Sheen on surface of water, hc odour
U07-10S	8/25/2021	6.130	32.950	4.294	28.656	ND	NA	Water level meter: Heron Dipper-TSerial:
U07-10S	3/24/2022	6.133	32.950	3.840	29.110	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
U07-10S	8/23/2022	6.145	32.950	4.320	28.630	ND	NA	not sampled due to sheen
U07-10S	3/14/2023	6.148	32.950	3.819	29.131	ND	NA	Clear; no odour
U07-10S	8/21/2023	6.133	32.950	4.625	28.325	ND	NA	Clear; faint HC odour
U07-10I	5/28/2014	7.340	32.993	3.695	29.298	ND	NA	Clear
U07-10I	8/27/2014	7.410	32.993	4.240	28.753	ND	NA	Slightly turbid
U07-10I	4/10/2015	7.410	32.993	3.310	29.683	ND	NA	
U07-10I	9/2/2015	7.350	32.993	4.800	28.193	ND	NA	Slightly turbid
U07-10I	9/15/2015	7.430	32.993	4.200	28.793	ND	NA	Clear
U07-10I	10/15/2015	7.420	32.993	3.650	29.343	ND	NA	Clear
U07-10I	3/15/2016	7.450	32.993	2.380	30.613	ND	NA	Clear
U07-10I	9/21/2016	7.430	32.993	4.310	28.683	ND	NA	Silty
U07-10I	4/25/2017	7.470	32.993	2.840	30.153	ND	NA	
U07-10I	9/21/2017	7.490	32.993	4.210	28.783	ND	NA	Clear
U07-10I	4/16/2018	7.480	32.993	2.820	30.173	ND	NA	Clear
U07-10I	9/10/2018	7.476	32.993	4.774	28.219	ND	NA	Slightly turbid; sampled
U07-10I	4/9/2019	7.463	32.993	3.275	29.718	ND	NA	clear; minor sediment
U07-10I	9/25/2019	7.478	32.993	3.431	29.562	ND	NA	Clear
U07-10I	3/24/2020	7.466	32.993	4.081	28.912	ND	NA	slightly turbid
U07-10I	8/20/2020	7.462	32.993	3.993	29.000	ND	NA	clear
U07-10I	3/29/2021	7.495	32.993	3.384	29.609	ND	NA	clear
U07-10I	8/25/2021	7.470	32.993	3.922	29.071	ND	NA	clear
U07-10I	8/25/2021	7.470	32.993	3.922	29.071	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
U07-10I	3/24/2022	7.458	32.993	3.053	29.940	ND	NA	orange biofoul
U07-10I	8/23/2022	7.464	32.993	4.192	28.801	ND	NA	clear, no odor
U07-10I	3/14/2023	7.477	32.993	3.142	29.851	ND	NA	Water level meter: Solinst 122Serial: 31334
U07-10I	8/21/2023	7.460	32.993	4.369	28.624	ND	NA	Clear; no odour
U07-10D	5/28/2014	9.930	33.069	3.700	29.369	ND	NA	Clear
U07-10D	8/27/2014	9.950	33.069	4.260	28.809	ND	NA	Clear
U07-10D	4/10/2015	9.940	33.069	3.450	29.619	ND	NA	Clear
U07-10D	9/2/2015	9.950	33.069	4.180	28.889	ND	NA	Clear
U07-10D	9/15/2015	9.990	33.069	4.245	28.824	ND	NA	Clear
U07-10D	10/15/2015	9.950	33.069	3.660	29.409	ND	NA	Clear; DUP-1
U07-10D	3/15/2016	9.970	33.069	2.560	30.509	ND	NA	Clear
U07-10D	9/21/2016	9.950	33.069	4.370	28.699	ND	NA	Clear
U07-10D	4/26/2017	10.000	33.069	2.620	30.449	ND	NA	Clear; DUP-14
U07-10D	9/21/2017	10.000	33.069	4.200	28.869	ND	NA	Clear
U07-10D	4/16/2018	10.000	33.069	2.730	30.339	ND	NA	Clear
U07-10D	9/10/2018	10.009	33.069	4.074	28.995	ND	NA	Clear; DUP-9
U07-10D	4/9/2019	10.009	33.069	3.916	29.153	ND	NA	clear
U07-10D	9/25/2019	10.038	33.069	3.551	29.518	ND	NA	Clear
U07-10D	3/24/2020	10.009	33.069	4.038	29.031	ND	NA	Clear
U07-10D	8/20/2020	10.045	33.069	4.071	28.998	ND	NA	Clear
U07-10D	3/29/2021	10.067	33.069	3.092	29.977	ND	NA	Clear
U07-10D	8/25/2021	10.100	33.069	3.922	29.147	ND	NA	Clear
U07-10D	8/25/2021	10.100	33.069	3.922	29.147	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
U07-10D	3/24/2022	10.115	33.069	2.406	30.663	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066

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TABLE 1-1a
AREAS 1 AND 3 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
U07-10D	8/23/2022	10.134	33.069	4.246	28.823	ND	NA	sampled cloudy, no odor
U07-10D	3/14/2023	10.170	33.069	2.744	30.325	ND	NA	Water level meter: Solinst 122Serial: 31334
U07-10D	8/21/2023	10.127	33.069	4.326	28.743	ND	NA	Clear; no odour
MW03-07	6/4/2014	2.120	34.874	1.270	33.604	ND	NA	Clear
MW03-07	9/4/2014	2.110	34.874	1.280	33.594	ND	NA	Clear
MW03-07	4/22/2015	2.110	34.874	1.270	33.604	ND	NA	Clear
MW03-07	9/15/2015	2.110	34.874	1.280	33.594	ND	NA	Clear
MW03-07	3/17/2016	2.110	34.874	1.270	33.604	ND	NA	Clear; DUP-8
MW03-07	9/23/2016	2.100	34.874	1.290	33.584	ND	NA	
MW03-07	4/13/2017	2.120	34.874	1.290	33.584	ND	NA	Clear
MW03-07	8/30/2017	2.120	34.874	1.310	33.564	ND	NA	Silty, brown
MW03-07	4/12/2018	2.130	34.874	1.306	33.568	ND	NA	Clear; sampled
MW03-07	9/4/2018	2.120	34.874	1.299	33.575	ND	NA	Silty; sampled
MW03-07	4/2/2019	2.103	34.874	1.282	33.592	ND	NA	cloudy/opaque
MW03-07	9/25/2019	2.120	34.874	1.296	33.578	ND	NA	Clear
MW03-07	3/19/2020	2.102	34.874	1.282	33.592	ND	NA	Slightly cloudy; purged dry 18/03/20 a sampled the next day
MW03-07	8/26/2020	2.119	34.874	1.288	33.586	ND	NA	Clear
MW03-07	3/30/2021	2.109	34.874	1.298	33.576	ND	NA	Clear
MW03-07	8/30/2021	2.106	34.874	1.297	33.577	ND	NA	Very pale yellow
MW03-07	8/30/2021	2.106	34.874	1.297	33.577	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW03-07	3/28/2022	2.104	34.874	1.288	33.586	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW03-07	8/23/2022	2.106	34.874	1.298	33.576	ND	NA	slightly yellow, no odor
MW03-07	3/7/2023	2.115	34.874	1.299	33.575	ND	NA	Clear; no odour
MW03-07	3/7/2023	2.115	34.874	1.299	33.575	ND	NA	Clear; no odour
MW03-07	8/21/2023	2.119	34.874	1.304	33.570	ND	NA	Clear; no odour
NDM97-3	6/3/2014	9.020	34.873	2.860	32.013	ND	NA	Sheen on probe; DUP-32
NDM97-3	9/4/2014	9.040	34.873	3.050	31.823	ND	NA	Clear; DUP-24
NDM97-3	4/21/2015	9.020	34.873	2.910	31.963	ND	NA	Clear
NDM97-3	9/15/2015	9.070	34.873	2.970	31.903	ND	NA	Clear; DUP-15
NDM97-3	12/1/2015	9.030	34.873	2.840	32.033	ND	NA	Clear; Analysis for Chlorinated hydrocarbons a VOCs (resampling)
NDM97-3	3/17/2016	9.030	34.873	2.620	32.253	ND	NA	Clear
NDM97-3	9/22/2016	9.030	34.873	2.970	31.903	ND	NA	
NDM97-3	4/13/2017	9.020	34.873	2.340	32.533	ND	NA	Clear; DUP-10
NDM97-3	8/30/2017	9.080	34.873	3.870	31.003	ND	NA	Clear
NDM97-3	4/11/2018	9.018	34.873	2.800	32.073	ND	NA	Clear; sampled; DUP-4
NDM97-3	9/6/2018	9.072	34.873	3.773	31.100	ND	NA	Clear; Sampled
NDM97-3	4/3/2019	9.023	34.873	2.914	31.959	ND	NA	silty; DUP-10
NDM97-3	9/23/2019	9.075	34.873	2.836	32.037	ND	NA	Clear, small black specs
NDM97-3	3/19/2020	9.048	34.873	2.754	32.119	ND	NA	Clear
NDM97-3	8/26/2020	9.052	34.873	3.125	31.748	ND	NA	Clear
NDM97-3	3/30/2021	9.016	34.873	2.786	32.087	ND	NA	Clear
NDM97-3	8/30/2021	9.061	34.873	3.424	31.449	ND	NA	Clear, DUP-06
NDM97-3	8/30/2021	9.061	34.873	3.424	31.449	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
NDM97-3	3/28/2022	9.019	34.873	2.754	32.119	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
NDM97-3	8/18/2022	9.063	34.873	3.498	31.375	ND	NA	clear, no odor
NDM97-3	3/7/2023	9.063	34.873	ND	NA	NA	NA	Can not access, blocked by CP office trailer
NDM97-3	8/15/2023	9.063	34.873	ND	NA	NA	NA	Can not access, blocked by CP office trailer

Abbreviations:

BC	Bailer confirmed
DUP	Duplicate
m	metre
mASL	metres above sea level
NA	Not applicable/available
ND	Not detected
NM	Not monitored
NS	Not sampled
TOC	Top of casing

Notes:

1 Elevations are in Parkland Datum = Geodetic Datum + 91.51 feet (27.895 m)

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TABLE 1-1b
AREAS 1 AND 3 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
A1-3S	2017-04-15	9.01	6.38	1.140	NM	0.56	110.0	1.050	0.82
A1-3S	2018-04-10	9.15	6.53	2.709	NM	5.90	198.0	2.520	2.06
A1-3S	2019-04-10	9.13	6.48	2.411	NM	8.93	156.7	2.250	1.83
A1-3S	2021-03-30	10.04	6.84	1.103	NM	5.53	19.8	1.000	0.78
A1-3S	2022-03-22	8.64	8.82	1.653	NM	4.14	167.5	1.562	1.24
A1-3S	2023-03-08	10.15	6.39	2.204	11.6	1.23	130.3	2.000	1.61
A1-3D	2014-06-02	12.80	7.92	0.434	NM	8.20	-28.7	0.370	0.27
A1-3D	2014-09-22	13.12	8.71	0.400	NM	7.84	30.4	0.340	0.25
A1-3D	2015-05-13	11.87	9.45	0.428	NM	1.37	21.8	0.370	0.28
A1-3D	2015-09-23	15.18	10.40	0.322	NM	7.97	134.2	0.260	0.19
A1-3D	2016-04-04	11.31	8.34	0.394	NM	6.02	83.4	0.350	0.25
A1-3D	2016-09-22	14.72	9.01	0.363	NM	4.01	84.4	0.290	0.22
A1-3D	2017-04-15	11.07	8.98	0.378	NM	4.25	62.5	0.330	0.25
A1-3D	2017-08-30	12.32	8.01	0.347	NM	3.78	210.1	0.300	0.22
A1-3D	2018-04-10	11.14	9.22	0.696	NM	10.39	157.4	0.610	0.48
A1-3D	2018-05-03	14.52	7.64	0.590	NM	6.74	121.6	0.480	0.36
A1-3D	2018-09-05	19.03	8.78	0.554	NM	6.83	190.8	0.410	0.30
A1-3D	2019-04-02	10.66	5.67	0.567	NM	7.71	-0.1	0.500	0.37
A1-3D	2019-09-19	12.23	8.98	0.494	NM	6.91	-20.6	0.420	0.32
A1-3D	2020-03-19	11.63	8.97	0.567	NM	6.91	97.7	0.500	0.37
A1-3D	2020-08-25	14.47	8.75	0.527	NM	5.94	51.3	0.430	0.32
A1-3D	2021-03-18	10.28	8.75	1.124	NM	5.10	33.2	1.020	0.79
A1-3D	2021-08-26	11.27	8.62	0.418	NM	4.32	40.4	0.370	0.28
A1-3D	2022-04-07	12.41	9.11	0.474	NM	9.71	119.6	0.406	0.31
A1-3D	2022-08-24	15.70	8.81	0.462	679.0	5.81	12.0	0.367	0.27
A1-3D	2023-03-09	11.00	7.80	0.792	179.0	16.98	-97.1	0.704	0.54
A1-3D	2023-08-15	15.30	8.43	0.470	47.7	3.59	117.0	0.376	0.28
G1-1A	2014-06-02	11.73	5.59	0.594	NM	0.57	25.3	0.520	0.39
G1-1A	2014-09-23	15.81	5.75	0.801	NM	1.07	-37.6	0.630	0.48
G1-1A	2015-05-04	12.05	6.02	0.549	NM	0.21	44.4	0.470	0.36
G1-1A	2015-09-03	15.23	5.96	0.731	NM	0.28	-26.2	0.580	0.44
G1-1A	2016-04-04	11.79	6.22	0.351	NM	0.38	-18.8	0.310	0.23
G1-1A	2016-09-22	12.92	8.28	0.273	NM	7.42	-23.4	0.230	0.17
G1-1A	2017-04-15	10.25	5.83	0.520	NM	0.93	-20.5	0.470	0.36
G1-1A	2017-08-30	15.53	5.91	0.495	NM	0.35	24.6	0.390	0.30
G1-1A	2018-04-10	11.31	6.24	0.637	NM	0.26	0.2	0.560	0.43
G1-1A	2018-05-07	11.21	5.82	0.545	NM	0.74	21.2	0.480	0.36
G1-1A	2018-09-05	15.81	5.90	0.527	NM	0.46	69.7	0.420	0.31
G1-1A	2019-04-04	11.00	5.96	1.005	NM	0.06	174.9	0.890	0.69
G1-1A	2019-09-23	11.57	6.64	2.256	NM	6.02	-61.9	1.970	1.59
G1-1A	2020-03-25	10.91	6.13	0.842	NM	0.51	33.4	0.750	0.58
G1-1A	2020-08-25	14.41	6.01	0.666	NM	1.16	11.6	0.540	0.41
G1-1A	2021-03-18	10.69	6.03	0.748	NM	0.29	-28.1	0.670	0.51
G1-1A	2021-08-30	14.87	6.04	0.483	NM	NM	46.3	0.390	0.29
G1-1A	2022-03-22	10.44	6.15	0.451	NM	-0.07	-46.2	0.406	0.31
G1-1A	2022-08-23	17.90	5.68	0.373	1.3	2.68	7.1	0.296	0.22
G1-1A	2023-03-14	10.37	6.04	0.953	3.7	0.44	-17.6	0.86	0.67
G1-1A	2023-08-15	15.50	6.05	0.455	0.6	0.24	84.8	0.362	0.27
G1-1B	2014-06-02	15.67	6.82	0.381	NM	3.33	-	NM	-
G1-1B	2014-09-23	12.51	6.92	0.376	NM	1.50	0.6	0.320	0.29
G1-1B	2015-05-04	12.98	6.98	0.172	NM	5.93	77.3	0.250	0.11
G1-1B	2015-09-03	13.88	6.97	0.109	NM	1.32	5.7	0.090	0.07
G1-1B	2016-04-04	12.82	6.83	0.060	NM	3.70	119.0	0.050	0.04
G1-1B	2017-04-15	12.00	7.83	0.271	NM	5.28	-66.3	0.230	0.17
G1-1B	2017-08-30	12.34	7.95	0.422	NM	3.00	102.5	0.360	0.27
G1-1B	2018-04-10	13.06	8.05	11.531	NM	4.36	-38.3	9.680	8.66
G1-1B	2018-05-07	14.24	7.87	2.675	NM	0.62	128.7	2.190	1.78
G1-1B	2018-09-05	12.84	7.32	4.437	NM	7.89	207.4	3.760	3.15
G1-1B	2019-04-04	14.07	7.99	8.047	NM	6.06	305.5	6.610	5.77
G1-1B	2019-09-23	14.50	5.81	0.614	NM	0.03	-13.1	0.500	0.38
G1-1B	2020-03-25	11.52	8.85	8.215	NM	1.67	-23.4	7.190	6.31
G1-1B	2020-08-25	15.84	8.45	4.398	NM	8.26	15.9	3.460	2.89
G1-1B	2021-03-18	11.66	8.89	4.556	NM	7.68	49.4	3.970	3.34
G1-1B	2021-08-30	15.76	8.62	2.272	NM	2.65	128.6	1.790	1.44
G1-1B	2022-03-22	12.00	8.58	4.264	NM	6.03	87.4	3.690	3.09
G1-1B	2022-08-24	14.00	8.63	2.130	26.0	7.04	81.7	1.755	1.41
G1-1B	2023-03-15	12.09	8.41	2.034	30.3	8.23	47.4	1.757	1.41
G1-1B	2023-08-16	17.80	7.20	1.116	21.7	4.32	218.3	0.842	0.65
G1-1C	2014-06-02	13.62	8.39	0.490	NM	2.41	65.3	0.410	0.31
G1-1C	2014-09-23	11.49	8.98	0.463	NM	3.31	-72.8	0.410	0.30
G1-1C	2015-05-04	11.84	9.17	0.473	NM	4.08	59.0	0.410	0.31
G1-1C	2015-09-03	11.56	9.07	0.449	NM	1.50	-55.6	0.390	0.30
G1-1C	2016-04-04	11.79	8.50	0.248	NM	6.40	109.7	0.220	0.16
G1-1C	2016-09-22	12.04	9.27	0.427	NM	4.91	-37.0	0.370	0.28
G1-1C	2017-04-15	11.99	9.55	0.406	NM	2.22	-39.2	0.350	0.26
G1-1C	2017-08-30	13.14	9.31	0.439	NM	4.63	37.3	0.370	0.28
G1-1C	2018-04-10	12.48	9.35	0.472	NM	3.84	82.8	0.400	0.30
G1-1C	2018-05-03	13.19	8.99	0.599	NM	7.29	41.9	0.500	0.38
G1-1C	2018-09-05	12.94	9.42	0.579	NM	7.40	-331.9	0.490	0.37
G1-1C	2019-04-04	13.18	8.57	0.709	NM	6.37	167.7	0.600	0.45
G1-1C	2019-09-23	11.24	8.88	0.567	NM	6.14	-24.4	0.510	0.38
G1-1C	2020-03-25	12.34	9.19	0.745	NM	7.65	1.8	0.640	0.49
G1-1C	2020-08-25	14.45	9.39	0.623	NM	3.77	9.6	0.510	0.38
G1-1C	2021-03-18	11.51	9.58	0.682	NM	7.75	-42.1	0.600	0.46
G1-1C	2021-08-30	12.30	9.48	0.564	NM	7.49	60.5	0.480	0.37
G1-1C	2022-03-23	11.68	9.84	0.546	NM	7.49	99.0	0.475	0.36
G1-1C	2022-08-24	13.80	9.82	0.650	20.7	5.76	77.7	0.540	0.41
G1-1C	2023-03-15	11.52	9.95	0.919	40.1	8.14	6.4	0.805	0.62
G1-1C	2023-08-15	18.30	8.42	0.623	11.7	4.45	109.5	0.464	0.35
G1-2A	2014-06-05	15.41	7.31	0.846	NM	1.28	-149.7	0.670	0.51
G1-2A	2014-09-03	19.81	7.50	1.783	NM	0.61	-27.0	1.290	1.01
G1-2A	2015-04-21	12.46	7.17	2.117	NM	2.39	2.3	1.810	1.45
G1-2A	2015-09-01	19.52	7.51	2.069	NM	1.24	-52.9	1.500	1.19
G1-2A	2016-03-15	9.51	7.97	1.161	NM	3.20	179.6	1.070	0.84
G1-2A	2016-09-21	15.93	7.46	1.012	NM	4.66	150.6	0.800	0.61
G1-2A	2017-04-19	9.43	7.52	0.819	NM	0.90	47.8	0.760	0.58
G1-2A	2017-08-31	20.15	7.15	2.463	NM	207.00	40.9	1.770	1.41
G1-2A	2018-04-16	10.23	7.66	2.941	NM	3.38	170.8	2.670	2.19
G1-2A	2018-09-06	20.23	7.09	3.047	NM	0.57	240.6	2.180	1.76
G1-2A	2019-03-28	8.80	7.19	2.004	NM	3.85	103.3	1.890	1.51
G1-2A	2019-09-24	17.71	7.21	2.246	NM	0.40	-31.1	1.690	1.35
G1-2A	2020-03-18	8.97	6.65	1.650	NM	1.30	110.1	1.550	1.23
G1-2A	2020-08-26	19.61	7.20	2.593	NM	2.26	32.1	1.880	1.51
G1-2A	2021-03-23	8.62	8.77	3.330	NM	6.00	63.8	3.150	2.60
G1-2A	2021-08-26	20.97	7.69	1.480	NM	0.50	54.7	1.000	0.77
G1-2A	2022-03-28	9.24	6.05	0.224	NM	7.68	183.7	0.208	0.15
G1-2A	2022-08-23	21.50	8.08	0.790	9.6	1.28	40.4	0.546	0.41
G1-2A	2023-03-07	8.93	7.88	0.888	87.9	5.23	63.9	0.830	0.64
G1-2A	2023-08-15	21.50	7.33	1.329	10.2	2.31	76.4	0.930	0.72
G1-2B	2014-06-05	12.28	7.43	3.772	NM	0.28	148.1	3.240	2.69
G1-2B	2014-09-03	15.71	8.42	2.439	NM	2.43	-18.6	1.930	1.55
G1-2B	2015-04-21	13.08	7.89	2.338	NM	0.33	282.9	1.970	1.59
G1-2B	2015-09-01	16.63	7.90	2.150	NM	1.18	3.4	1.660	1.32
G1-2B	2016-03-15	10.86	7.78	2.190	NM	2.35	193.6	1.940	1.56
G1-2B	2016-09-26	16.67	8.38	0.890	NM	1.00	-71.2	0.600	0.45
G1-2B	2017-04-19	10.24	7.80	2.710	NM	2.30	62.9	2.450	2.00
G1-2B	2017-08-31	15.77	7.66	2.183	NM	1.72	6.8	1.720	1.38
G1-2B	2018-04-16	9.25	7.50	1.879	NM	4.39	154.8	1.750	0.40
G1-2B	2018-09-06	17.39	7.60	2.708	NM	2.79	2.7	2.060	1.67
G1-2B	2019-03-28	10.99	6.95	11.621	NM	1.19	80.2	10.310	9.30
G1-2B	2019-09-24	16.60	8.65	1.999	NM	4.52	-17.2	1.530	1.21
G1-2B	2020-03-18	11.37	8.77	1.682	NM	4.67	-30.9	1.480	1.17
G1-2B	2020-08-26	16.19	8.77	2.691	NM	1.36	5.1	2.100	1.77
G1-2B	2021-03-23	10.25	9.16	2.074	NM	3.22	-18.7	1.880	1.51
G1-2B	2021-08-26	17.36	8.13	1.882	NM	4.45	83.7	1.410	1.12
G1-2B	2022-03-28	10.53	8.68	2.994	NM	1.98	58.0	2.682	2.20
G1-2B	2022-08-24	17.10	9.06	1.950	11.6	1.39	-41.2	1.528	1.24
G1-2B	2023-03-07	10.60	7.42	13.040	17.9	1.23	52.1	11.700	10.65
G1-2B	2023-08-15	17.70	7.62	3.080	12.5	1.37	18.0	2.327	1.89
G1-5	2014-06-02	14.10	6.30	0.367	NM	4.69	-138.3	0.300	0.20
G1-5	2014-09-02	15.01	6.95	0.520	NM	3.75	124.0	0.420	0.31
G1-5	2015-05-13	12.96	6.42	0.317	NM	3.76	146.8	0.270	0.20
G1-5	2015-09-23	15.20	6.67	0.535	NM	0.67	92.6	0.430	0.32
G1-5	2016-04-04	12.66	6.78	0.500	NM	0.73	19.2	0.420	0.32
G1-5	2016-09-22	14.89	6.75	0.269	NM	2.95	46.9	0.220	0.16
G1-5	2017-04-15	12.16	6.92	0.595	NM	0.65	42.0	0.520	0.39
G1-5	2017-08-30	14.28	7.19	0.577	NM	0.43	10.3	0.470	0.36
G1-5	2018-04-10	11.74	7.30	0.385	NM	4.93	49.2	0.340	0.25
G1-5	2018-05-03	13.97	6.71	0.623	NM	0.21	24.6	0.510	0.39
G1-5	2018-09-05	14.74	6.21	0.766	NM	7.14	257.2	0.620	0.47
G1-5	2019-04-02	15.14	6.73	0.528	NM	4.07	161.5	0.420	0.31
G1-5	2019-09-19	11.93	7.79	0.601	NM	8.66	-12.8	0.520	0.40
G1-5	2020-03-19	12.68	6.80	0.622	NM	6.65	132.1	0.530	0.40
G1-5	2020-08-25	13.64	6.63	0.753	NM	7.70	60.2	0.620	0.47
G1-5	2021-03-18	11.10	6.90	0.553	NM	1.50	53.8	0.490	0.37
G1-5	2021-08-26	13.61	6.87	0.716	NM	0.98	78.2	0.600	0.45
G1-5	2022-03-23	11.96	6.71	0.344	NM	9.84	162.2	0.298	0.22
G1-5	2022-08-25	15.20	6.93	0.700	131.0	4.78	54.7	0.559	0.43
G1-5	2023-03-09	12.03	8.40	0.678	10.1	82.83	-58.1	0.586	0.45
G1-5	2023-08-15	19.00	6.67	0.745	30.8	4.44	151.9	0.546	0.42
G1-6	2014-06-02	10.87	6.64	0.468	NM	0.28	8.6	0.420	0.31
G1-6	2014-09-22	10.99	7.11	0.464	NM	1.06	-11.1	0.410	0.31
G1-6	2015-05-13	11.56	7.22	0.434	NM	0.60	-9.9	0.380	0.29

AECOM

TABLE 1-1b
AREAS 1 AND 3 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
G1-6	2015-09-23	11.89	7.13	0.525	NM	0.10	8.6	0.460	0.34
G1-6	2016-04-04	11.66	7.23	0.485	NM	1.56	18.6	0.420	0.32
G1-6	2016-09-22	13.11	7.28	0.478	NM	0.01	-10.0	0.400	0.30
G1-6	2017-04-15	11.06	7.40	0.443	NM	0.53	-27.4	0.390	0.30
G1-6	2018-04-10	11.74	7.35	0.472	NM	0.28	-13.0	0.410	0.31
G1-6	2018-05-03	12.65	6.33	0.574	NM	0.59	105.0	0.490	0.37
G1-6	2018-09-05	12.35	6.89	0.550	NM	0.30	136.3	0.470	0.36
G1-6	2019-04-02	12.23	7.33	0.614	NM	0.27	-23.8	0.530	0.40
G1-6	2019-09-19	11.49	7.87	0.612	NM	0.38	-38.4	0.540	0.41
G1-6	2020-03-18	13.05	7.04	0.579	NM	4.36	-43.6	0.490	0.37
G1-6	2020-08-24	13.44	7.04	0.667	NM	0.60	32.6	0.560	0.42
G1-6	2021-03-18	11.22	7.25	0.717	NM	0.42	-65.0	0.630	0.48
G1-6	2021-08-26	12.40	7.18	0.641	NM	0.87	73.5	0.550	0.42
G1-6	2022-03-22	11.20	7.23	0.477	NM	1.61	-48.7	0.421	0.32
G1-6	2022-08-24	14.90	7.47	0.630	154.0	1.56	59.5	0.507	0.39
G1-6	2023-03-20	11.03	7.24	0.487	31.8	1.79	-112.9	0.432	0.33
G1-6	2023-08-29	12.10	7.21	0.531	11.5	0.37	23.4	0.458	0.35
G1-7A	2014-06-02	13.00	6.95	6.123	NM	2.27	-154.1	5.190	4.42
G1-7A	2014-09-22	16.58	7.33	2.711	NM	1.03	66.7	2.100	1.70
G1-7A	2015-05-04	11.05	7.23	3.824	NM	0.27	-3.0	3.390	2.83
G1-7A	2015-09-23	16.41	7.49	2.284	NM	1.60	327.6	1.780	1.42
G1-7A	2016-03-17	9.41	7.28	5.275	NM	4.16	87.9	4.880	4.16
G1-7A	2016-09-22	16.06	7.41	1.742	NM	0.51	11.2	1.380	1.09
G1-7A	2017-04-15	8.52	6.81	8.330	NM	4.37	33.5	7.890	2.30
G1-7A	2017-08-30	16.78	7.12	3.623	NM	0.66	19.8	2.780	23.00
G1-7A	2018-04-11	8.47	7.40	4.411	NM	3.41	149.5	3.480	3.52
G1-7A	2018-05-07	10.59	6.90	12.033	NM	3.59	10.4	10.790	9.76
G1-7A	2018-09-04	17.25	7.47	4.726	NM	4.40	234.3	3.580	2.99
G1-7A	2019-04-04	8.55	7.41	4.632	NM	0.05	621.0	4.390	3.71
G1-7A	2019-09-23	16.00	7.35	2.510	NM	0.57	79.6	1.960	1.57
G1-7A	2020-03-19	8.34	7.77	5.350	NM	3.94	105.7	5.100	4.35
G1-7A	2020-08-25	16.06	7.41	3.555	NM	0.87	46.7	2.800	2.31
G1-7A	2021-03-22	8.64	7.54	2.826	NM	5.09	124.8	2.670	2.19
G1-7A	2021-08-26	16.60	7.43	3.127	NM	0.29	91.3	2.420	1.98
G1-7A	2022-03-22	8.63	8.82	3.271	NM	5.83	127.1	3.090	2.55
G1-7A	2022-08-18	16.70	7.34	2.790	27.0	0.51	38.0	1.826	1.47
G1-7A	2023-03-08	8.11	7.22	5.799	25.8	3.50	63.0	5.565	4.77
G1-7A	2023-08-14	17.30	7.21	4.180	3.3	0.71	116.9	3.152	2.62
G1-7B	2014-06-02	11.62	7.80	0.385	NM	1.38	-	NM	-
G1-7B	2014-09-23	11.89	8.36	0.386	NM	0.94	-115.0	0.330	0.25
G1-7B	2015-05-04	12.53	8.10	0.371	NM	3.98	-192.7	0.320	0.24
G1-7B	2015-09-23	12.94	8.75	0.389	NM	0.08	32.2	0.330	0.25
G1-7B	2016-03-17	11.35	8.82	0.343	NM	0.63	6.4	0.300	0.22
G1-7B	2016-09-22	12.68	8.56	0.380	NM	0.92	66.4	0.320	0.24
G1-7B	2017-04-15	11.60	8.51	0.358	NM	0.22	-126.2	0.310	0.23
G1-7B	2017-08-31	13.67	8.28	0.374	NM	2.87	-47.4	0.310	0.23
G1-7B	2018-04-11	11.06	8.77	0.348	NM	1.69	-32.5	0.310	0.23
G1-7B	2018-05-07	12.18	8.67	0.378	NM	0.06	-117.4	0.330	0.24
G1-7B	2018-09-04	13.43	8.46	0.455	NM	0.35	234.0	0.380	0.28
G1-7B	2019-04-04	11.92	8.61	0.496	NM	1.16	15.7	0.430	0.32
G1-7B	2019-09-23	12.30	8.43	0.388	NM	0.14	-100.8	0.330	0.25
G1-7B	2020-03-19	11.24	8.88	0.540	NM	1.32	41.3	0.480	0.36
G1-7B	2020-08-26	14.60	8.68	0.673	NM	3.54	14.5	0.550	0.41
G1-7B	2021-03-22	11.02	8.48	0.601	NM	0.60	-110.2	NM	0.40
G1-7B	2021-08-26	13.02	8.32	0.442	NM	2.42	27.7	0.370	0.28
G1-7B	2022-03-23	11.48	8.18	0.478	NM	3.82	125.1	0.419	0.32
G1-7B	2022-08-24	17.10	8.54	0.540	23.1	1.96	-4.7	0.410	0.31
G1-7B	2023-03-09	10.04	8.44	0.534	32.4	3.65	60.1	0.487	0.37
G1-7B	2023-08-15	16.00	7.95	0.597	6.9	2.10	75.0	0.469	0.35
G1-8	2014-06-04	14.25	7.04	0.801	NM	5.92	70.5	0.660	0.50
G1-8	2014-09-23	13.64	7.78	0.692	NM	2.46	-89.7	0.570	0.44
G1-8	2015-05-13	12.80	7.30	0.545	NM	1.43	96.2	0.460	0.35
G1-8	2015-09-23	14.20	8.34	1.155	NM	0.29	-182.9	1.000	0.58
G1-8	2016-03-21	11.59	6.71	0.438	NM	4.28	-26.5	0.380	0.29
G1-8	2016-09-26	14.74	8.15	0.470	NM	0.56	-83.5	0.380	0.28
G1-8	2017-04-19	11.49	7.58	0.376	NM	2.12	-199.8	0.330	0.25
G1-8	2017-08-31	14.47	7.47	0.403	NM	1.28	-24.7	0.330	0.25
G1-8	2018-04-12	11.44	8.18	2.298	NM	0.10	-62.3	2.020	1.63
G1-8	2018-09-04	13.78	8.70	0.594	NM	0.22	189.8	0.490	0.37
G1-8	2019-04-03	11.37	8.41	1.190	NM	1.48	-60.1	1.050	0.82
G1-8	2019-09-23	12.25	8.38	0.598	NM	0.78	-111.2	0.510	0.39
G1-8	2020-03-18	11.12	7.77	0.491	NM	1.30	-53.4	0.430	0.33
G1-8	2020-08-26	15.61	8.55	0.581	NM	0.35	-67.5	0.460	0.35
G1-8	2021-03-23	11.64	8.53	0.756	NM	0.90	-107.1	0.660	0.50
G1-8	2021-08-30	14.19	7.80	0.538	NM	1.10	-37.0	0.440	0.33
G1-8	2022-03-29	12.58	5.44	0.509	NM	6.84	138.6	0.434	0.33
G1-8	2022-08-23	14.30	7.81	0.540	79.6	2.78	-0.2	0.442	0.33
G1-8	2023-03-08	11.91	8.58	0.576	46.7	4.93	52.4	0.500	0.38
G1-8	2023-08-15	16.40	8.17	0.673	12.1	4.60	201.0	0.523	0.40
NDM97-2	2014-06-04	10.94	6.75	0.404	NM	9.74	64.7	0.360	0.27
NDM97-2	2014-09-23	14.47	6.75	0.472	NM	2.10	60.5	0.380	0.29
NDM97-2	2015-05-13	11.56	6.68	0.472	NM	1.32	5.7	0.410	0.31
NDM97-2	2015-09-23	15.11	6.67	0.532	NM	2.37	110.6	0.430	0.32
NDM97-2	2016-03-21	10.14	6.65	0.335	NM	1.01	214.7	0.300	0.23
NDM97-2	2016-09-26	15.45	7.08	0.401	NM	2.74	66.4	0.320	0.24
NDM97-2	2017-04-19	9.34	6.76	0.361	NM	1.30	-161.8	0.340	0.25
NDM97-2	2017-08-31	15.50	6.77	0.449	NM	0.86	80.7	0.360	0.27
NDM97-2	2018-04-12	9.33	6.89	0.679	NM	0.73	103.3	0.630	0.48
NDM97-2	2018-09-04	16.14	7.07	0.660	NM	4.12	-332.6	0.520	0.40
NDM97-2	2019-03-28	9.00	6.87	1.280	NM	0.30	52.7	1.200	0.94
NDM97-2	2019-09-23	14.57	7.47	0.703	NM	2.63	-42.3	0.570	0.43
NDM97-2	2020-03-18	9.31	6.53	0.629	NM	1.68	102.8	0.580	0.44
NDM97-2	2020-08-26	15.79	6.76	0.585	NM	1.38	22.5	0.460	0.35
NDM97-2	2021-03-23	9.13	6.88	0.514	NM	1.13	42.8	0.480	0.36
NDM97-2	2021-08-20	16.51	7.05	0.468	NM	0.93	68.1	0.363	0.27
NDM97-2	2021-08-30	16.51	7.05	468.000	NM	0.93	68.1	0.363	0.27
NDM97-2	2022-03-28	9.40	7.09	0.250	NM	3.44	99.3	0.231	0.17
NDM97-2	2022-08-22	17.10	6.38	0.358	4.5	3.22	78.3	0.274	0.20
NDM97-2	2023-03-07	9.24	7.21	0.528	10.3	1.75	89.6	0.490	0.37
NDM97-2	2023-08-23	15.30	6.89	0.370	4.3	2.09	108.0	0.296	0.22
A1-12S	2014-05-23	14.69	5.34	0.951	NM	3.21	165.3	0.770	0.60
A1-12S	2014-09-02	19.79	4.88	0.808	NM	1.40	29.8	0.550	0.44
A1-12S	2015-04-01	11.10	5.67	0.857	NM	5.13	170.3	0.760	0.58
A1-12S	2015-09-01	21.01	5.55	1.485	NM	1.63	13.5	1.050	0.81
A1-12S	2016-03-16	9.68	5.77	0.556	NM	5.80	271.8	0.510	0.39
A1-12S	2016-10-04	16.49	5.97	0.313	NM	2.23	197.3	0.240	0.18
A1-12S	2017-04-28	11.03	6.01	0.821	NM	8.18	113.1	0.720	0.55
A1-12S	2017-09-14	20.45	5.43	0.644	NM	3.78	51.4	0.460	0.35
A1-12S	2018-04-09	10.77	5.65	1.241	NM	5.77	2450.0	1.110	0.87
A1-12S	2018-08-28	21.66	5.33	1.668	NM	0.42	240.1	1.160	0.93
A1-12S	2019-03-27	11.45	6.29	0.274	NM	4.76	105.4	0.240	0.18
A1-12S	2019-09-24	17.76	6.78	0.647	NM	3.08	-7.8	0.500	0.38
A1-12S	2020-03-17	8.97	5.64	1.026	NM	5.32	127.4	0.960	0.74
A1-12S	2020-08-27	20.59	5.60	1.073	NM	1.80	94.8	0.770	0.59
A1-12S	2021-03-25	10.17	6.09	0.743	NM	3.77	89.2	0.670	0.52
A1-12S	2021-08-25	21.39	5.70	0.762	NM	0.82	104.7	0.430	0.43
A1-12S	2022-03-24	8.65	7.72	0.293	NM	7.70	110.3	0.288	0.21
A1-12S	2022-08-17	22.20	5.80	0.407	6.1	1.41	53.6	0.280	0.21
A1-12S	2023-03-20	9.20	5.98	0.786	20.2	5.41	-172.8	0.734	0.56
A1-12S	2023-08-23	20.90	5.39	1.350	7.5	1.95	122.3	0.942	0.73
A1-12D	2014-05-23	12.72	5.90	0.680	NM	0.49	-101.3	0.580	0.44
A1-12D	2014-09-02	17.17	5.74	0.644	NM	0.57	-105.2	0.490	0.37
A1-12D	2015-04-01	10.98	5.98	0.564	NM	0.40	-74.2	0.500	0.38
A1-12D	2015-09-01	18.17	6.26	0.516	NM	0.11	8.6	0.390	0.29
A1-12D	2016-03-16	10.40	6.44	0.465	NM	0.18	32.0	0.420	0.32
A1-12D	2016-10-04	15.98	6.34	0.428	NM	0.29	5.9	0.340	0.25
A1-12D	2017-04-27	11.34	6.28	0.659	NM	0.26	13.6	0.600	0.45
A1-12D	2017-09-14	17.07	6.05	0.577	NM	0.93	-24.7	0.440	0.33
A1-12D	2018-04-09	9.94	4.60	0.582	NM	1.38	109.1	0.530	0.40
A1-12D	2018-08-28	19.27	6.11	1.118	NM	0.18	-31.3	0.820	0.63
A1-12D	2019-03-27	10.99	6.13	0.909	NM	0.22	6.8	0.810	0.62
A1-12D	2019-09-24	16.72	7.24	1.018	NM	0.29	-64.1	0.790	0.61
A1-12D	2020-03-17	10.10	5.81	0.726	NM	0.39	32.2	0.660	0.50
A1-12D	2020-08-27	17.67	6.14	0.930	NM	0.43	-4.8	0.700	0.53
A1-12D	2021-03-25	10.45	6.42	0.916	NM	0.91	28.1	0.830	0.64
A1-12D	2021-08-25	18.81	6.30	0.588	NM	0.65	23.2	0.370	0.33
A1-12D	2022-03-24	9.52	7.36	0.553	NM	0.45	40.3	0.510	0.39
A1-12D	2022-08-17	20.60	6.26	0.600	5.1	0.86	54.0	0.429	0.32
A1-12D	2023-03-20	9.87	6.09	0.653	15.8	0.39	-139.4	0.597	0.46
A1-12D	2023-08-23	18.30	6.08	0.820	11.9	1.19	54.0	0.611	0.46
A1-12C	2014-05-23	11.60	6.01	0.625	NM	0.26	37.4	0.550	0.42
A1-12C	2014-09-02	12.90	6.10	0.574	NM	0.32	-32.9	0.490	0.37
A1-12C	2015-04-01	11.81	6.08	0.545	NM	0.92	-5.8	0.470	0.36
A1-12C	2015-09-01	15.14	6.32	0.511	NM	0.27	13.9	0.410	0.31
A1-12C	2016-03-16	11.96	6.43	0.437	NM	1.09	61.7	0.380	0.28
A1-12C	2016-10-04	14.43	6.41	0.418	NM	0.50	11.7	0.340	0.25
A1-12C	2017-04-27	11.43	6.04	0.687	NM	6.89	142.0	0.600	0.46
A1-12C	2017-09-14	14.62	6.13	0.594	NM	1.08	0.5	0.480	0.36
A1-12C	2018-04-09	11.44	6.23	0.726	NM	1.14	87.4	0.640	0.49
A1-12C	2018-08-30	14.73	6.18	0.729	NM	0.33	-290.1	0.590	0.45
A1-12C	2019-03-27	12.73	6.25	1.053	NM	1.64	100.3	0.890	0.70
A1-12C	2019-09-24	14.70	6.19	0.708	NM	0.08	5.9	0.570	0.44
A1-12C	2020-03-17	12.38	6.23	1.412	NM	1.48	4.8	1.210	0.95

AECOM

TABLE 1-1b
AREAS 1 AND 3 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
A1-12C	2020-08-27	14.31	6.14	0.761	NM	0.51	18.8	0.620	0.47
A1-12C	2021-03-25	12.28	6.22	1.170	NM	0.51	33.2	1.010	0.78
A1-12C	2021-08-25	14.83	6.44	0.445	NM	0.75	7.5	0.350	0.27
A1-12C	2022-03-24	10.47	6.32	1.630	NM	0.98	50.2	1.466	1.16
A1-12C	2022-08-17	14.40	5.70	1.070	28.8	0.20	-34.7	0.864	0.67
A1-12C	2023-03-20	11.55	6.39	2.195	78.2	0.61	45.5	1.916	1.54
A1-12C	2023-08-23	14.60	6.32	0.760	15.7	1.37	67.3	0.624	0.47
MW17-4	2017-07-17	15.54	5.65	1.012	NM	0.86	83.0	0.800	0.62
MW17-4	2018-04-05	8.41	6.49	0.869	NM	0.46	-1.2	0.830	0.64
MW17-4	2018-08-30	15.97	0.28	1.162	NM	1.08	22.8	0.910	0.71
MW17-4	2019-03-28	9.22	6.34	1.293	NM	0.58	-7.8	1.190	0.93
MW17-4	2019-09-24	14.80	7.42	1.367	NM	0.64	-32.6	1.100	0.86
MW17-4	2020-03-17	7.75	6.01	0.960	NM	2.91	-40.4	10.930	10.72
MW17-4	2020-08-19	16.82	6.11	1.228	NM	0.35	31.3	0.950	0.74
MW17-4	2021-03-23	9.15	6.28	3.922	NM	0.93	30.7	3.620	3.01
MW17-4	2021-08-24	17.15	6.12	1.536	NM	0.61	96.6	1.170	0.92
MW17-4	2022-03-24	10.19	6.28	1.440	NM	4.54	105.6	1.295	1.02
MW17-4	2022-08-18	16.50	5.55	1.110	42.4	0.72	51.1	0.864	0.67
MW17-4	2023-03-20	8.64	6.22	1.138	14.8	4.99	122.0	1.076	0.84
MW17-4	2023-08-23	16.50	6.12	1.189	25.6	0.50	138.2	0.922	0.72
A3MW02-05	2014-05-28	11.21	6.02	0.664	NM	0.21	-8.7	0.580	0.45
A3MW02-05	2014-08-27	14.97	6.00	0.444	NM	1.51	82.3	0.360	0.27
A3MW02-05	2015-04-09	12.53	6.30	0.350	NM	0.59	-61.2	0.300	0.22
A3MW02-05	2015-09-02	16.75	6.31	0.667	NM	0.20	-14.3	0.510	0.39
A3MW02-05	2015-09-14	16.70	6.36	0.765	NM	0.39	-64.9	0.590	0.45
A3MW02-05	2015-10-14	17.06	6.50	0.533	NM	0.17	-49.4	0.410	0.31
A3MW02-05	2016-03-15	12.71	6.59	0.299	NM	1.23	-41.6	0.250	0.19
A3MW02-05	2016-09-19	16.02	6.35	0.335	NM	0.03	-49.1	0.260	0.19
A3MW02-05	2017-04-25	11.47	6.54	0.415	NM	0.25	-73.9	0.360	0.27
A3MW02-05	2017-09-21	15.74	6.11	0.529	NM	0.45	-26.2	0.420	0.40
A3MW02-05	2018-05-01	10.09	6.33	0.537	NM	0.59	-47.1	0.490	0.37
A3MW02-05	2018-09-13	15.18	5.87	1.290	NM	0.98	141.6	1.010	0.79
A3MW02-05	2019-04-09	9.46	6.49	0.627	NM	5.79	74.9	0.580	0.44
A3MW02-05	2019-09-26	15.59	7.26	0.738	NM	0.26	-76.2	0.590	0.45
A3MW02-05	2020-03-23	9.28	6.53	0.678	NM	1.21	-44.8	0.630	0.48
A3MW02-05	2020-08-19	16.82	6.58	0.538	NM	0.28	-28.7	0.420	0.31
A3MW02-05	2021-03-25	9.79	6.82	0.507	NM	0.30	-83.3	0.470	0.35
A3MW02-05	2021-08-25	16.10	6.50	0.513	NM	0.13	-8.8	0.400	0.30
A3MW02-05	2022-03-24	9.52	7.40	0.289	NM	0.28	-16.4	0.267	0.20
A3MW02-05	2022-08-17	16.80	5.94	0.388	4.7	0.37	-49.4	0.300	0.22
A3MW02-05	2023-03-14	9.63	6.62	0.348	6.5	0.55	-26.2	0.320	0.24
A3MW02-05	2023-08-21	16.00	6.40	0.398	6.6	0.09	61.2	0.315	0.24
A3MW02-06	2014-05-28	11.18	6.06	0.404	NM	0.31	-23.7	0.360	0.27
A3MW02-06	2014-08-27	4.66	6.17	0.528	NM	0.73	-40.6	0.430	0.32
A3MW02-06	2015-04-09	12.97	5.60	0.391	NM	0.28	-10.8	0.330	0.25
A3MW02-06	2015-09-02	16.06	6.51	0.288	NM	1.03	4.7	0.230	0.17
A3MW02-06	2015-09-14	16.30	6.56	0.440	NM	0.43	-90.5	0.340	0.25
A3MW02-06	2015-10-14	16.60	6.59	0.435	NM	0.18	-87.7	0.340	0.25
A3MW02-06	2016-03-15	13.56	6.51	0.333	NM	1.08	-32.8	0.290	0.19
A3MW02-06	2016-09-19	15.98	6.50	0.396	NM	0.31	-87.4	0.310	0.23
A3MW02-06	2017-04-25	10.65	6.73	0.228	NM	0.73	20.2	0.210	0.15
A3MW02-06	2017-09-20	16.17	6.54	0.391	NM	0.11	-68.9	0.310	0.23
A3MW02-06	2018-04-17	11.71	6.60	0.332	NM	0.38	-27.9	0.290	0.22
A3MW02-06	2018-09-25	16.34	6.67	0.451	NM	0.58	-289.5	0.350	0.26
A3MW02-06	2019-04-08	11.91	6.58	0.532	NM	-0.03	645.6	0.460	0.35
A3MW02-06	2019-09-26	16.50	6.44	0.453	NM	0.05	-48.3	0.350	0.26
A3MW02-06	2020-03-24	11.25	6.65	0.510	NM	3.48	-60.0	0.450	0.34
A3MW02-06	2020-08-19	16.22	6.64	0.482	NM	0.70	-82.0	0.380	0.28
A3MW02-06	2021-03-25	11.28	6.68	0.501	NM	0.15	-80.8	0.440	0.33
A3MW02-06	2021-08-25	16.42	6.50	0.513	NM	0.13	-8.8	0.400	0.30
A3MW02-06	2022-03-23	11.74	7.38	0.339	NM	0.28	-47.4	0.296	0.22
A3MW02-06	2022-08-17	19.10	6.49	0.320	26.1	0.53	29.2	0.226	0.17
A3MW02-06	2023-03-09	12.03	6.63	0.253	66.5	-0.43	-44.3	0.219	0.16
A3MW02-06	2023-08-21	16.20	6.42	0.312	13.8	0.07	6.9	0.244	0.18
A3MW02-07	2014-05-28	12.70	6.25	0.415	NM	6.31	-16.4	0.320	0.18
A3MW02-07	2014-08-27	16.67	6.39	0.982	NM	4.16	71.7	0.770	0.59
A3MW02-07	2015-04-09	11.91	6.29	0.679	NM	2.66	46.7	0.590	0.45
A3MW02-07	2015-09-02	16.37	6.53	0.854	NM	0.36	13.5	0.660	0.51
A3MW02-07	2015-09-14	16.20	6.39	0.735	NM	0.78	17.0	0.570	0.44
A3MW02-07	2015-10-14	16.34	6.64	0.466	NM	5.44	92.4	0.360	0.27
A3MW02-07	2016-03-15	12.51	6.69	0.270	NM	1.32	60.7	0.230	0.17
A3MW02-07	2016-09-19	15.55	6.38	1.352	NM	1.21	-25.6	1.070	0.84
A3MW02-07	2017-04-20	11.23	6.31	0.123	NM	5.48	167.5	0.110	0.08
A3MW02-07	2017-09-20	15.95	6.50	0.431	NM	0.77	-21.3	0.340	0.26
A3MW02-07	2018-04-17	11.64	6.40	0.610	NM	0.28	-16.0	0.530	0.40
A3MW02-07	2018-09-25	16.05	6.55	0.683	NM	1.21	34.5	0.540	0.41
A3MW02-07	2018-10-15	16.05	6.55	0.683	NM	1.21	34.5	0.540	0.41
A3MW02-07	2019-04-09	11.73	6.42	0.838	NM	-0.01	705.3	0.730	0.56
A3MW02-07	2019-09-26	15.24	7.50	0.829	NM	0.28	-122.9	0.660	0.51
A3MW02-07	2020-03-24	11.46	6.65	0.665	NM	0.47	-36.7	0.580	0.44
A3MW02-07	2020-08-19	15.92	6.48	0.672	NM	0.31	-65.9	0.530	0.40
A3MW02-07	2021-03-29	11.88	6.45	0.626	NM	0.22	-81.0	0.540	0.41
A3MW02-07	2021-08-25	16.28	6.40	0.725	NM	0.27	-20.8	0.570	0.43
A3MW02-07	2022-03-23	11.98	6.41	0.430	NM	0.28	-61.7	0.373	0.28
A3MW02-07	2022-08-17	20.60	6.44	0.520	10.3	1.03	40.5	0.377	0.28
A3MW02-07	2023-03-09	20.87	7.74	1.134	NM	4.12	-98.2	0.803	0.62
A3MW02-07	2023-08-21	16.40	6.41	0.613	3.1	0.10	-59.3	0.477	0.36
A3MW02-08	2014-05-28	13.60	6.10	0.693	NM	0.18	-48.3	0.570	0.44
A3MW02-08	2014-08-27	20.08	6.37	0.808	NM	0.33	-36.1	0.580	0.44
A3MW02-08	2015-04-09	14.19	6.57	0.447	NM	0.39	-42.0	0.370	0.27
A3MW02-08	2015-09-12	18.08	6.21	0.602	NM	0.14	-94.9	0.450	0.34
A3MW02-08	2015-09-14	18.40	6.10	0.440	NM	1.30	8.3	0.330	0.24
A3MW02-08	2015-10-14	17.95	6.31	0.634	NM	0.15	-75.0	0.460	0.35
A3MW02-08	2016-03-15	13.46	6.31	0.500	NM	0.13	-39.2	0.420	0.31
A3MW02-08	2016-09-19	16.67	6.11	0.559	NM	0.53	-88.7	0.430	0.32
A3MW02-08	2017-04-20	13.92	5.97	0.401	NM	0.38	-57.0	0.330	0.25
A3MW02-08	2017-09-20	18.49	6.19	0.469	NM	0.39	-33.9	0.350	0.26
A3MW02-08	2018-04-17	14.83	6.46	0.492	NM	0.46	16.2	0.400	0.30
A3MW02-08	2018-09-25	18.91	6.28	0.643	NM	0.27	-351.6	0.470	0.36
A3MW02-08	2019-04-09	14.26	6.38	0.608	NM	0.09	5.2	0.500	0.38
A3MW02-08	2019-09-26	18.56	6.96	0.738	NM	0.40	-100.2	0.550	0.41
A3MW02-08	2020-03-24	13.45	6.40	0.466	NM	0.54	-20.6	0.390	0.29
A3MW02-08	2020-08-19	18.06	6.00	0.649	NM	1.92	14.9	0.490	0.37
A3MW02-08	2021-03-29	14.36	6.80	0.363	NM	0.60	-1.3	0.300	0.27
A3MW02-08	2021-08-25	19.32	6.17	0.659	NM	0.18	-1.5	0.480	0.36
A3MW02-08	2022-03-23	16.92	7.27	0.336	NM	0.49	22.0	0.259	0.19
A3MW02-08	2022-08-17	21.90	5.50	0.510	121.0	0.28	-37.0	0.364	0.27
A3MW02-08	2023-03-09	19.53	6.63	0.330	104.0	0.15	-38.3	0.239	0.18
A3MW02-08	2023-08-21	20.70	6.09	0.551	44.8	0.12	13.1	0.390	0.29
A3MW03-01	2014-05-29	12.35	6.94	28.500	NM	4.33	-68.5	24.410	23.80
A3MW03-01	2014-08-27	16.23	7.03	34.465	NM	4.99	26.7	26.910	26.58
A3MW03-01	2015-04-10	11.34	6.57	13.240	NM	0.12	129.2	11.640	10.04
A3MW03-01	2015-09-03	16.08	6.94	33.929	NM	3.99	26.5	26.590	26.23
A3MW03-01	2016-03-15	9.87	7.64	8.955	NM	0.40	76.8	8.200	7.42
A3MW03-01	2016-09-21	15.31	7.14	34.071	NM	5.59	149.6	27.180	26.87
A3MW03-01	2017-04-26	10.01	6.87	20.095	NM	0.36	-46.7	18.290	17.79
A3MW03-01	2017-09-21	14.62	7.07	28.298	NM	5.16	-35.9	22.940	22.27
A3MW03-01	2018-04-16	9.74	6.85	19.805	NM	2.95	113.4	18.160	17.13
A3MW03-01	2018-09-10	15.50	6.98	22.123	NM	1.76	-321.0	17.440	16.56
A3MW03-01	2019-04-09	10.46	6.83	24.663	NM	0.34	208.0	22.200	21.38
A3MW03-01	2019-09-25	14.85	7.06	37.567	NM	1.14	-19.6	30.290	30.28
A3MW03-01	2020-03-23	9.60	7.30	38.600	NM	6.45	67.2	35.550	35.90
A3MW03-01	2020-08-20	16.09	6.94	39.766	NM	3.78	101.8	31.140	31.25
A3MW03-01	2021-03-25	9.19	7.29	39.631	NM	5.90	17.2	36.910	37.42
A3MW03-01	2021-08-25	16.83	7.00	41.487	NM	2.74	44.8	31.950	32.18
A3MW03-01	2022-03-23	9.14	8.37	20.590	NM	2.57	73.7	19.230	18.23
A3MW03-01	2022-08-16	21.10	6.91	29.780	3.1	2.40	13.5	20.969	20.17
A3MW03-01	2022-08-23	16.60	6.24	30.600	3.0	2.58	76.8	23.588	22.98
A3MW03-01	2023-03-14	9.32	6.92	24.580	6.1	0.63	59.1	22.980	21.97
A3MW03-01	2023-08-21	16.90	6.84	34.660	4.0	2.34	138.0	26.690	26.35
A3MW03-02	2014-05-29	11.22	6.57	0.695	NM	0.36	-70.7	0.610	0.47
A3MW03-02	2014-08-27	13.59	6.55	0.708	NM	0.20	-93.2	0.590	0.45
A3MW03-02	2015-04-10	11.51	6.65	0.663	NM	0.98	-96.9	0.510	0.44
A3MW03-02	2015-09-03	15.35	6.86	3.184	NM	0.21	-8.0	2.540	2.08
A3MW03-02	2015-09-14	16.40	6.89	1.334	NM	0.19	-110.7	1.040	0.81
A3MW03-02	2015-10-15	15.16	6.91	0.833	NM	0.09	-95.6	0.670	0.51
A3MW03-02	2016-03-15	11.51	7.02	0.635	NM	0.41	-73.4	0.560	0.42
A3MW03-02	2016-09-21	14.93	6.78	1.231	NM	0.02	-70.0	0.990	0.77
A3MW03-02	2017-04-26	10.97	6.98	0.654	NM	0.10	-121.3	0.580	0.44
A3MW03-02	2017-09-21	14.85	6.89	0.695	NM	1.33	-98.1	0.560	0.43
A3MW03-02	2018-04-12	10.77	7.03	0.454	NM	0.05	-82.4	0.400	0.31
A3MW03-02	2018-09-10	15.61	6.18	3.906	NM	0.61	-60.0	3.110	2.59
A3MW03-02	2019-04-09	11.17	6.88	0.856	NM	-0.02	798.7	0.760	0.58
A3MW03-02	2019-09-25	15.00	6.69	1.026	NM	0.55	-69.5	0.830	0.64
A3MW03-02	2020-03-24	10.31	6.91	0.785	NM	0.09	-61.8	0.710	0.54
A3MW03-02	2020-08-25	14.11	6.81	1.338	NM	0.30	-81.7	1.100	0.86
A3MW03-02	2021-03-25	10.95	7.07	0.787	NM	0.16	-125.6	0.690	0.54
A3MW03-02	2021-08-25	13.50	6.97	0.605	NM	0.08	-80.0	0.500	0.38
A3MW03-02	2022-03-23	10.75	7.35	0.385	NM	0.35	-122.0	0.344	0.26
A3MW03-02	2022-08-16	14.70	7.32	0.374	19.4	0.05	-139.3	0.302	0.23
A3MW03-02	2023-03-14	10.88	6.94	0.778	21.1	1.91	-	0.692	0.53
A3MW03-02	2023-08-21	13.80	7.07	0.680	27.8	0.43	-73.5	0.566	0.43
A3MW03-03	2014-05-28	11.80	6.38	0.444	NM	0.75	-21.9	0.390	0.29

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TABLE 1-1b
AREAS 1 AND 3 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
A3MW03-03	2014-08-27	16.25	6.33	0.776	NM	0.23	-28.5	0.610	0.46
A3MW03-03	2015-07-08	16.37	6.51	1.712	NM	0.50	5.6	1.330	1.05
A3MW03-03	2015-09-02	16.98	6.75	0.445	NM	0.29	11.5	0.340	0.26
A3MW03-03	2015-09-14	16.60	6.69	1.574	NM	0.35	-99.6	1.220	0.96
A3MW03-03	2015-10-14	17.04	6.52	1.106	NM	0.17	-58.5	0.850	0.66
A3MW03-03	2016-03-15	12.46	6.68	0.445	NM	4.82	75.6	0.380	0.29
A3MW03-03	2016-10-12	14.32	6.25	0.390	NM	0.23	-52.1	0.310	0.23
A3MW03-03	2017-04-25	10.78	6.77	0.402	NM	0.96	41.2	0.360	0.27
A3MW03-03	2017-09-20	14.51	6.41	0.859	NM	0.16	-72.0	0.700	0.54
A3MW03-03	2018-05-01	11.32	6.04	0.411	NM	0.90	132.4	0.360	0.27
A3MW03-03	2018-09-25	14.53	6.10	0.359	NM	0.68	151.0	0.290	0.22
A3MW03-03	2019-04-09	11.72	6.77	0.603	NM	4.36	65.0	0.530	0.40
A3MW03-03	2020-03-23	11.41	6.74	0.833	NM	3.53	32.3	0.730	0.56
A3MW03-03	2020-08-19	14.83	6.51	0.900	NM	0.41	6.4	0.730	0.56
A3MW03-03	2021-04-01	11.35	6.62	0.533	NM	0.36	66.5	0.470	0.35
A3MW03-03	2021-08-25	13.56	6.37	0.619	NM	1.81	16.8	0.520	0.39
A3MW03-03	2022-03-23	10.42	7.53	0.406	NM	6.06	88.3	0.366	0.27
A3MW03-03	2022-08-17	13.70	6.03	0.474	9.2	0.30	-76.5	0.392	0.29
A3MW03-03	2023-03-14	10.58	7.38	0.976	6.1	2.59	-160.7	0.872	0.68
MW03-04	2014-05-28	11.91	6.18	0.415	NM	2.52	-47.3	0.360	0.27
MW03-04	2014-08-27	14.41	6.16	0.508	NM	1.12	53.5	0.410	0.31
MW03-04	2015-04-09	13.64	6.08	0.375	NM	0.16	21.8	0.310	0.23
MW03-04	2015-09-02	14.95	6.67	0.534	NM	0.21	-20.3	0.430	0.32
MW03-04	2015-09-14	15.50	6.42	0.464	NM	0.44	-24.8	0.370	0.28
MW03-04	2015-10-14	15.35	6.41	0.452	NM	0.19	-6.2	0.360	0.27
MW03-04	2016-03-15	12.43	6.39	0.414	NM	0.27	61.0	0.350	0.27
MW03-04	2016-09-19	14.57	6.22	0.575	NM	0.33	13.1	0.470	0.35
MW03-04	2017-04-25	11.26	6.24	0.385	NM	0.50	29.0	0.340	0.25
MW03-04	2017-09-20	14.48	6.01	0.610	NM	1.46	51.4	0.500	0.38
MW03-04	2018-04-18	11.19	6.13	0.426	NM	2.63	87.6	0.370	0.28
MW03-04	2018-09-25	14.15	6.00	0.743	NM	0.81	152.9	0.610	0.46
MW03-04	2019-04-08	12.23	6.16	8.999	NM	0.02	365.8	0.770	0.59
MW03-04	2019-09-26	13.69	7.03	0.780	NM	0.48	-48.6	0.650	0.47
MW03-04	2020-03-23	11.12	6.29	0.608	NM	0.96	-17.2	0.530	0.40
MW03-04	2020-08-19	14.48	5.39	0.831	NM	0.64	93.6	0.680	0.52
MW03-04	2021-03-29	11.41	6.29	0.454	NM	1.18	16.7	0.400	0.30
MW03-04	2021-08-25	14.03	5.99	0.759	NM	0.29	52.9	0.621	0.48
MW03-04	2021-08-25	14.03	5.99	0.759	NM	0.29	52.9	0.620	0.48
MW03-04	2022-03-23	11.12	6.24	0.305	NM	0.54	99.0	0.271	0.20
MW03-04	2022-08-17	14.70	6.19	0.570	6.1	1.27	46.7	0.462	0.35
MW03-04	2023-03-14	11.48	6.39	0.492	12.9	3.19	73.0	0.431	0.32
MW03-04	2023-08-21	14.00	6.15	0.544	11.1	0.12	16.0	0.448	0.34
U6	2014-05-28	13.03	5.55	0.126	NM	3.67	-5.3	0.110	0.08
U6	2014-08-27	17.56	6.00	0.172	NM	0.55	56.7	0.130	0.10
U6	2015-04-09	10.96	4.69	0.098	NM	5.04	143.0	0.870	0.06
U6	2015-09-02	17.89	6.40	0.118	NM	5.16	14.3	0.090	0.06
U6	2016-03-15	10.84	6.89	0.065	NM	4.08	87.5	0.060	0.04
U6	2016-09-19	17.92	6.36	0.105	NM	2.61	47.5	0.080	0.06
U6	2017-04-20	11.13	5.43	0.067	NM	6.18	103.3	0.060	0.04
U6	2017-09-14	17.16	6.38	0.318	NM	0.11	-78.1	0.240	0.18
U6	2018-04-17	8.98	4.00	0.098	NM	0.75	198.4	0.090	0.07
U6	2018-09-25	16.72	6.22	0.085	NM	2.25	233.0	0.070	0.05
U6	2019-04-08	9.59	6.40	0.086	NM	-0.02	621.9	0.070	0.06
U6	2019-09-26	15.75	6.70	0.081	NM	1.63	-36.2	0.060	0.05
U6	2020-03-24	8.27	6.30	0.087	NM	6.17	35.5	0.080	0.06
U6	2020-08-19	17.78	5.25	0.087	NM	1.54	128.0	0.070	0.05
U6	2021-03-29	9.70	6.47	0.081	NM	3.66	27.0	0.080	0.05
U6	2021-08-25	15.42	6.16	0.382	NM	0.87	10.3	0.304	0.23
U6	2022-03-23	9.29	6.48	0.053	NM	5.92	66.2	0.049	0.04
U6	2022-08-17	17.80	5.60	0.184	12.2	0.55	-6.4	0.148	0.11
U6	2023-03-09	9.19	7.38	0.508	6.6	6.55	18.3	0.474	0.36
U7	2014-05-29	10.43	6.10	0.473	NM	0.41	-80.8	0.430	0.32
U7	2014-08-27	15.19	6.09	0.592	NM	0.27	-9.5	0.470	0.36
U7	2015-04-09	10.44	6.06	0.375	NM	2.20	-19.9	0.340	0.25
U7	2015-09-02	15.23	6.26	0.482	NM	0.54	-62.6	0.390	0.29
U7	2016-03-16	9.80	7.13	0.177	NM	1.60	65.6	0.160	0.12
U7	2016-09-21	15.53	6.52	0.407	NM	2.95	131.3	0.320	0.24
U7	2017-05-01	9.96	4.35	0.186	NM	2.18	210.8	0.170	0.12
U7	2017-09-14	14.63	6.25	0.382	NM	0.18	0.6	0.310	0.23
U7	2018-04-17	10.50	5.36	0.056	NM	3.38	132.6	0.050	0.04
U7	2018-09-25	14.86	6.28	0.322	NM	0.78	-367.6	0.260	0.19
U7	2019-04-08	9.32	6.85	0.229	NM	5.00	-36.8	0.210	0.16
U7	2019-09-26	15.90	6.62	0.152	NM	0.25	20.5	0.120	0.09
U7	2020-03-24	7.66	6.49	0.140	NM	6.35	12.8	0.140	0.10
U7	2020-08-19	13.70	6.58	0.404	NM	0.92	-8.6	0.340	0.25
U7	2021-03-29	8.07	6.72	0.128	NM	0.79	-3.3	0.120	0.09
U7	2021-08-25	13.16	6.11	0.442	NM	1.27	61.5	0.373	0.28
U7	2022-03-23	8.84	6.57	0.079	NM	0.23	73.5	0.075	0.05
U7	2022-08-17	16.90	6.44	0.375	30.1	1.57	44.8	0.290	0.22
U7	2023-03-09	7.05	6.80	0.227	3.2	1.84	-65.2	0.225	0.17
U7	2023-08-21	15.30	6.42	0.453	4.4	0.13	-28.4	0.361	0.27
U07-10S	2014-05-29	12.64	5.90	0.678	NM	0.84	-79.1	0.580	0.44
U07-10S	2014-08-27	17.32	6.08	1.060	NM	1.62	-66.5	0.810	0.62
U07-10S	2015-04-10	11.69	5.89	0.747	NM	1.73	-22.9	0.650	0.50
U07-10S	2015-09-02	15.31	6.27	0.964	NM	0.36	-47.7	0.770	0.59
U07-10S	2015-09-15	15.71	6.21	0.903	NM	0.80	-1.2	0.710	0.55
U07-10S	2015-10-15	16.07	6.19	0.955	NM	0.25	-64.8	0.750	0.58
U07-10S	2016-03-15	11.18	6.52	0.689	NM	1.55	-33.1	0.610	0.48
U07-10S	2016-09-21	15.83	6.19	0.945	NM	0.06	-39.7	0.750	0.57
U07-10S	2017-04-25	10.73	6.28	0.807	NM	0.99	-51.1	0.720	0.55
U07-10S	2017-09-21	15.79	6.09	0.729	NM	0.98	-23.1	0.570	0.44
U07-10S	2018-04-12	10.89	6.57	0.519	NM	0.75	80.0	0.960	0.35
U07-10S	2018-09-10	15.60	5.87	1.005	NM	0.89	25.8	0.790	0.61
U07-10S	2019-04-09	11.79	6.65	0.879	NM	0.00	717.9	0.760	0.59
U07-10S	2019-04-10	10.48	6.26	0.899	NM	0.21	434.7	0.810	0.62
U07-10S	2019-09-25	14.90	6.12	0.709	NM	0.06	-22.9	0.570	0.43
U07-10S	2020-03-24	9.91	6.32	1.013	NM	0.67	-15.5	0.920	0.72
U07-10S	2020-08-20	14.22	6.20	0.769	NM	0.33	-19.7	0.630	0.48
U07-10S	2021-03-29	10.19	6.29	0.752	NM	0.24	-55.2	0.680	0.52
U07-10S	2021-08-25	14.45	6.05	0.763	NM	0.41	22.1	0.622	0.47
U07-10S	2022-03-24	10.28	6.29	0.729	NM	0.30	-23.7	0.659	0.50
U07-10S	2022-08-23	13.50	6.09	0.530	9.5	0.22	22.8	0.442	0.35
U07-10S	2023-03-14	10.20	6.63	1.040	4.6	1.48	-155.3	0.941	0.73
U07-10S	2023-08-21	13.40	6.10	0.790	5.3	1.63	17.2	0.663	0.51
U07-10I	2014-05-28	13.65	6.66	0.454	NM	3.61	-19.8	0.380	0.28
U07-10I	2014-08-27	20.12	5.94	0.335	NM	0.39	116.4	0.240	0.18
U07-10I	2015-04-10	12.04	6.65	0.326	NM	7.54	58.9	0.280	0.21
U07-10I	2015-09-02	15.69	7.04	0.394	NM	4.09	12.5	0.310	0.23
U07-10I	2015-09-15	15.22	7.12	0.695	NM	0.28	69.0	0.560	0.40
U07-10I	2015-10-15	16.80	6.86	0.406	NM	1.50	39.9	0.310	0.23
U07-10I	2016-03-15	11.53	7.11	0.160	NM	4.73	54.2	0.140	0.10
U07-10I	2016-09-21	14.95	6.97	0.384	NM	0.48	-34.2	0.310	0.23
U07-10I	2017-04-25	10.97	6.86	0.191	NM	2.94	38.6	0.170	0.13
U07-10I	2017-09-21	14.63	6.55	0.595	NM	0.63	-22.2	0.480	0.37
U07-10I	2018-04-16	10.53	7.08	0.446	NM	7.98	131.7	0.400	0.30
U07-10I	2018-09-10	15.21	7.24	0.760	NM	2.60	-337.3	0.610	0.46
U07-10I	2019-04-09	11.65	6.91	0.828	NM	-0.02	634.9	0.720	0.56
U07-10I	2019-09-25	15.10	6.81	0.434	NM	1.08	-42.1	0.350	0.26
U07-10I	2020-03-24	9.97	7.12	0.543	NM	1.04	-29.2	0.500	0.38
U07-10I	2020-08-20	14.86	7.25	0.559	NM	1.60	-100.0	0.450	0.34
U07-10I	2021-03-29	10.77	7.10	0.492	NM	0.70	-92.0	0.440	0.33
U07-10I	2021-08-25	14.29	7.04	0.552	NM	0.25	-77.5	0.451	0.34
U07-10I	2022-03-24	10.49	7.25	0.299	NM	0.47	-97.2	0.269	0.20
U07-10I	2022-08-23	14.80	6.65	0.354	4.5	1.61	-98.9	0.287	0.21
U07-10I	2023-03-14	10.09	7.30	0.496	23.0	2.31	-98.1	0.450	0.34
U07-10I	2023-08-21	13.20	7.22	0.470	10.9	0.24	-33.8	0.389	0.30
U07-10D	2014-05-28	12.97	6.72	0.408	NM	5.81	-77.2	0.340	0.26
U07-10D	2014-08-27	18.84	7.03	0.317	NM	0.59	105.2	0.230	0.17
U07-10D	2015-04-10	11.62	6.90	0.344	NM	0.47	60.7	0.300	0.22
U07-10D	2015-09-02	13.69	7.37	0.442	NM	0.13	-11.8	0.370	0.27
U07-10D	2015-09-15	15.41	7.25	0.657	NM	0.21	11.8	0.520	0.40
U07-10D	2015-10-15	16.43	7.08	0.401	NM	1.95	43.9	0.310	0.23
U07-10D	2016-03-15	11.57	7.29	0.176	NM	3.86	229.0	0.150	0.11
U07-10D	2016-09-21	11.71	7.17	0.366	NM	0.70	477.6	0.300	0.22
U07-10D	2017-04-26	12.07	6.99	0.261	NM	2.05	-81.4	0.230	0.17
U07-10D	2017-09-21	13.96	7.21	0.582	NM	0.12	-72.8	0.480	0.36
U07-10D	2018-04-16	10.75	7.12	0.321	NM	4.99	100.7	0.290	0.21
U07-10D	2018-09-10	15.24	7.08	0.560	NM	0.95	-271.7	0.450	0.34
U07-10D	2019-04-09	11.80	6.93	0.620	NM	5.08	69.2	0.540	0.41
U07-10D	2019-09-25	14.66	8.14	0.495	NM	0.83	-54.1	0.400	0.30
U07-10D	2020-03-24	10.39	7.28	0.636	NM	1.39	-39.1	0.570	0.44
U07-10D	2020-08-20	14.47	7.33	0.782	NM	0.14	-50.1	0.640	0.49
U07-10D	2021-03-29	10.79	6.98	0.273	NM	3.60	-6.2	0.240	0.18
U07-10D	2021-08-25	13.02	7.17	0.716	NM	1.25	-32.8	0.605	0.46
U07-10D	2022-03-24	9.97	7.02	0.169	NM	4.85	67.7	0.154	0.11
U07-10D	2022-08-23	13.00	7.40	0.355	6.1	0.06	29.7	0.299	0.22
U07-10D	2023-03-14	10.25	7.20	0.350	2.8	1.54	18.8	0.317	0.24
U07-10D	2023-08-21	13.00	7.30	0.540	13.6	0.53	-53.7	0.455	0.34
MW03-07	2014-06-04	14.87	6.50	4.706	NM	1.56	19.7	3.790	3.18
MW03-07	2014-09-04	19.44	6.64	3.489	NM	1.33	62.2	2.620	2.13
MW03-07	2015-04-22	12.15	6.74	2.360	NM	0.84	114.9	2.030	1.64
MW03-07	2015-09-15	18.31	6.99	2.753	NM	1.05	8.7	2.040	1.64
MW03-07	2016-03-17	9.30	7.02	1.908	NM	4.90	62.2	1.770	1.41

AECOM

TABLE 1-1b
AREAS 1 AND 3 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
MW03-07	2016-09-23	16.36	6.76	3.230	NM	1.79	-40.7	2.510	2.05
MW03-07	2017-04-13	8.99	7.80	8.123	NM	2.45	-109.5	7.520	6.65
MW03-07	2017-08-30	20.66	6.85	5.177	NM	4.66	-36.5	3.680	3.08
MW03-07	2018-04-12	9.24	6.86	7.630	NM	1.68	11.0	7.100	6.20
MW03-07	2018-09-04	19.44	7.09	5.059	NM	0.69	-279.8	3.680	3.08
MW03-07	2019-04-02	10.74	6.50	10.461	NM	0.55	145.3	9.340	8.36
MW03-07	2019-09-25	16.51	8.31	3.719	NM	0.64	-138.8	2.890	2.38
MW03-07	2020-03-19	7.05	6.85	5.762	NM	8.59	-54.7	5.700	4.89
MW03-07	2020-08-26	19.01	7.17	4.662	NM	1.26	-98.3	3.420	2.85
MW03-07	2021-03-30	8.10	7.07	5.197	NM	2.42	31.1	4.980	4.24
MW03-07	2021-08-30	19.43	7.36	1.722	NM	1.13	-62.7	1.330	1.05
MW03-07	2022-03-28	8.52	4.74	6.138	NM	1.53	-98.7	5.734	4.94
MW03-07	2022-08-23	21.80	6.42	3.830	17.2	2.98	-114.9	2.610	2.15
MW03-07	2023-03-07	6.35	6.92	9.612	18.4	5.50	7.6	9.697	8.62
MW03-07	2023-08-21	20.80	6.92	5.130	64.6	2.54	33.6	3.620	3.02
NDM97-3	2014-06-03	10.91	6.91	0.496	NM	0.52	-122.8	0.440	0.33
NDM97-3	2014-09-04	12.54	6.98	0.331	NM	0.21	-132.9	0.290	0.21
NDM97-3	2015-04-21	12.20	7.34	0.361	NM	0.23	-99.9	0.310	0.23
NDM97-3	2015-09-15	13.19	7.45	0.318	NM	1.52	11.6	0.270	0.20
NDM97-3	2015-09-24	12.50	7.29	0.312	NM	1.14	-56.7	0.270	0.20
NDM97-3	2015-12-01	12.01	7.30	0.926	NM	1.08	-18.0	0.800	0.62
NDM97-3	2016-03-17	11.17	7.39	0.415	NM	0.18	-103.3	0.370	0.27
NDM97-3	2016-09-22	12.73	7.19	0.279	NM	0.07	-85.3	0.220	0.18
NDM97-3	2017-04-13	11.08	7.18	0.335	NM	0.49	-134.0	0.300	0.22
NDM97-3	2017-08-30	13.82	7.39	0.299	NM	1.02	29.2	0.250	0.18
NDM97-3	2018-04-11	10.92	7.52	0.556	NM	0.11	-91.9	0.490	0.37
NDM97-3	2018-09-06	13.64	6.72	0.398	NM	0.07	-34.2	0.330	0.25
NDM97-3	2019-04-03	10.92	7.37	0.008	NM	0.18	62.7	0.700	0.54
NDM97-3	2019-09-23	12.50	7.41	0.308	NM	1.77	145.6	0.260	0.20
NDM97-3	2020-03-19	11.30	7.36	0.469	NM	0.81	-122.4	0.410	0.31
NDM97-3	2020-08-26	12.88	7.60	0.349	NM	0.23	-41.4	0.300	0.22
NDM97-3	2021-03-30	11.13	7.55	0.422	NM	0.29	-148.6	0.370	0.28
NDM97-3	2021-08-30	13.02	7.63	0.298	NM	0.17	-56.8	0.252	0.19
NDM97-3	2022-03-28	11.24	5.21	0.372	NM	0.81	-52.5	0.328	0.25
NDM97-3	2022-08-18	14.90	6.78	0.297	2.5	2.38	3.3	0.239	0.18

Abbreviations:

°C	degrees Celsius
g/L	grams per litre
L	Litres
m	metres
mASL	metres above sea level
mg/L	milligrams per litre
mV	millivolts
mS/cm	millisiemens per centimetre
NA	Not applicable/available
ND	Not detected
NM	Not monitored
NS	Not sampled
NTU	Nephelometric Turbidity unit
ORP	Oxidation Reduction Potential
ppt	parts per thousand
TDS	Total Dissolved Solids
TOC	Top of Casing

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						LEPH$_w$	HEPH$_w$	EPH$_w$ (C10-C19)	EPH$_w$ (C19-C32)	VH$_w$ (C6-C10)	VPH$_w$ (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
A1-3S	A1-3S-20170406		2017-04-06	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3S	A1-3S-REG-GW_20180410		2018-04-10	1.1 - 4.1	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3S	A1-3S-20180410		2018-04-10	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3S	A1-3S-REG-GW_20190410		2019-04-10	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3S	A1-3S-20190410		2019-04-10	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3S	A1-3S-REG-GW_20210330		2021-03-30	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-3S	A1-3S-20210330		2021-03-30	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A1-3S	A1-3S-REG-GW_20220322		2022-03-22	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-3S	A1-3S_20230308		2023-03-08	1.1 - 4.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-3D	A1-3D-20140603		2014-06-03	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-3D	A1-3D_DUP-30-20140603	A1-3D-20140603	2014-06-03	10.9 - 15.5	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-3D	A1-3D-20140923		2014-09-23	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	0.64	< 0.5	0.81	-	-
A1-3D	A1-3D-20150513		2015-05-13	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-3D	A1-3D-20150923		2015-09-23	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-3D	A1-3D-20160405		2016-04-05	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-3D	A1-3D-20160922		2016-09-22	10.9 - 15.5	N	-	-	< 250	< 250	-	-	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	0.55
A1-3D	A1-3D-20170406		2017-04-06	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-20170830		2017-08-30	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-REG-GW_20180410		2018-04-10	10.9 - 15.5	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-20180410		2018-04-10	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-REG-GW_20180905		2018-09-05	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D_DUP-5-20180905	A1-3D-20180905	2018-09-05	10.9 - 15.5	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	DUP-5-FD-GW_20180905	A1-3D-REG-GW_20180905	2018-09-05	10.9 - 15.5	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-20180905		2018-09-05	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-20190404		2019-04-04	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-REG-GW_20190404		2019-04-04	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	L2350854-1		2019-09-19	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-20190919		2019-09-19	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	VA20A3631-001		2020-03-19	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-3D	A1-3D-20200319		2020-03-19	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	VA20B3584-007		2020-08-25	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-3D	A1-3D-20200825		2020-08-25	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-3D	A1-3D-REG-GW_20210318		2021-03-18	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-3D	A1-3D-20210318		2021-03-18	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A1-3D	A1-3D-20210826		2021-08-26	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.76
A1-3D	A1-3D-20220824		2022-08-24	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.56
A1-3D	A1-3D_20230309		2023-03-09	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-3D	A1-3D-20230815		2023-08-15	10.9 - 15.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.55
G1-1A	G1-1A-20140602		2014-06-02	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A-20140923		2014-09-23	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A-20150504		2015-05-04	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A-20150903		2015-09-03	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A_DUP-13-20160404	G1-1A-20160404	2016-04-04	3.1 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A-20160404		2016-04-04	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1A	G1-1A-20170407		2017-04-07	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A_DUP-7-20170407	G1-1A-20170407	2017-04-07	3.1 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A_DUP-3-20170830	G1-1A-20170830	2017-08-30	3.1 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-20170830		2017-08-30	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-REG-GW_20180410		2018-04-10	3.1 - 6.1	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-20180410		2018-04-10	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-REG-GW_20180905		2018-09-05	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-20180905		2018-09-05	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-REG-GW_20190404		2019-04-04	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-20190404		2019-04-04	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	L2352452-3		2019-09-23	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-20190923		2019-09-23	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	VA20A3942-001		2020-03-25	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1A	G1-1A-20200325		2020-03-25	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	VA20B3584-001		2020-08-25	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1A	G1-1A-20200825		2020-08-25	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1A	G1-1A-REG-GW_20210318		2021-03-18	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.53
G1-1A	G1-1A-20210318		2021-03-18	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.53
G1-1A	G1-1A_20210830		2021-08-30	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.88
G1-1A	G1-1A-20210830		2021-08-30	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.88
G1-1A	G1-1A-REG-GW_20220322		2022-03-22	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.52
G1-1A	G1-1A-20220823		2022-08-23	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.37
G1-1A	G1-1A_20230314		2023-03-14	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1A	G1-1A-20230815		2023-08-15	3.1 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.42
G1-1B	G1-1B-20140602		2014-06-02	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20140923		2014-09-23	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20150504		2015-05-04	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20150903		2015-09-03	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20160404		2016-04-04	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20160922		2016-09-22	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1B	G1-1B-20170407		2017-04-07	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-20170830		2017-08-30	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-REG-GW_20180410		2018-04-10	10.8 - 12.3	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-20180410		2018-04-10	10.8 - 12.3	N	-	-	< 250	480	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-REG-GW_20180905		2018-09-05	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-20180905		2018-09-05	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-REG-GW_20190404		2019-04-04	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-20190404		2019-04-04	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	L2352452-1		2019-09-23	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-20190923		2019-09-23	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	VA20A3942-002		2020-03-25	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1B	G1-1B-20200325		2020-03-25	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	VA20B3584-002		2020-08-25	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1B	G1-1B-20200825		2020-08-25	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1B	G1-1B-REG-GW_20210318		2021-03-18	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1B	G1-1B-20210318		2021-03-18	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-1B	G1-1B_20210830		2021-08-30	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
G1-1B	G1-1B-20210830		2021-08-30	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
G1-1B	G1-1B-REG-GW_20220322		2022-03-22	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1B	G1-1B-20220824		2022-08-24	10.8 - 12.3	N	-	-	< 250	260	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1B	G1-1B_20230315		2023-03-15	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1B	G1-1B-20230816		2023-08-16	10.8 - 12.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1C	G1-1C-20140602		2014-06-02	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20140923		2014-09-23	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C_DUP-11-20150504	G1-1C-20150504	2015-05-04	19.8 - 21.3	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20150504		2015-05-04	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20150903		2015-09-03	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20160405		2016-04-05	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C_DUP-8-20160922	G1-1C-20160922	2016-09-22	19.8 - 21.3	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20160922		2016-09-22	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-1C	G1-1C-20170407		2017-04-07	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-20170830		2017-08-30	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-REG-GW_20180410		2018-04-10	19.8 - 21.3	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-20180410		2018-04-10	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-REG-GW_20180905		2018-09-05	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-20180905		2018-09-05	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-REG-GW_20190404		2019-04-04	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-20190404		2019-04-04	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	L2352452-2		2019-09-23	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-20190923		2019-09-23	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	VA20A3942-003		2020-03-25	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1C	G1-1C-20200325		2020-03-25	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	VA20B3584-003		2020-08-25	19.8 - 21.3	N	-	-	< 250	370	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-1C	G1-1C-20200825		2020-08-25	19.8 - 21.3	N	-	-	< 250	370	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-1C	G1-1C-REG-GW_20210318		2021-03-18	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1C	G1-1C-20210318		2021-03-18	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-1C	G1-1C_20210830		2021-08-30	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.04
G1-1C	G1-1C-20210830		2021-08-30	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.04
G1-1C	G1-1C-REG-GW_20220323		2022-03-23	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.76
G1-1C	G1-1C-20220824		2022-08-24	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1C	G1-1C_20230315		2023-03-15	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-1C	G1-1C-20230815		2023-08-15	19.8 - 21.3	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A-20140605		2014-06-05	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2A	G1-2A-20140903		2014-09-03	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2A	G1-2A-20150421		2015-04-21	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2A	G1-2A-20150901		2015-09-01	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2A	G1-2A-20160315		2016-03-15	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2A	G1-2A-20161021		2016-10-21	1.8 - 3.4	N	< 250	< 250	< 250	< 250	-	-	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
G1-2A	G1-2A-20170419		2017-04-19	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-20170831		2017-08-31	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-REG-GW_20180416		2018-04-16	1.8 - 3.4	N	-	-	-	-	< 100	< 100	< 0.5	12.4	7.62	41.9	< 0.5	-
G1-2A	G1-2A-20180416		2018-04-16	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	12.4	7.62	41.9	< 0.5	-
G1-2A	G1-2A_20180906		2018-09-06	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-20180906		2018-09-06	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-REG-GW_20190328		2019-03-28	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-20190328		2019-03-28	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	L2353321-1		2019-09-24	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-20190924		2019-09-24	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-

Parkland Refining (B.C) Ltd.
20240402 Table 1-1 to 1-3 2023 PMP Areas 1 and 3_AGE_RS.xlsx - 1-2 PHCs
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AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						LEPH$_w$	HEPH$_w$	EPH$_w$ (C10-C19	EPH$_w$ (C19-C32	VH$_w$ (C6-C10)	VPH$_w$ (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
G1-2A	VA20A3569-003		2020-03-18	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2A	G1-2A-20200318		2020-03-18	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	VA20B3702-004		2020-08-26	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2A	G1-2A-20200826		2020-08-26	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2A	G1-2A-REG-GW_20210323		2021-03-23	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A-20210323		2021-03-23	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-2A	G1-2A-REG-GW_20210826		2021-08-26	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A-20210826		2021-08-26	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-2A	G1-2A-REG-GW_20220328		2022-03-28	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A-20220823		2022-08-23	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A_20230307		2023-03-07	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2A	G1-2A-20230815		2023-08-15	1.8 - 3.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2B	G1-2B_DUP-34-20140605	G1-2B-20140605	2014-06-05	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-20140605		2014-06-05	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-20140903		2014-09-03	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-20150421		2015-04-21	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-20150901		2015-09-01	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-20160315		2016-03-15	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-2B	G1-2B-DUP-20160926	G1-2B-20160926	2016-09-26	4.6 - 6.1	FD	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G1-2B	G1-2B-20160926		2016-09-26	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-20170419		2017-04-19	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-20170831		2017-08-31	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-REG-GW_20180416		2018-04-16	4.6 - 6.1	N	-	-	-	-	< 100	< 100	< 0.5	6.62	4.08	22.5	< 0.5	-
G1-2B	G1-2B-20180416		2018-04-16	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	6.62	4.08	22.5	< 0.5	-
G1-2B	G1-2B_20180906		2018-09-06	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	DUP-6_20180906	G1-2B_20180906	2018-09-06	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B_DUP-6-20180906	G1-2B-20180906	2018-09-06	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-20180906		2018-09-06	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-REG-GW_20190328		2019-03-28	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-20190328		2019-03-28	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	L2353321-2		2019-09-24	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-20190924		2019-09-24	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	VA20A3569-004		2020-03-18	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2B	G1-2B_DUP-2-20200318	G1-2B-20200318	2020-03-18	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	VA20A3569-006	VA20A3569-004	2020-03-18	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2B	G1-2B-20200318		2020-03-18	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	VA20B3702-005		2020-08-26	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2B	G1-2B_DUP-05-20200826	G1-2B-20200826	2020-08-26	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	VA20B3702-008	VA20B3702-005	2020-08-26	4.6 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-2B	G1-2B-20200826		2020-08-26	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-2B	G1-2B-REG-GW_20210323		2021-03-23	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2B	G1-2B-20210323		2021-03-23	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-2B	G1-2B-REG-GW_20210826		2021-08-26	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.97
G1-2B	G1-2B-20210826		2021-08-26	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.97
G1-2B	G1-2B-REG-GW_20220328		2022-03-28	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2B	G1-2B-20220824		2022-08-24	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2B	G1-2B_20230307		2023-03-07	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-2B	G1-2B-20230815		2023-08-15	4.6 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-5	G1-5-20140602		2014-06-02	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5_DUP-21-20140902	G1-5-20140902	2014-09-02	9.1 - 12.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20140902		2014-09-02	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5_DUP-14-20150513	G1-5-20150513	2015-05-13	9.1 - 12.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20150513		2015-05-13	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20150923		2015-09-23	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20160404		2016-04-04	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20160922		2016-09-22	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-5	G1-5-20170406		2017-04-06	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-20170830		2017-08-30	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-REG-GW_20180410		2018-04-10	9.1 - 12.2	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-20180410		2018-04-10	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5_20180906		2018-09-06	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-20180906		2018-09-06	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-REG-GW_20190402		2019-04-02	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-20190402		2019-04-02	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	L2350854-3		2019-09-19	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-20190919		2019-09-19	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	VA20A3631-006		2020-03-19	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-5	G1-5-20200319		2020-03-19	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	VA20B3584-004		2020-08-25	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-5	G1-5-20200825		2020-08-25	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-5	G1-5-REG-GW_20210318		2021-03-18	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.42
G1-5	G1-5-20210318		2021-03-18	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3.42
G1-5	G1-5-REG-GW_20210826		2021-08-26	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	1.23	< 0.50	25.7
G1-5	G1-5-20210826		2021-08-26	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	1.23	< 0.5	25.7
G1-5	G1-5-REG-GW_20220323		2022-03-23	9.1 - 12.2	N	-	-	350	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	37.7
G1-5	G1-5-20220825		2022-08-25	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	57.4
G1-5	G1-5_20230309		2023-03-09	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	39.8
G1-5	G1-5-20230815		2023-08-15	9.1 - 12.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	68.0
G1-5	DUP-1-20230815	G1-5-20230815	2023-08-15	9.1 - 12.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	70.3
G1-6	G1-6-20140602		2014-06-02	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20140922		2014-09-22	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20150513		2015-05-13	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20150923		2015-09-23	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20160404		2016-04-04	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20160922		2016-09-22	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-6	G1-6-20170406		2017-04-06	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-20170830		2017-08-30	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-REG-GW_20180410		2018-04-10	7.9 - 11	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-20180410		2018-04-10	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-REG-GW_20180905		2018-09-05	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-20180905		2018-09-05	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-REG-GW_20190402		2019-04-02	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	DUP-09-FD-GW_20190402	G1-6-REG-GW_20190402	2019-04-02	7.9 - 11	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6_DUP-09-20190402	G1-6-20190402	2019-04-02	7.9 - 11	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-20190402		2019-04-02	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	L2350854-2		2019-09-19	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-20190919		2019-09-19	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	VA20A3569-001		2020-03-18	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-6	G1-6-20200318		2020-03-18	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	VA20B3584-005		2020-08-24	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-6	G1-6-20200824		2020-08-24	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-6	G1-6-FD-GW_20210318		2021-03-18	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.94
G1-6	G1-6-20210318		2021-03-18	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.94
G1-6	G1-6-REG-GW_20210826		2021-08-26	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.74
G1-6	G1-6-20210826		2021-08-26	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	7.74
G1-6	G1-6-REG-GW_20220322		2022-03-22	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.95
G1-6	G1-6-20220824		2022-08-24	7.9 - 11	N	-	-	< 250	320	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	11.1
G1-6	G1-6_20230320		2023-03-20	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.48
G1-6	G1-6-20230829		2023-08-29	7.9 - 11	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.50	< 0.50	11.0
G1-7A	G1-7A-20140602		2014-06-02	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7A	G1-7A-20140922		2014-09-22	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7A	G1-7A-20150504		2015-05-04	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7A	G1-7A-20150923		2015-09-23	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7A	G1-7A-20160317		2016-03-17	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7A	G1-7A-20160922		2016-09-22	0.9 - 2.4	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20170407		2017-04-07	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20170830		2017-08-30	0.9 - 2.4	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20170831		2017-08-31	0.9 - 2.4	N	-	-	< 250	< 250	-	-	-	-	-	-	-	-
G1-7A	G1-7A-REG-GW_20180411		2018-04-11	0.9 - 2.4	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20180411		2018-04-11	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-REG-GW_20180904		2018-09-04	0.9 - 2.4	N	-	-	< 250	1100	-	-	-	-	-	-	-	-
G1-7A	G1-7A-20180904		2018-09-04	0.9 - 2.4	N	-	-	< 250	1100	-	-	-	-	-	-	-	-
G1-7A	G1-7A-20180905		2018-09-05	0.9 - 2.4	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-REG-GW_20180905		2018-09-05	0.9 - 2.4	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-REG-GW_20190404		2019-04-04	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20190404		2019-04-04	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	L2352452-4		2019-09-23	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-20190923		2019-09-23	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	VA20A3631-004		2020-03-19	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-7A	G1-7A-20200319		2020-03-19	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	VA20B3584-006		2020-08-25	0.9 - 2.4	N	-	-	< 250	430	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-7A	G1-7A-20200825		2020-08-25	0.9 - 2.4	N	-	-	< 250	430	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7A	G1-7A-REG-GW_20210322		2021-03-22	0.9 - 2.4	N	-	-	< 250	1000	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-7A	G1-7A-20210322		2021-03-22	0.9 - 2.4	N	-	-	< 250	1000	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G1-7A	G1-7A-REG-GW_20210826		2021-08-26	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.71	< 0.50	< 0.50
G1-7A	G1-7A-20210826		2021-08-26	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	0.71	< 0.5	< 0.5
G1-7A	G1-7A-REG-GW_20220322		2022-03-22	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-7A	G1-7A_20220818		2022-08-18	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-7A	G1-7A_20230308		2023-03-08	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-7A	G1-7A-20230814		2023-08-14	0.9 - 2.4	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G1-7B	G1-7B-20140603		2014-06-03	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7B	G1-7B-20140923		2014-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7B	G1-7B-20150504		2015-05-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						LEPH$_w$	HEPH$_w$	EPH$_w$ (C10-C19)	EPH$_w$ (C19-C32)	VH$_w$ (C6-C10)	VPH$_w$ (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
G1-7B	G1-7B_DUP-16-20150923	G1-7B-20150923	2015-09-23	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7B	G1-7B-20150923		2015-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7B	G1-7B-20160317		2016-03-17	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-7B	G1-7B-20160922		2016-09-22	6.1 - 9.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20170407		2017-04-07	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20170831		2017-08-31	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-REG-GW_20180411		2018-04-11	6.1 - 9.1	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	DUP-3-FD-GW_20180411	G1-7B-REG-GW_20180411	2018-04-11	6.1 - 9.1	FD	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B_DUP-3-20180411	G1-7B-20180411	2018-04-11	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20180411		2018-04-11	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-REG-GW_20180904		2018-09-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20180904		2018-09-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-REG-GW_20190404		2019-04-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	DUP-11-FD-GW_20190404	G1-7B-REG-GW_20190404	2019-04-04	6.1 - 9.1	FD	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B_DUP-3-20190404	G1-7B-20190404	2019-04-04	6.1 - 9.1	FD	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20190404		2019-04-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	L2352452-5		2019-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B_DUP-6-20190923	G1-7B-20190923	2019-09-23	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	L2352452-9	L2352452-5	2019-09-23	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-20190923		2019-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	VA20A3631-005		2020-03-19	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-7B	G1-7B-20200319		2020-03-19	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	VA20B3702-006		2020-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-7B	G1-7B-20200826		2020-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-7B	G1-7B-REG-GW_20210322		2021-03-22	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.90
G1-7B	G1-7B-20210322		2021-03-22	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	6.9
G1-7B	G1-7B-REG-GW_20210826		2021-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.68
G1-7B	G1-7B-20210826		2021-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	5.68
G1-7B	G1-7B-REG-GW_20220323		2022-03-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.46
G1-7B	G1-7B-20220824		2022-08-24	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.93
G1-7B	G1-7B_20230309		2023-03-09	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.71
G1-7B	G1-7B-20230815		2023-08-15	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	7.70
G1-8	G1-8-20140604		2014-06-04	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8_DUP-27-20140923	G1-8-20140923	2014-09-23	7 - 13.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8-20140923		2014-09-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8-20150513		2015-05-13	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8_DUP-17-20150923	G1-8-20150923	2015-09-23	7 - 13.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8-20150923		2015-09-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8-20160321		2016-03-21	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G1-8	G1-8-20160926		2016-09-26	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.3
G1-8	G1-8_DUP-12-20170419	G1-8-20170419	2017-04-19	7 - 13.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20170419		2017-04-19	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8_DUP-5-20170831	G1-8-20170831	2017-08-31	7 - 13.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20170831		2017-08-31	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-REG-GW_20180412		2018-04-12	7 - 13.1	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20180412		2018-04-12	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-REG-GW_20180904		2018-09-04	7 - 13.1	N	-	-	< 250	290	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20180904		2018-09-04	7 - 13.1	N	-	-	< 250	290	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8_20190403		2019-04-03	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20190403		2019-04-03	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	L2352452-7		2019-09-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-20190923		2019-09-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	VA20A3569-002		2020-03-18	7 - 13.1	N	-	-	< 250	390	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-8	G1-8-20200318		2020-03-18	7 - 13.1	N	-	-	< 250	390	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	VA20B3702-007		2020-08-26	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
G1-8	G1-8-20200826		2020-08-26	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G1-8	G1-8-REG-GW_20210323		2021-03-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.70
G1-8	G1-8-20210323		2021-03-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.7
G1-8	G1-8_20210830		2021-08-30	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.42
G1-8	G1-8-20210830		2021-08-30	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.42
G1-8	G1-8-REG-GW_20220329		2022-03-29	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.93
G1-8	G1-8-20220822		2022-08-23	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.02
G1-8	G1-8_20230308		2023-03-08	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.01
G1-8	DUP-03_20230308	G1-8_20230308	2023-03-08	7 - 13.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.03
G1-8	G1-8-20230816		2023-08-16	7 - 13.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.19
NDM97-2	NDM97-2-20140604		2014-06-04	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-20140923		2014-09-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-20150513		2015-05-13	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-20150923		2015-09-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2_DUP-10-20160321	NDM97-2-20160321	2016-03-21	2.3 - 5.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-20160321		2016-03-21	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-DUP-20160926	NDM97-2-20160926	2016-09-26	2.3 - 5.1	FD	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-2	NDM97-2-20160926		2016-09-26	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
NDM97-2	NDM97-2-20170419		2017-04-19	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-20170831		2017-08-31	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-REG-GW_20180412		2018-04-12	2.3 - 5.1	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-20180412		2018-04-12	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-REG-GW_20180904		2018-09-04	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-20180904		2018-09-04	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-REG-GW_20190328		2019-03-28	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-20190328		2019-03-28	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	L2352452-6		2019-09-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-20190923		2019-09-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	VA20A3569-005		2020-03-18	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
NDM97-2	NDM97-2-20200318		2020-03-18	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	VA20B3702-001		2020-08-26	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
NDM97-2	NDM97-2-20200826		2020-08-26	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-2	NDM97-2-REG-GW_20210323		2021-03-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
NDM97-2	NDM97-2-20210323		2021-03-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
NDM97-2	NDM97-2_20210830		2021-08-30	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
NDM97-2	NDM97-2-20210830		2021-08-30	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
NDM97-2	NDM97-2-REG-GW_20220328		2022-03-28	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
NDM97-2	NDM97-2-20220822		2022-08-22	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
NDM97-2	NDM97-2_20230307		2023-03-07	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
NDM97-2	NDM97-2-20230823		2023-08-23	2.3 - 5.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12S	A1-12S-20140523		2014-05-23	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20140902		2014-09-02	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20150401		2015-04-01	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20150901		2015-09-01	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20160316		2016-03-16	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20161004		2016-10-04	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12S	A1-12S-20170428		2017-04-28	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-20170914		2017-09-14	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-20180410		2018-04-10	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-REG-GW_20180410		2018-04-10	0.98 - 2.48	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-REG-GW_20180828		2018-08-28	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S_DUP-3-20180828	A1-12S-20180828	2018-08-28	0.98 - 2.48	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	DUP-3-FD-GW_20180828	A1-12S-REG-GW_20180828	2018-08-28	0.98 - 2.48	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-20180828		2018-08-28	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-REG-GW_20190327		2019-03-27	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-20190327		2019-03-27	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	L2353321-3		2019-09-24	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-20190924		2019-09-24	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	VA20A3495-001		2020-03-17	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12S	A1-12S-20200317		2020-03-17	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	VA20B3791-001		2020-08-27	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12S	A1-12S-20200827		2020-08-27	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12S	A1-12S-REG-GW_20210325		2021-03-25	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12S	A1-12S-20210325		2021-03-25	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A1-12S	A1-12S-REG-GW_20210825		2021-08-25	0.98 - 2.48	N	-	-	< 250	360	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
A1-12S	A1-12S-20210825		2021-08-25	0.98 - 2.48	N	-	-	< 250	360	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
A1-12S	A1-12S-REG-GW_20220324		2022-03-24	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12S	A1-12S-20220817		2022-08-17	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12S	A1-12S_20230320		2023-03-20	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12S	A1-12S-20230823		2023-08-23	0.98 - 2.48	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A1-12D	A1-12D_DUP-24-20140523	A1-12D-20140523	2014-05-23	1.7 - 3.2	FD	-	-	430	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20140523		2014-05-23	1.7 - 3.2	N	-	-	330	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D_DUP-20-20140902	A1-12D-20140902	2014-09-02	1.7 - 3.2	FD	-	-	300	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20140902		2014-09-02	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D_DUP-6-20150401	A1-12D-20150401	2015-04-01	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20150401		2015-04-01	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D_DUP-10-20150901	A1-12D-20150901	2015-09-01	1.7 - 3.2	FD	-	-	280	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20150901		2015-09-01	1.7 - 3.2	N	-	-	380	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20160316		2016-03-16	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D_DUP-10-20161004	A1-12D-20161004	2016-10-04	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D-20161004		2016-10-04	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12D	A1-12D_DUP-15-20170427	A1-12D-20170427	2017-04-27	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20170427		2017-04-27	1.7 - 3.2	N	-	-	260	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20170914		2017-09-14	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-REG-GW_20180409		2018-04-09	1.7 - 3.2	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D_DUP-2-20180409	A1-12D-20180409	2018-04-09	1.7 - 3.2	FD	-	-	< 250	< 250	120	120	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	DUP-2-FD-GW_20180409	A1-12D-REG-GW_20180409	2018-04-09	1.7 - 3.2	FD	-	-	-	-	120	120	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20180409		2018-04-09	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	<

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19)	EPH_w (C19-C32)	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
A1-12D	A1-12D-REG-GW_20180828		2018-08-28	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20180828		2018-08-28	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-REG-GW_20190327		2019-03-27	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D_DUP-2-20190327	A1-12D-20190327	2019-03-27	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	DUP-07-FD-GW_20190327	A1-12D-REG-GW_20190327	2019-03-27	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20190327		2019-03-27	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	L2353321-4		2019-09-24	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-20190924		2019-09-24	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	VA20A3495-002		2020-03-17	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12D	A1-12D-20200317		2020-03-17	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	VA20B3791-002		2020-08-27	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12D	A1-12D-20200827		2020-08-27	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12D	A1-12D-REG-GW_20210325		2021-03-25	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.71
A1-12D	A1-12D-20210325		2021-03-25	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.71
A1-12D	A1-12D-REG-GW_20210825		2021-08-25	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.38
A1-12D	A1-12D-20210825		2021-08-25	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.38
A1-12D	A1-12D-REG-GW_20220324		2022-03-24	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.39
A1-12D	A1-12D-20220817		2022-08-17	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.70
A1-12D	DUP-3-20220817	A1-12D-20220817	2022-08-17	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.55
A1-12D	A1-12D_20230320		2023-03-20	1.7 - 3.2	N	-	-	< 250	< 250	110	110	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.10
A1-12D	DUP-05_20230320	A1-12D_20230320	2023-03-20	1.7 - 3.2	FD	-	-	< 250	< 250	110	110	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.09
A1-12D	A1-12D-20230823		2023-08-23	1.7 - 3.2	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.28
A1-12D	DUP-5-20230823	A1-12D-20230823	2023-08-23	1.7 - 3.2	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.24
A1-12C	A1-12C-20140523		2014-05-23	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20140902		2014-09-02	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20150401		2015-04-01	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20150901		2015-09-01	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C_DUP-7-20160316	A1-12C-20160316	2016-03-16	5.2 - 6.7	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20160316		2016-03-16	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20161004		2016-10-04	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A1-12C	A1-12C-20170427		2017-04-27	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-20170914		2017-09-14	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-REG-GW_20180409		2018-04-09	5.2 - 6.7	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-20180409		2018-04-09	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-REG-GW_20180830		2018-08-30	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-20180830		2018-08-30	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-REG-GW_20190327		2019-03-27	5.2 - 6.7	N	-	-	< 250	290	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-20190327		2019-03-27	5.2 - 6.7	N	-	-	< 250	290	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	L2353321-5		2019-09-24	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-20190924		2019-09-24	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	VA20A3495-003		2020-03-17	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12C	A1-12C-20200317		2020-03-17	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	VA20B3791-003		2020-08-27	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A1-12C	A1-12C-20200827		2020-08-27	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A1-12C	A1-12C-REG-GW_20210325		2021-03-25	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.01
A1-12C	A1-12C_DUP-08-20210325	A1-12C-20210325	2021-03-25	5.2 - 6.7	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.1
A1-12C	DUP-08-FD-GW_20210325	A1-12C-REG-GW_20210325	2021-03-25	5.2 - 6.7	fd	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.10
A1-12C	A1-12C-20210325		2021-03-25	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.01
A1-12C	A1-12C-REG-GW_20210825		2021-08-25	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.65
A1-12C	A1-12C_DUP-05-20210825	A1-12C-20210825	2021-08-25	5.2 - 6.7	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.73
A1-12C	DUP-05-FD-GW_20210825	A1-12C-REG-GW_20210825	2021-08-25	5.2 - 6.7	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.73
A1-12C	A1-12C-20210825		2021-08-25	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.65
A1-12C	A1-12C-REG-GW_20220324		2022-03-24	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.02
A1-12C	DUP-08-FD-GW_20220324	A1-12C-REG-GW_20220324	2022-03-24	5.2 - 6.7	FD	-	-	< 250	260	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.07
A1-12C	A1-12C-20220817		2022-08-17	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	0.62	< 0.50	< 0.50	< 0.50	3.44
A1-12C	A1-12C_20230320		2023-03-20	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.29
A1-12C	A1-12C-20230823		2023-08-23	5.2 - 6.7	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.54
MW17-4	MW17-4-20170717		2017-07-17	0.8 - 1.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-REG-GW_20180405		2018-04-05	0.8 - 1.5	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-20180405		2018-04-05	0.8 - 1.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-REG-GW_20180830		2018-08-30	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-20180830		2018-08-30	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-REG-GW_20190328		2019-03-28	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-20190328		2019-03-28	0.8 - 1.5	N	-	-	< 250	< 250	< 100	101	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	L2353320-4		2019-09-24	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-20190924		2019-09-24	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	VA20A3495-004		2020-03-17	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW17-4	MW17-4-20200317		2020-03-17	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	VA20B3130-007		2020-08-19	0.8 - 1.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW17-4	MW17-4-20200819		2020-08-19	0.8 - 1.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW17-4	MW17-4-REG-GW_20210323		2021-03-23	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW17-4	MW17-4-20210323		2021-03-23	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW17-4	MW17-4_20210824		2021-08-24	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	0.82
MW17-4	MW17-4-20210824		2021-08-24	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	0.82
MW17-4	MW17-4-REG-GW_20220324		2022-03-24	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW17-4	MW17-4_20220818		2022-08-18	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW17-4	MW17-4_20230320		2023-03-20	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW17-4	MW17-4-20230823		2023-08-23	0.8 - 1.5	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.79
MW17-4	DUP-4-20230823	MW17-4-20230823	2023-08-23	0.8 - 1.5	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.75
A3MW02-05	A3MW02-05_DUP-29-20140528	A3MW02-05-20140528	2014-05-28	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20140528		2014-05-28	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05_DUP-19-20140827	A3MW02-05-20140827	2014-08-27	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20140827		2014-08-27	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05_DUP-8-20150409	A3MW02-05-20150409	2015-04-09	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20150409		2015-04-09	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20150902		2015-09-02	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20150914		2015-09-14	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20151014		2015-10-14	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20160316		2016-03-16	2.4 - 6.1	N	310	470	320	470	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-05	A3MW02-05-20160919		2016-09-19	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
A3MW02-05	A3MW02-05-20170425		2017-04-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-20170921		2017-09-21	2.4 - 6.1	N	**2430**	2640	2430	2650	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-REG-GW_20180501		2018-05-01	2.4 - 6.1	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	< 0.5
A3MW02-05	A3MW02-05-20180501		2018-05-01	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	< 0.5
A3MW02-05	A3MW02-05_20180913		2018-09-13	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-20180913		2018-09-13	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-REG-GW_20190409		2019-04-09	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-20190409		2019-04-09	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	L2354839-6		2019-09-26	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-20190926		2019-09-26	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	VA20A3785-001		2020-03-23	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-05	A3MW02-05-20200323		2020-03-23	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	VA20B3130-004		2020-08-19	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-05	A3MW02-05_DUP-04-20200819	A3MW02-05-20200819	2020-08-19	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	VA20B3130-008	VA20B3130-004	2020-08-19	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-05	A3MW02-05-20200819		2020-08-19	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-05	A3MW02-05-REG-GW_20210325		2021-03-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-05	A3MW02-05-20210325		2021-03-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A3MW02-05	A3MW02-05-REG-GW_20210825		2021-08-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	0.67
A3MW02-05	DUP-04-FD-GW_20210825	A3MW02-05-REG-GW_20210825	2021-08-25	2.4 - 6.1	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	0.70
A3MW02-05	A3MW02-05-20210825		2021-08-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	0.67
A3MW02-05	A3MW02-05-REG-GW_20220324		2022-03-24	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-05	A3MW02-05-20220817		2022-08-17	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-05	A3MW02-05_20230314		2023-03-14	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-05	A3MW02-05-20230821		2023-08-21	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-06	A3MW02-06-REG-GW_20180417		2018-04-17	2.4 - 6.1	N	260	< 250	-	-	150	150	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-06	A3MW02-06-REG-GW_20180925		2018-09-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-06	A3MW02-06-REG-GW_20190408		2019-04-08	2.4 - 6.1	N	< 250	< 250	< 250	< 250	170	170	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-06	L2354839-7		2019-09-26	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-06	L2431889-2		2020-03-24	2.4 - 6.1	N	< 250	< 250	< 250	< 250	170	170	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-06	VA20B3130-003		2020-08-19	2.4 - 6.1	N	< 250	< 250	< 250	< 250	160	160	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-06	A3MW02-06-REG-GW_20210325		2021-03-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	170	170	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.06
A3MW02-06	A3MW02-06-REG-GW_20210825		2021-08-25	2.4 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.88
A3MW02-06	A3MW02-06-REG-GW_20220323		2022-03-23	2.4 - 6.1	N	330	< 250	330	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.57
A3MW02-06	A3MW02-06-20220817		2022-08-17	2.4 - 6.1	N	300	< 250	300	< 250	120	120	< 0.50	0.57	< 0.50	0.58	< 0.50	1.18
A3MW02-06	A3MW02-06_20230309		2023-03-09	2.4 - 6.1	N	< 250	< 250	< 250	< 250	270	270	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.02
A3MW02-06	A3MW02-06-20230821		2023-08-21	2.4 - 6.1	N	< 250	< 250	< 250	< 250	150	150	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.08
A3MW02-07	A3MW02-07-20140528		2014-05-28	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20140827		2014-08-27	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20150409		2015-04-09	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20150902		2015-09-02	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20150914		2015-09-14	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20151014		2015-10-14	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20160316		2016-03-16	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-07	A3MW02-07-20160919		2016-09-19	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
A3MW02-07	A3MW02-07-20170420		2017-04-20	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	<

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
A3MW02-07	A3MW02-07-REG-GW_20190409		2019-04-09	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	A3MW02-07-20190409		2019-04-09	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	L2354839-2		2019-09-26	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	A3MW02-07-20190926		2019-09-26	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	L2431889-3		2020-03-24	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	A3MW02-07_DUP-4-20200324	A3MW02-07-20200324	2020-03-24	3.1 - 6.2	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	L2431889-10	L2431889-3	2020-03-24	3.1 - 6.2	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	A3MW02-07-20200324		2020-03-24	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	VA20B3129-002		2020-08-19	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-07	A3MW02-07_DUP-03-20200819	A3MW02-07-20200819	2020-08-19	3.1 - 6.2	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	VA20B3129-003	VA20B3129-002	2020-08-19	3.1 - 6.2	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-07	A3MW02-07-20200819		2020-08-19	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-07	A3MW02-07-REG-GW_20210329		2021-03-29	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-07	A3MW02-07_DUP-09-20210329	A3MW02-07-20210329	2021-03-29	3.1 - 6.2	FD	< 250	< 250	250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A3MW02-07	DUP-09-FD-GW_20210329	A3MW02-07-REG-GW_20210329	2021-03-29	3.1 - 6.2	FD	< 250	< 250	250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-07	A3MW02-07-20210329		2021-03-29	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A3MW02-07	A3MW02-07-REG-GW_20210825		2021-08-25	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
A3MW02-07	A3MW02-07-20210825		2021-08-25	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
A3MW02-07	A3MW02-07-REG-GW_20220323		2022-03-23	3.1 - 6.2	N	< 250	< 250	280	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-07	A3MW02-07-20220817		2022-08-17	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.54	< 0.50	< 0.50
A3MW02-07	A3MW02-07_20230309		2023-03-09	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-07	A3MW02-07-20230821		2023-08-21	3.1 - 6.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	A3MW02-08-20140528		2014-05-28	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20140827		2014-08-27	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20150409		2015-04-09	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20150902		2015-09-02	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20150914		2015-09-14	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20151014		2015-10-14	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20160316		2016-03-16	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW02-08	A3MW02-08-20160919		2016-09-19	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
A3MW02-08	A3MW02-08-20170420		2017-04-20	1.5 - 5.5	N	< 250	280	< 250	280	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08_DUP-9-20170920	A3MW02-08-20170920	2017-09-20	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20170920		2017-09-20	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-
A3MW02-08	A3MW02-08-REG-GW_20180417		2018-04-17	1.5 - 5.5	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20180417		2018-04-17	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-REG-GW_20180925		2018-09-25	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20180925		2018-09-25	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-REG-GW_20190409		2019-04-09	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20190409		2019-04-09	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	L2354839-3		2019-09-26	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08_DUP-10-20190926	A3MW02-08-20190926	2019-09-26	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	L2354839-8	L2354839-3	2019-09-26	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20190926		2019-09-26	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	L2431889-4		2020-03-24	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-20200324		2020-03-24	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	VA20B3129-001		2020-08-19	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW02-08	A3MW02-08-20200819		2020-08-19	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW02-08	A3MW02-08-REG-GW_20210329		2021-03-29	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	A3MW02-08-20210329		2021-03-29	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A3MW02-08	A3MW02-08-REG-GW_20210825		2021-08-25	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
A3MW02-08	A3MW02-08-20210825		2021-08-25	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
A3MW02-08	A3MW02-08-REG-GW_20220323		2022-03-23	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	DUP-07-FD-GW_20220323	A3MW02-08-REG-GW_20220323	2022-03-23	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	A3MW02-08-20220817		2022-08-17	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	A3MW02-08_20230309		2023-03-09	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	DUP-04_20230309	A3MW02-08_20230309	2023-03-09	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	A3MW02-08-20230821		2023-08-21	1.5 - 5.5	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW02-08	DUP-02-20230821	A3MW02-08-20230821	2023-08-21	1.5 - 5.5	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW03-01	A3MW03-01-20140529		2014-05-29	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01_DUP-18-20140827	A3MW03-01-20140827	2014-08-27	1.5 - 6.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01-20140827		2014-08-27	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01-20150410		2015-04-10	1.5 - 6.1	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01-20150903		2015-09-03	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01-20160315		2016-03-15	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-01	A3MW03-01-20160921		2016-09-21	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
A3MW03-01	A3MW03-01-20170426		2017-04-26	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-01	A3MW03-01-20170921		2017-09-21	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-01	A3MW03-01-REG-GW_20180910		2018-09-10	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-01	A3MW03-01-REG-GW_20190409		2019-04-09	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-01	L2354359-1		2019-09-25	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-01	VA20A3785-002		2020-03-23	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW03-01	VA20B3370-001		2020-08-20	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW03-01	A3MW03-01_20210325		2021-03-25	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW03-01	A3MW03-01-REG-GW_20210825		2021-08-25	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
A3MW03-01	A3MW03-01-20210825		2021-08-25	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
A3MW03-01	A3MW03-01-REG-GW_20220323		2022-03-23	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.82
A3MW03-01	A3MW03-01-20220816		2022-08-16	1.5 - 6.1	N	-	-	-	-	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW03-01	A3MW03-01_20230314		2023-03-14	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.01
A3MW03-01	A3MW03-01-20230821		2023-08-21	1.5 - 6.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A3MW03-02	A3MW03-02-20140529		2014-05-29	2.3 - 8.3	N	**560**	< 250	560	< 250	330	330	< 0.5	0.56	< 0.5	1.34	-	-
A3MW03-02	A3MW03-02-20140827		2014-08-27	2.3 - 8.3	N	**520**	< 250	520	< 250	340	340	< 0.5	< 0.53	< 0.5	0.91	-	-
A3MW03-02	A3MW03-02_DUP-9-20150410	A3MW03-02-20150410	2015-04-10	2.3 - 8.3	FD	**650**	< 250	660	< 250	580	580	< 0.9	1.42	< 0.5	3.78	-	-
A3MW03-02	A3MW03-02-20150410		2015-04-10	2.3 - 8.3	N	**690**	< 250	690	< 250	590	590	< 0.9	< 2	< 0.5	3.85	-	-
A3MW03-02	A3MW03-02-20150903		2015-09-03	2.3 - 8.3	N	470	< 250	470	< 250	810	810	< 0.9	0.99	< 0.5	2.11	-	-
A3MW03-02	A3MW03-02-20150914		2015-09-14	2.3 - 8.3	N	380	< 250	380	< 250	510	510	< 1	0.88	< 0.5	1.75	-	-
A3MW03-02	A3MW03-02-20151015		2015-10-15	2.3 - 8.3	N	**790**	< 250	790	< 250	740	730	< 0.6	1.2	< 0.5	3.55	-	-
A3MW03-02	A3MW03-02-20160315		2016-03-15	2.3 - 8.3	N	**930**	< 250	940	< 250	990	990	< 0.5	1.5	0.68	4.04	-	-
A3MW03-02	A3MW03-02_DUP-7-20160921	A3MW03-02-20160921	2016-09-21	2.3 - 8.3	FD	**750**	< 250	760	< 250	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
A3MW03-02	A3MW03-02-20160921		2016-09-21	2.3 - 8.3	N	**720**	< 250	720	< 250	<	<	< 2	1.57	< 0.5	2.68	-	226
A3MW03-02	A3MW03-02-20170426		2017-04-26	2.3 - 8.3	N	**950**	< 250	960	< 250	930	930	< 0.7	1.25	< 0.5	4.04	< 0.5	-
A3MW03-02	A3MW03-02-20170921		2017-09-21	2.3 - 8.3	N	**820**	< 250	830	< 250	700	700	< 2	1.41	< 0.5	3.25	< 0.5	-
A3MW03-02	A3MW03-02-REG-GW_20180412		2018-04-12	2.3 - 8.3	N	**1150**	< 250	-	-	1130	1120	< 0.5	1.65	< 0.5	5.91	< 0.5	-
A3MW03-02	MW03-02-REG-GW_20180426		2018-04-26	2.3 - 8.3	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-02	A3MW03-02-REG-GW_20180910		2018-09-10	2.3 - 8.3	N	< 250	< 250	< 250	< 250	560	560	< 2.5	1.09	< 0.5	< 0.75	< 0.5	-
A3MW03-02	A3MW03-02-REG-GW_20190409		2019-04-09	2.3 - 8.3	N	**900**	< 250	910	< 250	680	680	< 0.5	0.97	< 0.5	3.50	< 0.5	-
A3MW03-02	DUP-13-FD-GW_20190409	A3MW03-02-REG-GW_20190409	2019-04-09	2.3 - 8.3	FD	**960**	< 250	970	< 250	930	930	< 0.5	0.91	< 0.5	3.34	< 0.5	-
A3MW03-02	L2354359-2		2019-09-25	2.3 - 8.3	N	**560**	< 250	570	< 250	640	640	< 0.8	0.69	< 0.5	1.64	< 0.5	-
A3MW03-02	L2354359-7	L2354359-2	2019-09-25	2.3 - 8.3	FD	**620**	< 250	620	< 250	610	610	< 0.8	0.62	< 0.5	1.56	< 0.5	-
A3MW03-02	L2431889-1		2020-03-24	2.3 - 8.3	N	-	-	940	< 250	1020	1020	< 0.5	0.94	< 0.5	4.13	< 0.5	-
A3MW03-02	VA20B3584-008		2020-08-25	2.3 - 8.3	N	**680**	< 250	690	< 250	790	770	18.1	1.11	1.36	2.49	< 0.50	-
A3MW03-02	A3MW03-02-REG-GW_20210325		2021-03-25	2.3 - 8.3	N	**820**	< 250	820	< 250	660	640	< 1.00	1.24	4.96	8.38	< 0.50	153
A3MW03-02	A3MW03-02-REG-GW_20210825		2021-08-25	2.3 - 8.3	N	**860**	< 250	860	< 250	650	640	< 0.50	1.49	< 0.50	6.45	< 0.50	166
A3MW03-02	A3MW03-02-20210825		2021-08-25	2.3 - 8.3	N	**860**	< 250	860	< 250	650	640	< 0.5	1.49	< 0.5	6.45	< 0.5	166
A3MW03-02	A3MW03-02-REG-GW_20220323		2022-03-23	2.3 - 8.3	N	**710**	< 250	710	< 250	400	390	< 0.50	0.59	< 0.50	5.54	< 0.50	74.0
A3MW03-02	DUP-06-FD-GW_20220323	A3MW03-02-REG-GW_20220323	2022-03-23	2.3 - 8.3	FD	**750**	< 250	760	< 250	400	390	< 0.50	0.58	< 0.50	5.42	< 0.50	74.4
A3MW03-02	A3MW03-02-20220816		2022-08-16	2.3 - 8.3	N	**760**	< 250	760	< 250	750	740	< 0.50	0.76	< 0.50	8.84	< 0.50	71.6
A3MW03-02	A3MW03-02_20230314		2023-03-14	2.3 - 8.3	N	**820**	< 250	830	< 250	800	800	< 0.50	< 0.50	< 0.50	4.23	< 0.50	55.7
A3MW03-02	DUP-01_20230314	A3MW03-02_20230314	2023-03-14	2.3 - 8.3	FD	**840**	< 250	850	< 250	750	740	< 0.50	0.53	< 0.50	4.44	< 0.50	57.0
A3MW03-02	A3MW03-02-20230821		2023-08-21	2.3 - 8.3	N	**640**	< 250	640	< 250	620	620	< 0.50	0.62	< 0.50	1.75	< 0.50	84.3
A3MW03-02	DUP-3-20230821	A3MW03-02-20230821	2023-08-21	2.3 - 8.3	FD	**660**	< 250	670	< 250	580	580	< 0.50	0.60	< 0.50	1.67	< 0.50	83.6
A3MW03-03	A3MW03-03-20140528		2014-05-28	0.8 - 6.9	N	380	< 250	380	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20140827		2014-08-27	0.8 - 6.9	N	**930**	740	930	740	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20150708		2015-07-08	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20150902		2015-09-02	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20150914		2015-09-14	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20151014		2015-10-14	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20160316		2016-03-16	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-DUP-20161012	A3MW03-03-20161012	2016-10-12	0.8 - 6.9	FD	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	47.7
A3MW03-03	A3MW03-03-20161012		2016-10-12	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A3MW03-03	A3MW03-03-20170425		2017-04-25	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-03	A3MW03-03-20170920		2017-09-20	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-03	A3MW03-03-REG-GW_20180501		2018-05-01	0.8 - 6.9	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	47.3
A3MW03-03	A3MW03-03-REG-GW_20180925		2018-09-25	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-03	A3MW03-03-REG-GW_20190409		2019-04-09	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A3MW03-03	VA20A3785-003		2020-03-23	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW03-03	VA20B3130-005		2020-08-19	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A3MW03-03	A3MW03-03-REG-GW_20210401		2021-04-01	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	221
A3MW03-03	A3MW03-03-REG-GW_20210825		2021-08-25	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	258
A3MW03-03	A3MW03-03-20210825		2021-08-25	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	258
A3MW03-03	A3MW03-03-REG-GW_20220323		2022-03-23	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	23.8
A3MW03-03	A3MW03-03-20220817		2022-08-17	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	422
A3MW03-03	A3MW03-03_20230314		2023-03-14	0.8 - 6.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
MW03-04	A3MW03-04_DUP-13-20170425	A3MW03-04-20170425	2017-04-25	1.5 - 6.7	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	A3MW03-04-20170920		2017-09-20	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	A3MW03-04_DUP-10-20170920	A3MW03-04-20170920	2017-09-20	1.5 - 6.7	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	A3MW03-04-20180418		2018-04-18	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	A3MW03-04-REG-GW_20180418		2018-04-18	1.5 - 6.7	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-REG-GW_20180925		2018-09-25	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-20180925		2018-09-25	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-REG-GW_20190408		2019-04-08	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-20190408		2019-04-08	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	L2354839-1		2019-09-26	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-20190926		2019-09-26	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	VA20A3785-004		2020-03-23	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW03-04	MW03-04-20200323		2020-03-23	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	VA20B3130-006		2020-08-19	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW03-04	MW03-04-20200819		2020-08-19	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-04	MW03-04-REG-GW_20210329		2021-03-29	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.84
MW03-04	MW03-04-20210329		2021-03-29	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.84
MW03-04	MW03-04-REG-GW_20210825		2021-08-25	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	6.52
MW03-04	MW03-04-20210825		2021-08-25	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	6.52
MW03-04	MW03-04-REG-GW_20220323		2022-03-23	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.98
MW03-04	MW03-04-20220817		2022-08-17	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.62	< 0.50	6.95
MW03-04	MW03-04_20230314		2023-03-14	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.01
MW03-04	MW03-04-20230821		2023-08-21	1.5 - 6.7	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.32
U6	U6-20140528		2014-05-28	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U6	U6-20140827		2014-08-27	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U6	U6-20150409		2015-04-09	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U6	U6-20150902		2015-09-02	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U6	U6-20160316		2016-03-16	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U6	U6-20160919		2016-09-19	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
U6	U6-20170420		2017-04-20	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-20170914		2017-09-14	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 300	< 300	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-REG-GW_20180417		2018-04-17	0.9 - 3.9	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-20180417		2018-04-17	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-REG-GW_20180925		2018-09-25	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-20180925		2018-09-25	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-REG-GW_20190408		2019-04-08	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	DUP-12-FD-GW_20190408	U6-REG-GW_20190408	2019-04-08	0.9 - 3.9	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6_DUP-12-20190408	U6-20190408	2019-04-08	0.9 - 3.9	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-20190408		2019-04-08	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	L2354839-4		2019-09-26	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	0.63	< 0.5	< 0.75	< 0.5	-
U6	U6-20190926		2019-09-26	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	0.63	< 0.5	< 0.75	< 0.5	-
U6	L2431889-5		2020-03-24	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-20200324		2020-03-24	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	VA20B3130-001		2020-08-19	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
U6	U6-20200819		2020-08-19	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U6	U6-REG-GW_20210329		2021-03-29	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U6	U6-20210329		2021-03-29	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U6	U6-REG-GW_20210825		2021-08-25	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
U6	U6-20210825		2021-08-25	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
U6	U6-REG-GW_20220323		2022-03-23	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U6	U6-20220817		2022-08-17	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U6	U6_20230309		2023-03-09	0.9 - 3.9	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U7	U7-20140529		2014-05-29	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U7	U7-20140827		2014-08-27	1.2 - 5.8	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U7	U7-20150409		2015-04-09	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U7	U7-20150902		2015-09-02	1.2 - 5.8	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U7	U7-20160316		2016-03-16	1.2 - 5.8	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U7	U7-20160921		2016-09-21	1.2 - 5.8	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
U7	U7-20170501		2017-05-01	1.2 - 5.8	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20170914		2017-09-14	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-REG-GW_20180417		2018-04-17	1.2 - 5.8	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20180417		2018-04-17	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-REG-GW_20180925		2018-09-25	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	DUP-8-FD-GW_20180925	U7-REG-GW_20180925	2018-09-25	1.2 - 5.8	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7_DUP-8-20180925	U7-20180925	2018-09-25	1.2 - 5.8	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20180925		2018-09-25	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-REG-GW_20190408		2019-04-08	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20190408		2019-04-08	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	L2354839-5		2019-09-26	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20190926		2019-09-26	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	L2431889-6		2020-03-24	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-20200324		2020-03-24	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	VA20B3130-002		2020-08-19	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
U7	U7-20200819		2020-08-19	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U7	U7-REG-GW_20210329		2021-03-29	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U7	U7-20210329		2021-03-29	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U7	U7-REG-GW_20210825		2021-08-25	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
U7	U7-20210825		2021-08-25	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
U7	U7-REG-GW_20220323		2022-03-23	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U7	U7-20220817		2022-08-17	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.50	< 0.50	< 0.50
U7	U7_20230309		2023-03-09	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U7	U7-20230821		2023-08-21	1.2 - 5.8	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U07-10S	U7-10S-20140529		2014-05-29	4.7 - 6.2	N	6700	1300	11400	1500	< 100	< 100	20.8	3.32	5.54	9.82	-	-
U07-10S	U7-10S-20140827		2014-08-27	4.7 - 6.2	N	1940	3190	25600	3270	180	< 100	66.3	12.4	21.5	30.8	-	-
U07-10S	U7-10S-20150410		2015-04-10	4.7 - 6.2	N	8590	2660	16300	3690	190	< 100	38.1	8.3	17.5	25.8	-	-
U07-10S	U7-10S-20150903		2015-09-03	4.7 - 6.2	N	8140	320	15900	440	200	< 100	58	10.7	23	32.1	-	-
U07-10S	U07-10S_DUP-13-20150903	U7-10S-20150903	2015-09-03	4.7 - 6.2	FD	8230	350	15400	450	230	110	56.2	10.4	22.6	31.5	-	-
U07-10S	U07-10S_DUP-1-20150915	U07-10S-20150915	2015-09-15	4.7 - 6.2	FD	9580	470	18200	630	220	< 100	69.2	14	29.7	40.2	-	-
U07-10S	U07-10S-20150915		2015-09-15	4.7 - 6.2	N	7650	1190	22300	2970	230	< 100	67.4	14	29.9	40.5	-	-
U07-10S	U07-10S-20151015		2015-10-15	4.7 - 6.2	N	1400	9970	56500	1960	260	< 100	69.7	15.5	33	45	-	-
U07-10S	U07-10S-20160315		2016-03-15	4.7 - 6.2	N	8460	4710	15700	7410	300	< 200	40.7	10.9	30.1	40.6	-	-
U07-10S	U07-10S-20160921		2016-09-21	4.7 - 6.2	N	5870	< 250	18100	250	< 400	< 400	73.8	13	29.6	38.1	< 0.5	293
U07-10S	U07-10S-20170425		2017-04-25	4.7 - 6.2	N	8250	560	14500	730	260	110	58.3	12.6	32.7	44.2	< 0.5	-
U07-10S	U07-10S-DUP-20170921	U07-10S-20170921	2017-09-21	4.7 - 6.2	FD	-	-	-	-	-	-	34.8	8.94	28.4	38.2	< 0.5	574
U07-10S	U07-10S-20170921		2017-09-21	4.7 - 6.2	N	4080	< 250	1320	250	210	100	41.1	8.62	26.5	35.9	< 0.5	-
U07-10S	V07-10S-REG-GW_20180412		2018-04-12	4.7 - 6.2	N	-	-	-	-	-	-	16.3	4.51	11.3	17.6	0.83	542
U07-10S	U07-10S-20180412		2018-04-12	4.7 - 6.2	N	-	-	-	-	-	-	16.3	4.51	11.3	17.6	0.83	542
U07-10S	U07-10S-REG-GW_20180910		2018-09-10	4.7 - 6.2	N	8440	560	17500	740	220	130	40.9	10.8	15.9	29.6	1.11	-
U07-10S	U07-10S-REG-GW_20180910_2		2018-09-10	4.7 - 6.2	N	-	-	-	-	-	-	39.3	9.68	25.9	35.5	1.51	406
U07-10S	U07-10S-DUP-20180910	U07-10S-20180910	2018-09-10	4.7 - 6.2	FD	-	-	-	-	-	-	39.3	9.68	25.9	35.5	1.51	406
U07-10S	U07-10S-20180910		2018-09-10	4.7 - 6.2	N	8440	560	17500	740	220	130	40.9	10.8	15.9	29.6	1.11	-
U07-10S	U07-10S-REG-GW_20190409		2019-04-09	4.7 - 6.2	N	4660	780	10400	1090	< 100	< 100	6.24	2.31	7.59	11.4	< 0.5	-
U07-10S	U07-10S-20190409		2019-04-09	4.7 - 6.2	N	4660	780	10400	1090	< 100	< 100	6.24	2.31	7.59	11.4	< 0.5	-
U07-10S	U07-10S-REG-GW_20190410		2019-04-10	4.7 - 6.2	N	-	-	-	-	-	-	9.46	3.53	8.38	12.6	< 0.5	563
U07-10S	U07-10S-20190410		2019-04-10	4.7 - 6.2	N	-	-	-	-	-	-	9.46	3.53	8.38	12.6	1.51	-
U07-10S	L2354359-3		2019-09-25	4.7 - 6.2	N	7020	300	14600	360	150	< 100	23.4	9.22	24.5	30.9	< 0.5	-
U07-10S	U07-10S-20190925		2019-09-25	4.7 - 6.2	N	7020	300	14600	360	150	< 100	23.4	9.22	24.5	30.9	< 0.5	-
U07-10S	L2431889-7		2020-03-24	4.7 - 6.2	N	7760	< 250	14800	280	250	170	21.5	7.33	20.0	29.7	< 0.5	-
U07-10S	L2431889-11	L2431889-7	2020-03-24	4.7 - 6.2	FD	8370	260	14700	300	200	120	21.7	7.93	21.0	29.4	< 0.5	-
U07-10S	U07-10S_DUP-5-20200324	U07-10S-20200324	2020-03-24	4.7 - 6.2	FD	8370	260	14700	300	200	120	21.7	7.93	21	29.4	< 0.5	-
U07-10S	U07-10S-20200324		2020-03-24	4.7 - 6.2	N	7760	< 250	14800	280	250	170	21.5	7.33	20	29.7	< 0.5	-
U07-10S	VA20B3370-002		2020-08-20	4.7 - 6.2	N	6350	3630	11300	5440	270	150	35.8	11.2	30.1	39.7	< 0.50	-
U07-10S	U07-10S-20200820		2020-08-20	4.7 - 6.2	N	6350	3630	11300	5440	270	150	35.8	11.2	30.1	39.7	< 0.5	-
U07-10S	U07-10S-REG-GW_20210329		2021-03-29	4.7 - 6.2	N	6620	< 250	12000	280	160	< 100	18.1	6.20	18.3	28.0	< 0.50	346
U07-10S	DUP-10-FD-GW_20210329	U07-10S-REG-GW_20210329	2021-03-29	4.7 - 6.2	FD	6780	< 250	12800	260	< 100	< 100	12.6	6.96	24.6	33.2	< 0.50	334
U07-10S	U07-10S_DUP-10-20210329	U07-10S-20210329	2021-03-29	4.7 - 6.2	FD	6780	< 250	12800	260	< 100	< 100	12.6	6.96	24.6	33.2	< 0.5	334
U07-10S	U07-10S-20210329		2021-03-29	4.7 - 6.2	N	6620	< 250	12000	280	160	< 100	18.1	6.2	18.3	28	< 0.5	346
U07-10S	U07-10S-REG-GW_20210825		2021-08-25	4.7 - 6.2	N	9090	1560	19300	2180	160	< 100	17.6	6.99	27.7	32.0	< 0.50	304
U07-10S	U07-10S-20210825		2021-08-25	4.7 - 6.2	N	9090	1560	19300	2180	160	< 100	17.6	6.99	27.7	32	< 0.5	304
U07-10S	U07-10S-REG-GW_20220324		2022-03-24	4.7 - 6.2	N	5200	350	14100	390	150	< 100	16.0	5.56	20.9	26.6	< 0.50	593
U07-10S	U07-10S_20230314		2023-03-14	4.7 - 6.2	N	8380	280	15600	320	170	< 100	23.6	8.14	25.1	32.2	< 0.50	941
U07-10S	U07-10S-20230821		2023-08-21	4.7 - 6.2	N	9240	310	18000	380	210	110	31.2	10.2	25.9	32.5	< 0.50	515
U07-10I	U7-10I-20140528		2014-05-28	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U7-10I-20140827		2014-08-27	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U7-10I-20150410		2015-04-10	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U7-10I-20150902		2015-09-02	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U07-10I-20150915		2015-09-15	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U07-10I-20151015		2015-10-15	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U7-10I-20160315		2016-03-15	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10I	U7-10I-20160921		2016-09-21	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	12.9
U07-10I	U07-10I-20160921		2016-09-21	6.65 - 8.15	N	-	-	-	-	-	-	-	-	-	-	< 0.5	-
U07-10I	U07-10I-20170425		2017-04-25	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20170921		2017-09-21	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20180416		2018-04-16	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	3.61	2.5	12.2	< 0.5	-
U07-10I	U07-10I-REG-GW_20180910		2018-09-10	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	0.55	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20180910		2018-09-10	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	0.55	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-REG-GW_20190409		2019-04-09	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20190409		2019-04-09	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	L2354359-4		2019-09-25	6.65 - 8.15	N	< 250	< 250	< 250	< 250	120	120	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20190925		2019-09-25	6.65 - 8.15	N	< 250	< 250	< 250	< 250	120	120	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	L2431889-8		2020-03-24	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-20200324		2020-03-24	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0

AECOM

TABLE 1-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						LEPH$_w$	HEPH$_w$	EPH$_w$ (C10-C19	EPH$_w$ (C19-C32	VH$_w$ (C6-C10)	VPH$_w$ (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
***CSR-SCH-3.2C3-GENWAT-AW**						500	--	5000	--	15000	1500	400	5	2000	300	720	34000
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	0.03	100	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type												
U07-10I	U07-10I-20200820		2020-08-20	6.65 - 8.15	N	330	< 250	330	< 250	180	160	18.9	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10I	U07-10I-REG-GW_20210329		2021-03-29	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	18.8	< 0.50	0.96	0.72	< 0.50	54.8
U07-10I	U07-10I-20210329		2021-03-29	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	18.8	< 0.5	0.96	0.72	< 0.5	54.8
U07-10I	U07-10I-REG-GW_20210825		2021-08-25	6.65 - 8.15	N	430	< 250	440	< 250	320	270	40.6	1.59	0.67	3.34	< 0.50	131
U07-10I	U07-10I-20210825		2021-08-25	6.65 - 8.15	N	430	< 250	440	< 250	320	270	40.6	1.59	0.67	3.34	< 0.5	131
U07-10I	U07-10I-REG-GW_20220324		2022-03-24	6.65 - 8.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	12.1
U07-10I	U07-10I-20220823		2022-08-23	6.65 - 8.15	N	**550**	< 250	560	< 250	240	240	< 0.55	0.80	< 0.50	3.80	< 0.50	35.0
U07-10I	U07-10I_20230314		2023-03-14	6.65 - 8.15	N	< 250	< 250	< 250	< 250	120	120	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.79
U07-10I	U07-10I-20230821		2023-08-21	6.65 - 8.15	N	420	< 250	430	< 250	300	300	< 0.50	0.70	< 0.50	3.12	< 0.50	41.9
U07-10D	U7-10D-20140528		2014-05-28	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U7-10D-20140827		2014-08-27	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U7-10D-20150410		2015-04-10	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U7-10D-20150902		2015-09-02	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U07-10D-20150915		2015-09-15	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U07-10D_DUP-1-20151015	U07-10D-20151015	2015-10-15	8.5 - 10.65	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U07-10D-20151015		2015-10-15	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U7-10D-20160315		2016-03-15	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U07-10D	U7-10D-20160921		2016-09-21	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	10.2
U07-10D	U07-10D-20160921		2016-09-21	8.5 - 10.65	N	-	-	-	-	-	-	-	-	-	-	< 0.5	-
U07-10D	U07-10D_DUP-14-20170426	U07-10D-20170426	2017-04-26	8.5 - 10.65	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20170426		2017-04-26	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20170921		2017-09-21	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20180416		2018-04-16	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	2.15	1.38	7.4	< 0.5	-
U07-10D	U07-10D-20180925		2018-09-25	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-REG-GW_20180925		2018-09-25	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	DUP-9-FD-GW_20180925	U07-10D-REG-GW_20180925	2018-09-25	8.5 - 10.65	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D_DUP-9-20180925	U07-10D-20180925	2018-09-25	8.5 - 10.65	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-REG-GW_20190409		2019-04-09	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20190409		2019-04-09	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	L2354359-5		2019-09-25	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20190925		2019-09-25	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	L2431889-9		2020-03-24	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-20200324		2020-03-24	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	VA20B3370-004		2020-08-20	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	7.10	< 0.50	< 0.50	< 0.75	< 0.50	-
U07-10D	U07-10D-20200820		2020-08-20	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	7.1	< 0.5	< 0.5	< 0.75	< 0.5	-
U07-10D	U07-10D-REG-GW_20210329		2021-03-29	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U07-10D	U07-10D-20210329		2021-03-29	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U07-10D	U07-10D-REG-GW_20210825		2021-08-25	8.5 - 10.65	N	260	< 250	300	< 250	360	280	66.4	1.87	2.69	3.78	< 0.50	155
U07-10D	U07-10D-20210825		2021-08-25	8.5 - 10.65	N	260	< 250	300	< 250	360	280	66.4	1.87	2.69	3.78	< 0.5	155
U07-10D	U07-10D-REG-GW_20220324		2022-03-24	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U07-10D	U07-10D-20220823		2022-08-23	8.5 - 10.65	N	< 250	< 250	< 250	< 250	320	310	2.94	0.78	< 0.50	4.53	< 0.50	48.1
U07-10D	U07-10D_20230314		2023-03-14	8.5 - 10.65	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.66
U07-10D	U07-10D-20230821		2023-08-21	8.5 - 10.65	N	< 250	< 250	280	< 250	230	230	< 0.75	0.57	< 0.50	1.82	< 0.50	39.9
MW03-07	MW03-07-20140604		2014-06-04	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20140904		2014-09-04	0.6 - 2.2	N	< 250	330	< 250	330	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20150422		2015-04-22	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20150915		2015-09-15	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07_DUP-8-20160317	MW03-07-20160317	2016-03-17	0.6 - 2.2	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20160317		2016-03-17	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20160923		2016-09-23	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-07	MW03-07-20170413		2017-04-13	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-20170830		2017-08-30	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-REG-GW_20180412		2018-04-12	0.6 - 2.2	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-20180412		2018-04-12	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-REG-GW_20180904		2018-09-04	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-20180904		2018-09-04	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-REG-GW_20190402		2019-04-02	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-20190402		2019-04-02	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	L2354359-6		2019-09-25	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-20190925		2019-09-25	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	VA20A3631-002		2020-03-19	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW03-07	MW03-07-20200319		2020-03-19	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	VA20B3702-003		2020-08-26	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW03-07	MW03-07-20200826		2020-08-26	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-07	MW03-07-REG-GW_20210330		2021-03-30	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.10
MW03-07	MW03-07-20210330		2021-03-30	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.1
MW03-07	MW03-07_20210830		2021-08-30	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.50
MW03-07	MW03-07-20210830		2021-08-30	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.5
MW03-07	MW03-07-REG-GW_20220328		2022-03-28	0.6 - 2.2	N	440	< 250	440	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.56
MW03-07	MW03-07-20220823		2022-08-23	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.39
MW03-07	MW03-07_20230307		2023-03-07	0.6 - 2.2	N	260	< 250	260	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.04
MW03-07	MW03-07-20230821		2023-08-21	0.6 - 2.2	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.13
NDM97-3	NDM97-3_DUP-32-20140603	NDM97-3-20140603	2014-06-03	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20140603		2014-06-03	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3_DUP-24-20140904	NDM97-3-20140904	2014-09-04	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20140904		2014-09-04	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20150421		2015-04-21	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3_DUP-15-20150915	NDM97-3-20150915	2015-09-15	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20150915		2015-09-15	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20160317		2016-03-17	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
NDM97-3	NDM97-3-20160923		2016-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3_DUP-10-20170413	NDM97-3-20170413	2017-04-13	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3-20170413		2017-04-13	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-03-20170830		2017-08-30	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3-REG-GW_20180411		2018-04-11	6.1 - 9.1	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	DUP-4-FD-GW_20180411	NDM97-3-REG-GW_20180411	2018-04-11	6.1 - 9.1	FD	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3_DUP-4-20180411	NDM97-3-20180411	2018-04-11	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3-20180411		2018-04-11	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3_20180906		2018-09-06	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3-20180906		2018-09-06	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-03-20190403		2019-04-03	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3_20190403		2019-04-03	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	DUP-10_20190403		2019-04-03	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-3_DUP-10-20190403	NDM97-03-20190403	2019-04-03	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	L2352452-8		2019-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-03-20190923		2019-09-23	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	NDM97-03-20200319		2020-03-19	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	VA20A3631-003		2020-03-19	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
NDM97-3	NDM97-03-20200826		2020-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
NDM97-3	VA20B3702-002		2020-08-26	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
NDM97-3	NDM97-3-REG-GW_20210330		2021-03-30	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.16
NDM97-3	NDM97-3-20210330		2021-03-30	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	6.16
NDM97-3	NDM97-3_20210830		2021-08-30	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	4.69
NDM97-3	DUP-06_20210830	NDM97-3_20210830	2021-08-30	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.72
NDM97-3	NDM97-3_DUP-06-20210830	NDM97-3-20210830	2021-08-30	6.1 - 9.1	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4.72
NDM97-3	NDM97-3-20210830		2021-08-30	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	4.69
NDM97-3	NDM97-3-REG-GW_20220328		2022-03-28	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.26
NDM97-3	NDM97-3_20220818		2022-08-18	6.1 - 9.1	N	-	-	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.10

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 14 Amendments, July 2022)
EPHw	Extractable petroleum hydrocarbons in water
FD	Field duplicate sample
LEPHw	Light extractable petroleum hydrocarbons in water
N	Normal environmental sample
HEPHw	Heavy extractable petroleum hydrocarbons in water
VHw	Volatile hydrocarbons in water
VPHw	Volatile petroleum hydrocarbons in water
MTBE	Methyl tert-butyl ether
mbgs	Metres below ground surface
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
-	Sample not analyzed for indicated parameter
--	No standard/guideline

Notes:
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Marine Water
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Freshwater
Exceeds Parkland Refinery Site Specific Screening Levels (SSSLs)
Detection Limit Exceeds Applicable Standard/Guideline
*Only MW17-4 is compared to the BC CSR Schedule 3.2 - Aquatic Life - Freshwater

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
G1-1A	G1-1A-20140602		2014-06-02	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20140923		2014-09-23	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20150504		2015-05-04	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20150903		2015-09-03	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A_DUP-13-20160404	G1-1A-20160404	2016-04-04	3.1 - 6.1	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20160404		2016-04-04	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20160922		2016-09-22	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20170407		2017-04-07	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A_DUP-7-20170407	G1-1A-20170407	2017-04-07	3.1 - 6.1	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-20170830		2017-08-30	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-REG-GW_20180410		2018-04-10	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
G1-1A	G1-1A-20180410		2018-04-10	3.1 - 6.1	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
G1-1A	G1-1A-REG-GW_20180905		2018-09-05	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G1-1A	G1-1A-20180905		2018-09-05	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	G1-1A-REG-GW_20190404		2019-04-04	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	0.0063	-	< 0.000015	< 0.00002	< 0.01	< 0.005	0.017	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.018	< 0.05	< 0.11
G1-1A	G1-1A-20190404		2019-04-04	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	0.01	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.02	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.02	< 0.05	-
G1-1A	L2352452-3		2019-09-23	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G1-1A	G1-1A-20190923		2019-09-23	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	VA20A3942-001		2020-03-25	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	-
G1-1A	G1-1A-20200325		2020-03-25	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	VA20B3584-001		2020-08-25	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G1-1A	G1-1A-20200825		2020-08-25	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	G1-1A-REG-GW_20210318		2021-03-18	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G1-1A	G1-1A-20210318		2021-03-18	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	G1-1A_20210830		2021-08-30	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G1-1A	G1-1A-20210830		2021-08-30	3.1 - 6.1	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
G1-1A	G1-1A-REG-GW_20220322		2022-03-22	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G1-1A	G1-1A-20220823		2022-08-23	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.019	< 0.010	< 0.010	< 0.010	0.010	< 0.050	0.030	0.014	< 0.050	< 0.065
G1-1A	G1-1A_20230314		2023-03-14	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G1-1A	G1-1A-20230815		2023-08-15	3.1 - 6.1	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A3MW02-05	A3MW02-05_DUP-29-20140528	A3MW02-05-20140528	2014-05-28	2.4 - 6.1	FD	0.42	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20140528		2014-05-28	2.4 - 6.1	N	0.44	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05_DUP-19-20140827	A3MW02-05-20140827	2014-08-27	2.4 - 6.1	FD	0.16	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20140827		2014-08-27	2.4 - 6.1	N	0.20	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05_DUP-8-20150409	A3MW02-05-20150409	2015-04-09	2.4 - 6.1	FD	0.68	< 0.08	< 0.04	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	< 0.01	0.10	< 0.01	-	-	< 0.05	< 0.02	0.02	< 0.05	-
A3MW02-05	A3MW02-05-20150409		2015-04-09	2.4 - 6.1	N	0.66	< 0.07	< 0.04	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	< 0.01	0.10	< 0.01	-	-	< 0.05	< 0.02	0.02	< 0.05	-
A3MW02-05	A3MW02-05-20150902		2015-09-02	2.4 - 6.1	N	3.08	< 0.05	0.06	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.96	< 0.05	-	-	0.07	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20150914		2015-09-14	2.4 - 6.1	N	0.39	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20151014		2015-10-14	2.4 - 6.1	N	0.94	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.18	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20160316		2016-03-16	2.4 - 6.1	N	5.50	< 0.08	0.20	0.52	**0.26**	0.54	-	-	0.36	< 0.05	**2.52**	1.83	0.10	-	-	0.09	< 0.06	**2.32**	< 0.05	-
A3MW02-05	A3MW02-05-20160919		2016-09-19	2.4 - 6.1	N	1.03	< 0.06	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	0.15	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW02-05	A3MW02-05-20170425		2017-04-25	2.4 - 6.1	N	0.74	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	0.11	0.48	< 0.05	-	-	< 0.05	< 0.05	0.17	< 0.05	-
A3MW02-05	A3MW02-05-20170921		2017-09-21	2.4 - 6.1	N	2.48	**< 0.6**	< 0.5	< 0.5	**< 0.2**	0.25	-	-	< 0.9	< 0.04	**2.89**	1.23	< 0.05	-	-	< 0.09	< 0.08	**2.83**	< 0.2	-
A3MW02-05	A3MW02-05-REG-GW_20180501		2018-05-01	2.4 - 6.1	N	0.024	< 0.02	0.012	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.016	0.010	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.017	< 0.05	< 0.11
A3MW02-05	A3MW02-05-20180501		2018-05-01	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	A3MW02-05_20180913		2018-09-13	2.4 - 6.1	N	0.988	< 0.2	< 0.04	< 0.05	< 0.03	-	0.000019	0.000013	< 0.07	< 0.007	0.191	0.055	0.010	< 0.05	< 0.05	< 0.05	< 0.02	0.200	< 0.05	1.48
A3MW02-05	A3MW02-05-20180913		2018-09-13	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	A3MW02-05-REG-GW_20190409		2019-04-09	2.4 - 6.1	N	0.083	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
A3MW02-05	A3MW02-05-20190409		2019-04-09	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	L2354839-6		2019-09-26	2.4 - 6.1	N	0.561	< 0.03	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.015	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.014	< 0.05	0.59
A3MW02-05	A3MW02-05-20190926		2019-09-26	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	VA20A3785-001		2020-03-23	2.4 - 6.1	N	0.355	< 0.040	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.028	0.011	< 0.010	0.011	0.016	< 0.050	< 0.020	0.031	< 0.050	-
A3MW02-05	A3MW02-05-20200323		2020-03-23	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	VA20B3130-004		2020-08-19	2.4 - 6.1	N	0.493	< 0.020	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.011	< 0.010	0.016	0.016	< 0.050	< 0.020	0.012	< 0.050	0.516
A3MW02-05	A3MW02-05_DUP-04-20200819	A3MW02-05-20200819	2020-08-19	2.4 - 6.1	FD	0.54	< 0.04	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	0.01	< 0.05	-
A3MW02-05	VA20B3130-008	VA20B3130-004	2020-08-19	2.4 - 6.1	FD	0.539	< 0.040	0.016	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.014	0.015	< 0.050	< 0.020	0.012	< 0.050	0.568
A3MW02-05	A3MW02-05-20200819		2020-08-19	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	A3MW02-05-REG-GW_20210325		2021-03-25	2.4 - 6.1	N	0.300	< 0.010	0.017	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.011	< 0.010	< 0.010	0.013	0.016	< 0.050	< 0.020	0.013	< 0.050	0.341
A3MW02-05	A3MW02-05-20210325		2021-03-25	2.4 - 6.1	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-05	A3MW02-05-REG-GW_20210825		2021-08-25	2.4 - 6.1	N	0.490	< 0.050	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.039	0.024	< 0.010	0.030	0.043	0.129	0.036	0.040	< 0.050	0.758
A3MW02-05	DUP-04-FD-GW_20210825	A3MW02-05-REG-GW_20210825	2021-08-25	2.4 - 6.1	FD	0.426	< 0.035	< 0.019	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.026	0.014	< 0.010	0.027	0.038	0.090	< 0.020	0.025	< 0.050	0.581
A3MW02-05	A3MW02-05-20210825		2021-08-25	2.4 - 6.1	N	0.49	< 0.05	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.04	0.02	< 0.01	0.03	0.04	0.13	0.04	0.04	< 0.05	-
A3MW02-05	A3MW02-05-REG-GW_20220324		2022-03-24	2.4 - 6.1	N	0.239	0.016	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.012	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.012	< 0.050	0.263
A3MW02-05	A3MW02-05-20220817		2022-08-17	2.4 - 6.1	N	0.295	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.013	< 0.010	< 0.010	0.017	0.032	0.066	< 0.020	0.014	< 0.050	0.388
A3MW02-05	A3MW02-05_20230314		2023-03-14	2.4 - 6.1	N	0.342	< 0.040	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.031	0.012	< 0.010	0.016	0.014	< 0.050	< 0.020	0.032	< 0.050	0.417
A3MW02-05	A3MW02-05-20230821		2023-08-21	2.4 - 6.1	N	0.395	< 0.043	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.026	0.014	< 0.010	0.013	< 0.010	< 0.050	0.033	0.030	< 0.050	0.498
A3MW02-06	A3MW02-06-20140528		2014-05-28	3.4 - 6.4	N	1.40	< 0.05	0.13	0.06	0.06	0.16	-	-	< 0.2	< 0.05	0.53	0.58	< 0.05	-	-	< 0.5	0.08	**0.46**	< 0.2	-
A3MW02-06	A3MW02-06-20140827		2014-08-27	3.4 - 6.4	N	1.23	< 0.05	0.08	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.20	0.29	< 0.05	-	-	< 0.3	< 0.05	0.13	< 0.07	-
A3MW02-06	A3MW02-06-20150409		2015-04-09	3.4 - 6.4	N	1.57	< 0.15	< 0.03	0.03	0.02	0.05	-	-	0.02	< 0.01	0.57	1.07	0.02	-	-	< 0.8	0.14	**0.44**	< 0.4	-
A3MW02-06	A3MW02-06-20150902		2015-09-02	3.4 - 6.4	N	0.83	< 0.05	0.10	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	0.23	0.66	< 0.05	-	-	< 0.4	< 0.05	0.18	< 0.3	-
A3MW02-06	A3MW02-06-20150914		2015-09-14	3.4 - 6.4	N	1.43	< 0.05	< 0.2	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.28	1.37	< 0.05	-	-	< 0.9	< 0.05	0.18	< 1	-
A3MW02-06	A3MW02-06-20151014		2015-10-14	3.4 - 6.4	N	1.75	< 0.05	0.14	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.39	2.20	< 0.05	-	-	< 2	< 0.05	**0.24**	< 2	-
A3MW02-06	A3MW02-06-20160316		2016-03-16	3.4 - 6.4	N	2.04	< 0.05	0.08	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.18	1.75	< 0.05	-	-	< 0.7	< 0.05	0.12	< 0.9	-
A3MW02-06	A3MW02-06-20160919		2016-09-19	3.4 - 6.4	N	2.11	< 0.2	0.13	0.06	0.06	0.11	-	-	0.08	0.01	0.50	2.05	< 0.05	-	-	< 0.4	0.07	**0.39**	< 1.5	-
A3MW02-06	A3MW02-06-20170425		2017-04-25	3.4 - 6.4	N	3.32	< 0.05	< 0.2	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	0.46	3.25	< 0.05	-	-	< 2	< 0.05	**0.31**	< 2	-
A3MW02-06	A3MW02-06-20170920		2017-09-20	3.4 - 6.4	N	2.30	< 0.05	0.13	< 0.05	0.02	< 0.1	-	-	< 0.06	< 0.005	0.53	2.37	< 0.05	-	-	< 0.8	0.06	**0.38**	< 2	-
A3MW02-06	A3MW02-06-REG-GW_20180417		2018-04-17	3.4 - 6.4	N	3.24	< 0.2	< 0.2	< 0.05	0.0276	-	-	< 0.00005	< 0.05	< 0.006	0.471	2.61	< 0.05	0.172	< 0.05	< 1	0.094	**0.339**	< 2	7
A3MW02-06	A3MW02-06-20180417		2018-04-17	3.4 - 6.4	N	3.24	< 0.2	< 0.2	< 0.05	0.03	< 0.1	-	-	< 0.05	< 0.006	0.47	2.61	< 0.05	0.17	< 0.05	< 1	0.09	**0.34**	< 2	-

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
A3MW02-06	A3MW02-06-REG-GW_20180925		2018-09-25	3.4 - 6.4	N	2.74	< 0.09	< 0.1	< 0.02	< 0.005	-	< 0.000015	< 0.00001	< 0.03	< 0.005	0.310	1.63	< 0.01	< 0.05	0.062	< 0.08	< 0.02	**0.206**	< 0.7	4.94
A3MW02-06	A3MW02-06-REG-GW_20190408		2019-04-08	3.4 - 6.4	N	2.41	< 0.08	< 0.07	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.02	< 0.005	0.216	1.22	< 0.01	0.827	< 0.05	< 2	0.068	0.144	< 0.8	4.9
A3MW02-06	L2354839-7		2019-09-26	3.4 - 6.4	N	2.11	< 0.07	0.058	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.178	0.992	< 0.01	0.545	< 0.05	< 0.7	0.046	0.112	< 1	4.1
A3MW02-06	L2431889-2		2020-03-24	3.4 - 6.4	N	2.98	< 0.08	< 0.08	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.183	1.36	< 0.01	1.34	< 0.06	< 2	< 0.07	0.121	< 0.9	6
A3MW02-06	VA20B3130-003		2020-08-19	3.4 - 6.4	N	2.58	< 0.070	< 0.070	< 0.010	0.0051	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.194	1.12	< 0.010	2.11	0.151	< 0.800	0.104	0.129	< 0.800	4.13
A3MW02-06	A3MW02-06-REG-GW_20210325		2021-03-25	3.4 - 6.4	N	2.61	0.031	0.050	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.106	0.958	< 0.010	1.86	0.175	< 0.800	0.074	0.070	< 0.900	3.92
A3MW02-06	A3MW02-06-REG-GW_20210825		2021-08-25	3.4 - 6.4	N	3.20	< 0.080	< 0.090	< 0.010	< 0.0050	-	< 0.000022	< 0.000010	< 0.010	< 0.0050	0.202	1.30	< 0.010	4.60	1.53	< 0.950	0.267	0.134	< 1.00	5.10
A3MW02-06	A3MW02-06-20210825		2021-08-25	3.4 - 6.4	N	3.20	< 0.08	< 0.09	< 0.01	< 0.005	-	< 0.000022	< 0.00001	< 0.01	< 0.005	0.20	1.30	< 0.01	4.60	1.53	< 0.95	0.27	0.13	< 1	-
A3MW02-06	A3MW02-06-REG-GW_20220323		2022-03-23	3.4 - 6.4	N	2.65	0.062	0.056	0.012	0.0185	-	0.000018	< 0.000010	0.018	< 0.0050	0.152	0.862	< 0.010	1.56	< 0.010	< 0.210	0.141	0.119	< 0.820	4.10
A3MW02-06	A3MW02-06-20220817		2022-08-17	3.4 - 6.4	N	2.42	< 0.011	0.062	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.140	0.900	< 0.010	2.82	0.686	< 0.710	0.235	0.092	< 1.00	3.85
A3MW02-06	A3MW02-06_20230309		2023-03-09	3.4 - 6.4	N	2.88	< 0.061	< 0.049	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.121	1.00	< 0.010	1.10	0.024	< 0.587	0.172	0.071	< 1.05	4.24
A3MW02-06	A3MW02-06-20230821		2023-08-21	3.4 - 6.4	N	3.40	< 0.059	< 0.072	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.167	1.09	< 0.010	2.00	0.041	< 0.730	0.205	0.112	< 1.15	5.03
A3MW02-07	A3MW02-07-20140528		2014-05-28	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20140827		2014-08-27	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20150409		2015-04-09	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20150902		2015-09-02	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20150914		2015-09-14	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20151014		2015-10-14	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20160316		2016-03-16	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20160919		2016-09-19	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20170420		2017-04-20	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20170920		2017-09-20	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20180417		2018-04-17	3.1 - 6.2	N	28.8	< 0.07	0.595	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	0.922	16.5	< 0.05	< 0.05	< 0.05	< 0.7	< 0.2	**0.448**	< 0.7	47.4
A3MW02-07	A3MW02-07_DUP-6-20180417	A3MW02-07-20180417	2018-04-17	3.1 - 6.2	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20180417		2018-04-17	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20180925		2018-09-25	3.1 - 6.2	N	69.8	< 0.2	**1.42**	0.012	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	**2.13**	32.6	< 0.01	7.22	< 0.3	**13.9**	1.53	**0.947**	< 2	130
A3MW02-07	A3MW02-07-20180925		2018-09-25	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-20181015		2018-10-15	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20190409		2019-04-09	3.1 - 6.2	N	52.2	< 0.09	0.823	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	1.24	23.6	< 0.01	1.42	< 0.05	4.27	< 0.2	**0.564**	< 0.7	84.4
A3MW02-07	A3MW02-07-20190409		2019-04-09	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	L2354839-2		2019-09-26	3.1 - 6.2	N	44.4	< 0.09	0.738	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	1.30	20.5	< 0.01	1.50	< 0.05	< 0.7	< 0.2	**0.590**	< 0.8	69.2
A3MW02-07	A3MW02-07-20190926		2019-09-26	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	L2431889-3		2020-03-24	3.1 - 6.2	N	40.6	< 0.09	0.829	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	1.31	20.9	< 0.01	2.00	< 0.05	5.08	< 0.2	**0.598**	< 0.6	71.4
A3MW02-07	A3MW02-07_DUP-4-20200324	A3MW02-07-20200324	2020-03-24	3.1 - 6.2	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	L2431889-10	L2431889-3	2020-03-24	3.1 - 6.2	FD	37.8	< 0.09	0.790	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	1.33	19.5	< 0.01	1.94	< 0.05	4.96	< 0.3	**0.606**	< 0.7	66.9
A3MW02-07	A3MW02-07-20200324		2020-03-24	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	VA20B3129-002		2020-08-19	3.1 - 6.2	N	31.1	< 0.060	0.618	0.012	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	1.48	16.1	< 0.010	0.149	0.014	< 0.200	< 0.040	**0.698**	< 0.600	50.1
A3MW02-07	A3MW02-07_DUP-03-20200819	A3MW02-07-20200819	2020-08-19	3.1 - 6.2	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	VA20B3129-003	VA20B3129-002	2020-08-19	3.1 - 6.2	FD	29.3	< 0.070	0.616	0.011	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	1.41	15.2	< 0.010	0.142	0.014	< 0.200	< 0.040	**0.668**	< 0.500	47.4
A3MW02-07	A3MW02-07-20200819		2020-08-19	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20210329		2021-03-29	3.1 - 6.2	N	48.1	< 0.110	0.761	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	1.83	23.6	< 0.010	5.40	0.064	7.80	0.454	**0.838**	< 0.800	83.7
A3MW02-07	A3MW02-07_DUP-09-20210329	A3MW02-07-20210329	2021-03-29	3.1 - 6.2	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	DUP-09-FD-GW_20210329	A3MW02-07-REG-GW_20210329	2021-03-29	3.1 - 6.2	FD	48.4	< 0.100	0.765	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	1.81	23.6	< 0.010	5.38	0.059	8.21	0.452	**0.838**	< 0.800	84.4
A3MW02-07	A3MW02-07-20210329		2021-03-29	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20210825		2021-08-25	3.1 - 6.2	N	48.3	< 0.090	0.862	0.011	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	**2.02**	23.5	< 0.010	0.142	0.037	< 0.220	< 0.040	**0.945**	< 0.600	75.8
A3MW02-07	A3MW02-07-20210825		2021-08-25	3.1 - 6.2	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-07	A3MW02-07-REG-GW_20220323		2022-03-23	3.1 - 6.2	N	45.2	< 0.060	0.450	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	1.34	19.8	< 0.010	5.35	0.147	5.31	0.722	**0.616**	< 0.050	73.6
A3MW02-07	A3MW02-07-20220817		2022-08-17	3.1 - 6.2	N	47.4	< 0.110	0.793	0.014	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	**2.11**	23.2	< 0.010	0.248	0.026	< 0.175	< 0.080	**1.01**	< 0.720	74.7
A3MW02-07	A3MW02-07_20230309		2023-03-09	3.1 - 6.2	N	23.8	< 0.045	0.284	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.924	11.9	< 0.010	0.550	0.018	0.758	0.324	**0.408**	< 0.342	38.5
A3MW02-07	A3MW02-07-20230821		2023-08-21	3.1 - 6.2	N	15.5	< 0.037	0.131	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.832	7.39	< 0.010	0.039	< 0.010	< 0.050	0.046	**0.414**	< 0.250	24.4
A3MW02-08	A3MW02-08-20140528		2014-05-28	1.5 - 5.5	N	1.97	< 0.05	0.09	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.13	0.85	< 0.05	-	-	0.55	0.12	0.10	< 0.05	-
A3MW02-08	A3MW02-08-20140827		2014-08-27	1.5 - 5.5	N	1.35	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.07	0.69	< 0.05	-	-	0.20	< 0.05	0.05	< 0.05	-
A3MW02-08	A3MW02-08-20150409		2015-04-09	1.5 - 5.5	N	2.40	< 0.06	0.14	< 0.01	< 0.01	< 0.03	-	-	< 0.01	< 0.01	0.26	1.08	< 0.01	-	-	0.16	0.11	0.18	< 0.05	-
A3MW02-08	A3MW02-08-20150902		2015-09-02	1.5 - 5.5	N	1.67	< 0.05	0.13	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.14	0.73	< 0.05	-	-	0.97	0.05	0.11	< 0.05	-
A3MW02-08	A3MW02-08-20150914		2015-09-14	1.5 - 5.5	N	2.86	< 0.05	0.13	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.14	1.48	< 0.05	-	-	2.39	0.15	0.10	< 0.05	-
A3MW02-08	A3MW02-08-20151014		2015-10-14	1.5 - 5.5	N	2.05	< 0.05	0.11	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.14	1.08	< 0.05	-	-	0.30	0.05	0.10	< 0.05	-
A3MW02-08	A3MW02-08-20160316		2016-03-16	1.5 - 5.5	N	4.30	< 0.05	0.13	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	0.32	2.06	< 0.05	-	-	0.07	< 0.05	**0.21**	< 0.05	-
A3MW02-08	A3MW02-08-20160919		2016-09-19	1.5 - 5.5	N	2.65	< 0.05	0.09	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	0.18	1.39	< 0.05	-	-	0.14	< 0.05	0.13	< 0.05	-
A3MW02-08	A3MW02-08-20170420		2017-04-20	1.5 - 5.5	N	2.50	< 0.05	0.11	< 0.05	0.03	< 0.1	-	-	< 0.05	< 0.005	0.34	1.17	< 0.05	-	-	0.16	0.07	**0.29**	< 0.05	-
A3MW02-08	A3MW02-08_DUP-9-20170920	A3MW02-08-20170920	2017-09-20	1.5 - 5.5	FD	4.62	< 0.05	0.15	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	0.33	2.31	< 0.05	-	-	1.48	0.08	**0.23**	< 0.09	-
A3MW02-08	A3MW02-08-20170920		2017-09-20	1.5 - 5.5	N	4.13	< 0.05	0.12	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	0.24	1.96	< 0.05	-	-	< 2	0.07	0.17	< 0.08	-
A3MW02-08	A3MW02-08-REG-GW_20180417		2018-04-17	1.5 - 5.5	N	2.02	< 0.05	0.097	< 0.05	0.0104	-	-	< 0.00005	< 0.05	< 0.005	0.269	1.05	< 0.05	0.062	< 0.05	0.218	< 0.05	**0.222**	< 0.05	3.95
A3MW02-08	A3MW02-08-20180417		2018-04-17	1.5 - 5.5	N	2.02	< 0.05	0.10	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	0.27	1.05	< 0.05	0.06	< 0.05	0.22	< 0.05	**0.22**	< 0.05	-
A3MW02-08	A3MW02-08-REG-GW_20180925		2018-09-25	1.5 - 5.5	N	4.16	< 0.03	0.168	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.432	1.96	< 0.01	0.160	< 0.05	0.587	0.044	**0.280**	< 0.08	7.8
A3MW02-08	A3MW02-08-20180925		2018-09-25	1.5 - 5.5	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-08	A3MW02-08-REG-GW_20190409		2019-04-09	1.5 - 5.5	N	2.62	< 0.02	0.103	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.236	1.33	< 0.01	0.124	< 0.05	0.646	0.037	0.152	< 0.05	5.26
A3MW02-08	A3MW02-08-20190409		2019-04-09	1.5 - 5.5	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A3MW02-08	L2354839-3		2019-09-26	1.5 - 5.5	N	4.30	< 0.03	0.130	< 0.02	0.0055	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.410	1.86	< 0.01	0.161	< 0.05	0.733	0.048	**0.258**	< 0.06	7.93
A3MW02-08	A3MW02-08_DUP-10-20190926	A3MW02-08-20190926	2019-09-26	1.5 - 5.5	FD	4.44	< 0.03	0.13	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.41	1.93	< 0.01	0.17	< 0.05	0.74	0.05	**0.26**	< 0.08	-
A3MW02-08	L2354839-8	L2354839-3	2019-09-26	1.5 - 5.5	FD	4.44	< 0.03	0.132	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.407	1.93	< 0.01	0.166	< 0.05	0.743	0.049	**0.257**	< 0.08	8.14
A3MW02-08	A3MW02-08-20190926		2019-09-26	1.5 - 5.5	N	4.30	< 0.03	0.13	< 0.02	0.01	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.41	1.86	< 0.01	0.16	< 0.05	0.73	0.05	**0.26**	< 0.06	-
A3MW02-08	L2431889-4		2020-03-24	1.5 - 5.5	N	0.968	< 0.01	0.024	0.019	< 0.03	-	< 0.000032	< 0.00003	0.026	< 0.005	0.034	0.286	< 0.03	< 0.05	< 0.05	< 0.05	0.020	0.035	< 0.05	1.41
A3MW02-08	A3MW02-08-20200324		2020-03-24	1.5 - 5.5	N	0.97	< 0.01	0.02	0.02	< 0.03	-	< 0.000032	< 0.00001	0.03	< 0.005	0.03	0.29	< 0.03	< 0.05	< 0.05	< 0.05	0.02	0.04	< 0.05	-
A3MW02-08	VA20B3129-001		2020-08-19	1.5 - 5.5	N	2.64	< 0.020	0.106	< 0.010	0.0067	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.318	1.33	< 0.010	0.105	0.036	0.519	0.028	**0.227**	< 0.050	5.19
A3MW02-08	A3MW02-08-20200819		2020-08-19	1.5 - 5.5	N	2.64	< 0.02	0.11	< 0.01	0.01	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.32	1.33	< 0.01	0.11	0.04	0.52	0.03	**0.23**	< 0.05	-
A3MW02-08	A3MW02-08-REG-GW_20210329		2021-03-29	1.5 - 5.5	N	0.556	< 0.010	0.070	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.037	0.236	< 0.010	0.024	0.018	0.086	< 0.020	0.025	< 0.050	1.01
A3MW02-08	A3MW02-08-20210329		2021-03-29	1.5 - 5.5	N	0.56	< 0.01	0.07	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.04	0.24	< 0.01	0.02	0.02	0.09	< 0.02	0.03	< 0.05	-
A3MW02-08	A3MW02-08-REG-GW_20210825		2021-08-25	1.5 - 5.5	N	5.37	< 0.030	0.165	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.501	2.47	< 0.010	0.345	0.146	< 2.10	0.156	**0.323**	< 0.060	8.98

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
A3MW02-08	A3MW02-08-20210825		2021-08-25	1.5 - 5.5	N	5.37	< 0.03	0.17	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.50	2.47	< 0.01	0.35	0.15	< 2.1	0.16	**0.32**	< 0.06	-
A3MW02-08	A3MW02-08-REG-GW_20220323		2022-03-23	1.5 - 5.5	N	2.23	< 0.010	0.090	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.243	1.03	< 0.010	0.107	0.038	0.399	0.050	0.157	< 0.050	4.20
A3MW02-08	DUP-07-FD-GW_20220323	A3MW02-08-REG-GW_20220323	2022-03-23	1.5 - 5.5	FD	2.26	< 0.010	0.098	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.254	1.03	< 0.010	0.115	0.041	0.398	0.053	0.162	< 0.050	4.26
A3MW02-08	A3MW02-08-20220817		2022-08-17	1.5 - 5.5	N	4.45	< 0.030	0.181	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.505	2.07	< 0.010	0.434	0.249	3.40	0.214	**0.329**	< 0.050	11.2
A3MW02-08	A3MW02-08_20230309		2023-03-09	1.5 - 5.5	N	1.53	< 0.018	0.057	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.158	0.695	< 0.010	0.094	0.049	0.591	0.047	0.098	< 0.050	3.18
A3MW02-08	DUP-04_20230309	A3MW02-08_20230309	2023-03-09	1.5 - 5.5	FD	1.53	< 0.015	0.057	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.154	0.695	< 0.010	0.093	0.050	0.589	0.048	0.098	< 0.050	3.17
A3MW02-08	A3MW02-08-20230821		2023-08-21	1.5 - 5.5	N	2.91	< 0.024	0.100	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.278	1.30	< 0.010	0.455	0.214	6.06	0.129	0.196	< 0.055	11.0
A3MW02-08	DUP-02-20230821	A3MW02-08-20230821	2023-08-21	1.5 - 5.5	FD	2.94	< 0.025	0.097	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.264	1.30	< 0.010	0.460	0.215	6.14	0.124	0.184	< 0.055	11.1
A3MW03-02	A3MW03-02-20140529		2014-05-29	2.3 - 8.3	N	1.10	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.92	< 0.05	-	-	< 0.8	0.12	< 0.05	< 0.3	-
A3MW03-02	A3MW03-02-20140827		2014-08-27	2.3 - 8.3	N	1.34	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	1.06	< 0.05	-	-	< 0.5	0.05	< 0.05	< 0.3	-
A3MW03-02	A3MW03-02_DUP-9-20150410	A3MW03-02-20150410	2015-04-10	2.3 - 8.3	FD	1.33	< 0.05	< 0.03	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	0.02	1.05	< 0.01	-	-	< 0.95	0.16	< 0.03	< 0.8	-
A3MW03-02	A3MW03-02-20150410		2015-04-10	2.3 - 8.3	N	2.62	< 0.07	0.10	0.02	< 0.01	< 0.02	-	-	< 0.01	< 0.01	0.22	1.78	< 0.01	-	-	< 1.5	1.58	0.16	< 0.8	-
A3MW03-02	A3MW03-02-20150903		2015-09-03	2.3 - 8.3	N	1.53	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	1.45	< 0.05	-	-	< 1	0.16	< 0.05	< 4	-
A3MW03-02	A3MW03-02-20150914		2015-09-14	2.3 - 8.3	N	1.30	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	1.21	< 0.05	-	-	< 0.8	0.12	< 0.05	< 0.8	-
A3MW03-02	A3MW03-02-20151015		2015-10-15	2.3 - 8.3	N	1.57	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	1.51	< 0.05	-	-	< 2	0.25	< 0.05	< 3	-
A3MW03-02	A3MW03-02-20160315		2016-03-15	2.3 - 8.3	N	1.87	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	1.60	< 0.05	-	-	< 2	0.29	< 0.05	< 4	-
A3MW03-02	A3MW03-02_DUP-7-20160921	A3MW03-02-20160921	2016-09-21	2.3 - 8.3	FD	1.38	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.05	< 0.05	1.39	< 0.05	-	-	< 0.8	0.25	< 0.05	< 0.4	-
A3MW03-02	A3MW03-02-20160921		2016-09-21	2.3 - 8.3	N	1.37	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.05	< 0.05	1.39	< 0.05	-	-	< 0.8	0.26	< 0.05	< 3	-
A3MW03-02	A3MW03-02-20170426		2017-04-26	2.3 - 8.3	N	2.36	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	1.91	< 0.05	-	-	< 2	0.35	< 0.05	< 6	-
A3MW03-02	A3MW03-02-20170921		2017-09-21	2.3 - 8.3	N	1.67	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	2.04	< 0.05	-	-	< 2	0.44	< 0.05	< 3	-
A3MW03-02	A3MW03-02-REG-GW_20180412		2018-04-12	2.3 - 8.3	N	1.96	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	1.88	< 0.05	53.4	< 0.2	< 2	0.448	< 0.05	< 4	57.7
A3MW03-02	MW03-02-REG-GW_20180426		2018-04-26	2.3 - 8.3	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
A3MW03-02	A3MW03-02-REG-GW_20180910		2018-09-10	2.3 - 8.3	N	1.09	< 0.05	< 0.03	< 0.01	0.0060	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.013	1.11	< 0.01	8.80	< 0.05	< 0.6	0.133	0.012	< 0.5	11.2
A3MW03-02	A3MW03-02-REG-GW_20190409		2019-04-09	2.3 - 8.3	N	2.28	< 0.07	< 0.2	0.088	0.0286	-	0.000059	< 0.00001	0.059	< 0.005	0.736	2.27	0.010	53.1	0.170	< 2	2.28	**0.531**	< 4	61.6
A3MW03-02	DUP-13-FD-GW_20190409	A3MW03-02-REG-GW_20190409	2019-04-09	2.3 - 8.3	FD	1.69	< 0.05	< 0.1	0.055	0.0189	-	0.000040	< 0.00001	0.040	< 0.005	0.445	1.89	< 0.01	54.7	0.139	< 2	1.44	**0.327**	< 4	60.7
A3MW03-02	L2354359-2		2019-09-25	2.3 - 8.3	N	1.03	< 0.05	0.020	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	1.12	< 0.01	19.1	0.067	0.695	0.170	< 0.01	< 4	22.2
A3MW03-02	L2354359-7	L2354359-2	2019-09-25	2.3 - 8.3	FD	1.37	< 0.05	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	1.33	< 0.01	28.2	0.081	< 1	0.189	< 0.01	< 3	31.2
A3MW03-02	L2431889-1		2020-03-24	2.3 - 8.3	N	1.81	< 0.07	< 0.03	< 0.01	< 0.005	-	-	< 0.00001	< 0.01	< 0.005	< 0.01	1.97	< 0.01	48.7	< 0.07	< 2	0.543	< 0.01	< 4	-
A3MW03-02	VA20B3584-008		2020-08-25	2.3 - 8.3	N	1.62	< 0.050	< 0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.010	1.52	< 0.010	38.7	0.136	< 1.25	0.364	< 0.010	< 1.90	3.52
A3MW03-02	A3MW03-02-REG-GW_20210325		2021-03-25	2.3 - 8.3	N	2.42	< 0.020	< 0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	1.96	< 0.010	53.1	0.068	< 2.00	0.455	< 0.010	< 3.50	4.84
A3MW03-02	A3MW03-02-REG-GW_20210825		2021-08-25	2.3 - 8.3	N	2.01	< 0.070	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	2.16	< 0.010	46.6	0.062	< 2.00	0.593	< 0.010	< 3.20	4.76
A3MW03-02	A3MW03-02-20210825		2021-08-25	2.3 - 8.3	N	2.01	< 0.07	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	2.16	< 0.01	46.60	0.06	< 2	0.59	< 0.01	< 3.2	-
A3MW03-02	A3MW03-02-REG-GW_20220323		2022-03-23	2.3 - 8.3	N	< 3.49	< 0.040	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	1.83	< 0.010	36.5	< 0.010	< 0.750	0.332	< 0.010	< 0.850	< 3.57
A3MW03-02	DUP-06-FD-GW_20220323	A3MW03-02-REG-GW_20220323	2022-03-23	2.3 - 8.3	FD	3.37	0.034	0.016	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	1.72	< 0.010	35.9	< 0.010	0.809	0.319	< 0.010	< 0.860	6.42
A3MW03-02	A3MW03-02-20220816		2022-08-16	2.3 - 8.3	N	2.16	< 0.020	< 0.035	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	2.00	< 0.010	44.2	< 0.010	< 1.40	0.504	< 0.010	< 3.35	4.88
A3MW03-02	A3MW03-02_20230314		2023-03-14	2.3 - 8.3	N	3.40	< 0.070	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.014	2.52	< 0.010	36.8	0.278	< 1.39	0.540	< 0.010	< 3.48	6.47
A3MW03-02	DUP-01_20230314	A3MW03-02_20230314	2023-03-14	2.3 - 8.3	FD	3.18	< 0.070	< 0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.013	2.35	< 0.010	38.0	0.258	< 1.40	0.530	< 0.010	< 3.50	6.07
A3MW03-02	A3MW03-02-20230821		2023-08-21	2.3 - 8.3	N	2.27	< 0.055	< 0.039	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.014	2.05	< 0.010	31.6	0.212	< 1.15	0.332	0.011	< 2.30	4.89
A3MW03-02	DUP-3-20230821	A3MW03-02-20230821	2023-08-21	2.3 - 8.3	FD	2.24	< 0.051	< 0.036	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.014	2.02	< 0.010	29.1	0.136	< 1.15	0.332	0.012	< 2.15	4.81
A3MW03-03	A3MW03-03-20140528		2014-05-28	0.8 - 6.9	N	0.05	< 0.2	< 0.05	< 0.05	< 0.02	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.11	< 0.05	-	-	< 0.05	< 0.05	0.07	< 0.05	-
A3MW03-03	A3MW03-03-20140827		2014-08-27	0.8 - 6.9	N	< 0.05	< 0.2	0.05	< 0.1	**0.11**	< 0.15	-	-	< 0.2	< 0.05	0.07	0.08	< 0.05	-	-	< 0.05	< 0.05	0.16	< 0.05	-
A3MW03-03	A3MW03-03-20150708		2015-07-08	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20150902		2015-09-02	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20150914		2015-09-14	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.06	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20151014		2015-10-14	0.8 - 6.9	N	0.06	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.07	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20160316		2016-03-16	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20161012		2016-10-12	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20170425		2017-04-25	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-20170920		2017-09-20	0.8 - 6.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A3MW03-03	A3MW03-03-REG-GW_20180501		2018-05-01	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
A3MW03-03	A3MW03-03-20180501		2018-05-01	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
A3MW03-03	A3MW03-03-REG-GW_20180925		2018-09-25	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
A3MW03-03	A3MW03-03-20180925		2018-09-25	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
A3MW03-03	A3MW03-03-REG-GW_20190409		2019-04-09	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
A3MW03-03	A3MW03-03-20190409		2019-04-09	0.8 - 6.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
A3MW03-03	VA20A3785-003		2020-03-23	0.8 - 6.9	N	< 0.010	< 0.040	< 0.010	< 0.020	< 0.0300	-	< 0.000015	0.000041	< 0.030	< 0.0090	< 0.010	< 0.010	< 0.010	0.013	0.025	< 0.050	< 0.020	0.015	< 0.050	-
A3MW03-03	A3MW03-03-20200323		2020-03-23	0.8 - 6.9	N	< 0.01	< 0.04	< 0.01	< 0.02	< 0.03	-	< 0.000015	< 0.00001	< 0.03	< 0.009	< 0.01	< 0.01	< 0.01	0.01	0.03	< 0.05	< 0.02	0.02	< 0.05	-
A3MW03-03	VA20B3130-005		2020-08-19	0.8 - 6.9	N	0.034	< 0.010	< 0.010	< 0.010	< 0.0080	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.034	< 0.010	0.023	0.021	< 0.050	< 0.020	< 0.010	< 0.050	0.068
A3MW03-03	A3MW03-03-20200819		2020-08-19	0.8 - 6.9	N	0.03	< 0.01	< 0.01	< 0.01	< 0.008	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.03	< 0.01	0.02	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
A3MW03-03	A3MW03-03-REG-GW_20210401		2021-04-01	0.8 - 6.9	N	0.112	< 0.020	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.046	< 0.010	0.025	0.020	< 0.060	< 0.020	0.017	< 0.050	0.175
A3MW03-03	A3MW03-03-20210401		2021-04-01	0.8 - 6.9	N	0.11	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.05	< 0.01	0.03	0.02	< 0.06	< 0.02	0.02	< 0.05	-
A3MW03-03	A3MW03-03-REG-GW_20210825		2021-08-25	0.8 - 6.9	N	0.978	< 0.100	< 0.050	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.014	0.434	< 0.010	0.056	0.052	< 0.200	0.054	0.041	< 0.150	1.52
A3MW03-03	A3MW03-03-20210825		2021-08-25	0.8 - 6.9	N	0.98	< 0.1	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	0.43	< 0.01	0.06	0.05	< 0.2	0.05	0.04	< 0.15	-
A3MW03-03	A3MW03-03-REG-GW_20220323		2022-03-23	0.8 - 6.9	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A3MW03-03	A3MW03-03-20220817		2022-08-17	0.8 - 6.9	N	0.310	< 0.010	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.076	< 0.010	0.046	0.036	< 0.070	< 0.020	0.023	< 0.080	0.409
A3MW03-03	A3MW03-03_20230314		2023-03-14	0.8 - 6.9	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.024	< 0.010	0.012	0.018	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-04	A3MW03-04-20140528		2014-05-28	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04_DUP-28-20140528	MW03-04-20140528	2014-05-28	1.5 - 6.7	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	MW03-04-20140528		2014-05-28	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	A3MW03-04-20140827		2014-08-27	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.07	< 0.05	< 0.05	< 0.05	-
MW03-04	MW03-04-20140827		2014-08-27	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	A3MW03-04-20150409		2015-04-09	1.5 - 6.7	N	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	< 0.01	0.03	< 0.01	-	-	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-04	MW03-04-20150409		2015-04-09	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	A3MW03-04-20150902		2015-09-02	1.5 - 6.7	N	< 0.05	< 0.05	< 0.06	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04_DUP-12-20150902	MW03-04-20150902	2015-09-02	1.5 - 6.7	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.05	-
MW03-04	MW03-04-20150902		2015-09-02	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	MW03-04-20150914		2015-09-14	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.06	< 0.05	< 0.05	< 0.09	-
MW03-04	A3MW03-04-20151014		2015-10-14	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.08	< 0.05	< 0.05	< 0.2	-

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
				Parameter																					
				Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW		60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
				SSSLs Parkland Refinery		60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
				Minimum RDL		0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
MW03-04	A3MW03-04-20160316		2016-03-16	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	MW03-04-20160316		2016-03-16	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	A3MW03-04-20160919		2016-09-19	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.06	-
MW03-04	MW03-04-20160919		2016-09-19	1.5 - 6.7	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-04	A3MW03-04-20170425		2017-04-25	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04_DUP-13-20170425	A3MW03-04-20170425	2017-04-25	1.5 - 6.7	FD	0.09	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	0.34	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04-20170920		2017-09-20	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04_DUP-10-20170920	A3MW03-04-20170920	2017-09-20	1.5 - 6.7	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04-20180418		2018-04-18	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-04	A3MW03-04-REG-GW_20180418		2018-04-18	1.5 - 6.7	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW03-04	MW03-04-REG-GW_20180925		2018-09-25	1.5 - 6.7	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-04	MW03-04-20180925		2018-09-25	1.5 - 6.7	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-04	MW03-04-REG-GW_20190408		2019-04-08	1.5 - 6.7	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-04	MW03-04-20190408		2019-04-08	1.5 - 6.7	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-04	L2354839-1		2019-09-26	1.5 - 6.7	N	0.012	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-04	MW03-04-20190926		2019-09-26	1.5 - 6.7	N	0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-04	VA20A3785-004		2020-03-23	1.5 - 6.7	N	0.025	< 0.020	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.019	< 0.010	0.027	0.042	< 0.100	< 0.020	0.011	< 0.050	-
MW03-04	MW03-04-20200323		2020-03-23	1.5 - 6.7	N	0.03	< 0.02	< 0.01	< 0.01	< 0.005	-	-	< 0.00001	< 0.01	< 0.005	< 0.01	0.02	< 0.01	0.03	0.04	< 0.1	< 0.02	0.01	< 0.05	-
MW03-04	VA20B3130-006		2020-08-19	1.5 - 6.7	N	0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-04	MW03-04-20200819		2020-08-19	1.5 - 6.7	N	0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-04	MW03-04-REG-GW_20210329		2021-03-29	1.5 - 6.7	N	0.012	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.015	< 0.050	< 0.020	0.012	< 0.050	< 0.065
MW03-04	MW03-04-20210329		2021-03-29	1.5 - 6.7	N	0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	0.01	< 0.05	-
MW03-04	MW03-04-REG-GW_20210825		2021-08-25	1.5 - 6.7	N	< 0.020	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.015	0.026	< 0.070	< 0.020	< 0.010	< 0.050	< 0.083
MW03-04	MW03-04-20210825		2021-08-25	1.5 - 6.7	N	< 0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.02	0.03	< 0.07	< 0.02	< 0.01	< 0.05	-
MW03-04	MW03-04-REG-GW_20220323		2022-03-23	1.5 - 6.7	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-04	MW03-04-20220817		2022-08-17	1.5 - 6.7	N	0.018	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.013	0.030	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
MW03-04	MW03-04_20230314		2023-03-14	1.5 - 6.7	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-04	MW03-04-20230821		2023-08-21	1.5 - 6.7	N	0.034	< 0.023	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.017	< 0.010	< 0.010	0.012	< 0.010	< 0.050	0.029	0.019	< 0.050	0.099
U6	U6-20140528		2014-05-28	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-20140827		2014-08-27	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	0.08	< 0.05	< 0.05	-
U6	U6-20150409		2015-04-09	0.9 - 3.9	N	< 0.01	< 0.01	0.02	< 0.01	< 0.01	0.02	-	-	< 0.01	< 0.01	0.01	< 0.01	< 0.01	-	-	< 0.05	< 0.02	0.01	< 0.05	-
U6	U6-20150902		2015-09-02	0.9 - 3.9	N	< 0.05	< 0.05	0.07	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-20160316		2016-03-16	0.9 - 3.9	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U6	U6-20160317		2016-03-17	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-20160919		2016-09-19	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-20170420		2017-04-20	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-20170914		2017-09-14	0.9 - 3.9	N	< 0.05	0.08	< 0.05	< 0.1	**0.12**	0.51	-	-	< 0.4	0.03	0.28	< 0.05	0.12	-	-	< 0.05	< 0.05	**0.32**	< 0.05	-
U6	U6-REG-GW_20180417		2018-04-17	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	0.0104	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
U6	U6-20180417		2018-04-17	0.9 - 3.9	N	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
U6	U6-REG-GW_20180925		2018-09-25	0.9 - 3.9	N	< 0.01	< 0.01	0.014	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U6	U6-20180925		2018-09-25	0.9 - 3.9	N	< 0.01	< 0.01	0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U6	U6-REG-GW_20190408		2019-04-08	0.9 - 3.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U6	DUP-12-FD-GW_20190408	U6-REG-GW_20190408	2019-04-08	0.9 - 3.9	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.013	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.013	< 0.05	< 0.11
U6	U6_DUP-12-20190408	U6-20190408	2019-04-08	0.9 - 3.9	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.01	< 0.05	-
U6	U6-20190408		2019-04-08	0.9 - 3.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U6	L2354839-4		2019-09-26	0.9 - 3.9	N	< 0.01	< 0.01	0.043	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U6	U6-20190926		2019-09-26	0.9 - 3.9	N	< 0.01	< 0.01	0.04	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U6	L2431889-5		2020-03-24	0.9 - 3.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U6	U6-20200324		2020-03-24	0.9 - 3.9	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U6	VA20B3130-001		2020-08-19	0.9 - 3.9	N	< 0.010	< 0.010	0.015	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U6	U6-20200819		2020-08-19	0.9 - 3.9	N	< 0.01	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U6	U6-REG-GW_20210329		2021-03-29	0.9 - 3.9	N	< 0.010	< 0.010	0.019	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.012	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.013	< 0.050	< 0.065
U6	U6-20210329		2021-03-29	0.9 - 3.9	N	< 0.01	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	0.01	< 0.05	-
U6	U6-REG-GW_20210825		2021-08-25	0.9 - 3.9	N	< 0.010	0.024	0.013	< 0.040	< 0.0550	-	0.000196	0.000063	< 0.100	< 0.0090	0.132	< 0.010	0.054	0.015	0.026	0.071	0.030	0.143	< 0.050	0.702
U6	U6-20210825		2021-08-25	0.9 - 3.9	N	< 0.01	0.02	0.01	< 0.04	< 0.055	-	0.00020	0.00005	< 0.01	< 0.009	0.13	< 0.01	0.05	0.02	0.03	0.07	0.03	0.14	< 0.05	-
U6	U6-REG-GW_20220323		2022-03-23	0.9 - 3.9	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	0.010	< 0.0050	0.018	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.016	< 0.050	< 0.065
U6	U6-20220817		2022-08-17	0.9 - 3.9	N	< 0.010	< 0.010	0.012	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.012	< 0.0050	0.017	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	0.018	< 0.050	< 0.065
U6	U6_20230309		2023-03-09	0.9 - 3.9	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20140529		2014-05-29	1.2 - 5.8	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U7	U7-20140827		2014-08-27	1.2 - 5.8	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U7	U7-20150409		2015-04-09	1.2 - 5.8	N	< 0.01	< 0.01	0.02	< 0.01	< 0.01	0.03	-	-	< 0.01	< 0.01	0.02	< 0.01	< 0.01	-	-	< 0.05	< 0.02	0.02	< 0.05	-
U7	U7-20150902		2015-09-02	1.2 - 5.8	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U7	U7-20160316		2016-03-16	1.2 - 5.8	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U7	U7-20160921		2016-09-21	1.2 - 5.8	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U7	U7-20170501		2017-05-01	1.2 - 5.8	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U7	U7-20170914		2017-09-14	1.2 - 5.8	N	< 0.05	< 0.05	< 0.05	< 0.05	0.03	< 0.131	-	-	< 0.08	0.01	0.07	< 0.05	< 0.05	-	-	< 0.05	< 0.05	0.08	< 0.05	-
U7	U7-REG-GW_20180417		2018-04-17	1.2 - 5.8	N	< 0.05	< 0.05	< 0.05	< 0.05	0.0080	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
U7	U7-20180417		2018-04-17	1.2 - 5.8	N	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
U7	U7-REG-GW_20180925		2018-09-25	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U7	DUP-8-FD-GW_20180925	U7-REG-GW_20180925	2018-09-25	1.2 - 5.8	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U7	U7_DUP-8-20180925	U7-20180925	2018-09-25	1.2 - 5.8	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	U7-20180925		2018-09-25	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	U7-REG-GW_20190408		2019-04-08	1.2 - 5.8	N	< 0.01	< 0.01	0.011	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U7	U7-20190408		2019-04-08	1.2 - 5.8	N	< 0.01	< 0.01	0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	L2354839-5		2019-09-26	1.2 - 5.8	N	< 0.01	< 0.01	0.016	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U7	U7-20190926		2019-09-26	1.2 - 5.8	N	< 0.01	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	L2431889-6		2020-03-24	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U7	U7-20200324		2020-03-24	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
U7	VA20B3130-002		2020-08-19	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20200819		2020-08-19	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	U7-REG-GW_20210329		2021-03-29	1.2 - 5.8	N	< 0.010	< 0.010	0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20210329		2021-03-29	1.2 - 5.8	N	< 0.01	< 0.01	0.03	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	U7-REG-GW_20210825		2021-08-25	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.011	0.018	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20210825		2021-08-25	1.2 - 5.8	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
U7	U7-REG-GW_20220323		2022-03-23	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20220817		2022-08-17	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7_20230309		2023-03-09	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.014	0.020	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U7	U7-20230821		2023-08-21	1.2 - 5.8	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U07-10S	U7-10S-20140529		2014-05-29	4.7 - 6.2	N	343.00	**8.85**	**13.00**	**14.00**	5.46	12.21	-	-	9.95	0.40	77.80	132.00	1.56	-	-	4060.00	213.00	55.10	1.89	-
U07-10S	U7-10S-20140827		2014-08-27	4.7 - 6.2	N	401.00	**12.70**	**11.00**	**4.28**	**1.30**	2.93	-	-	2.98	0.08	42.20	160.00	0.38	-	-	5420.00	209.00	**29.00**	< 3	-
U07-10S	U7-10S-20150410		2015-04-10	4.7 - 6.2	N	817.00	< 20	125.00	**77.30**	30.40	67.50	-	-	51.70	2.29	534.00	405.00	9.92	-	-	5080.00	1270.00	387.00	< 2	-
U07-10S	U7-10S-20150903		2015-09-03	4.7 - 6.2	N	504.00	**9.05**	< 20	**7.18**	**2.44**	4.98	-	-	5.19	0.16	65.20	173.00	0.66	-	-	6850.00	234.00	45.40	< 0.2	-
U07-10S	U07-10S_DUP-13-20150903	U7-10S-20150903	2015-09-03	4.7 - 6.2	FD	461.00	**9.19**	< 20	**4.96**	**2.28**	4.66	-	-	3.67	0.14	54.60	162.00	0.61	-	-	6340.00	211.00	**37.70**	< 0.2	-
U07-10S	U07-10S_DUP-1-20150915	U07-10S-20150915	2015-09-15	4.7 - 6.2	FD	602.00	< 20	< 30	**8.51**	**2.60**	5.49	-	-	4.99	0.17	83.90	217.00	0.77	-	-	7480.00	332.00	56.80	< 2	-
U07-10S	U07-10S-20150915		2015-09-15	4.7 - 6.2	N	1320.00	< 30	184.00	**134.00**	54.70	127.40	-	-	94.10	< 3	918.00	698.00	11.10	-	-	10300.00	2100.00	673.00	< 7	-
U07-10S	U07-10S-20151015		2015-10-15	4.7 - 6.2	N	5470.00	< 60	978.00	**749.00**	320.00	643.00	-	-	463.00	11.70	4920.00	3230.00	56.10	-	-	22000.00	10800.00	3610.00	< 20	-
U07-10S	U07-10S-20160315		2016-03-15	4.7 - 6.2	N	12600.00	< 200	1620.00	**1800.00**	648.00	1246.00	-	-	1020.00	49.50	14000.00	6290.00	196.00	-	-	22800.00	28700.00	10600.00	< 20	-
U07-10S	U07-10S-20160921		2016-09-21	4.7 - 6.2	N	639.00	**8.13**	**6.51**	**2.61**	**0.70**	1.41	-	-	1.68	0.05	**16.70**	86.70	0.20	-	-	11400.00	102.00	**11.40**	< 0.2	-
U07-10S	U07-10S-20170425		2017-04-25	4.7 - 6.2	N	460.00	< 20	< 20	**11.00**	4.07	7.76	-	-	8.79	0.27	82.80	178.00	1.08	-	-	5330.00	258.00	63.10	< 2	-
U07-10S	U07-10S-20170921		2017-09-21	4.7 - 6.2	N	467.00	< 8	< 8	**1.91**	**0.59**	1.23	-	-	1.18	0.03	**36.60**	163.00	0.13	-	-	8270.00	178.00	**23.80**	< 2	-
U07-10S	U07-10S-REG-GW_20180910		2018-09-10	4.7 - 6.2	N	596	**13.4**	**26.0**	**10.6**	3.50	-	0.00603	0.000779	8.38	0.291	97.3	271	1.19	408	518	7820	379	70.2	< 9	10300
U07-10S	U07-10S-20180910		2018-09-10	4.7 - 6.2	N	596.00	**13.40**	**26.00**	**10.60**	3.50	6.03	-	-	8.38	0.29	97.30	271.00	1.19	408.00	518.00	7820.00	379.00	70.20	< 9	-
U07-10S	U07-10S-REG-GW_20190409		2019-04-09	4.7 - 6.2	N	655	< 20	**24.0**	**27.7**	6.96	-	0.0327	0.00161	7.70	0.541	157	219	2.24	309	477	4510	363	116	< 0.6	6920
U07-10S	U07-10S-20190409		2019-04-09	4.7 - 6.2	N	655.00	< 20	**24.00**	**27.70**	6.96	-	0.03270	0.00420	7.70	0.54	157.00	219.00	2.24	309.00	477.00	4510.00	363.00	116.00	< 0.6	-
U07-10S	L2354359-3		2019-09-25	4.7 - 6.2	N	683	**13.0**	< 20	**1.54**	**0.479**	-	0.000932	0.000112	0.955	0.0379	**32.3**	240	0.148	334	568	6370	268	**21.6**	< 5	8550
U07-10S	U07-10S-20190925		2019-09-25	4.7 - 6.2	N	683.00	**13.00**	< 20	**1.54**	**0.48**	-	0.00093	0.00028	0.96	0.04	**32.30**	240.00	0.15	334.00	568.00	6370.00	268.00	**21.60**	< 5	-
U07-10S	L2431889-7		2020-03-24	4.7 - 6.2	N	555	**10.5**	< 9	**2.42**	**0.454**	-	0.000763	0.000114	1.49	0.0392	**24.4**	199	0.165	279	461	6110	215	**15.2**	< 2	7880
U07-10S	L2431889-11	L2431889-7	2020-03-24	4.7 - 6.2	FD	548	< 10	< 9	**1.21**	**0.364**	-	0.000604	0.000088	0.718	0.0307	**23.2**	202	0.130	278	488	5320	214	**9.73**	< 3	7100
U07-10S	U07-10S_DUP-5-20200324	U07-10S-20200324	2020-03-24	4.7 - 6.2	FD	548.00	< 10	< 9	**1.21**	**0.36**	-	0.00060	0.00018	0.72	0.03	**23.20**	202.00	0.13	278.00	488.00	5320.00	214.00	**9.73**	< 3	-
U07-10S	U07-10S-20200324		2020-03-24	4.7 - 6.2	N	555.00	**10.50**	< 9	**2.42**	**0.45**	-	0.00076	0.00022	1.49	0.04	**24.40**	199.00	0.17	279.00	461.00	6110.00	215.00	**15.20**	< 2	-
U07-10S	VA20B3370-002		2020-08-20	4.7 - 6.2	N	9420	< 118	1030	**1480**	563	-	1	0.126	1060	44.1	9300	5280	171	2550	4820	17700	15900	6790	< 5.80	-
U07-10S	U07-10S-20200820		2020-08-20	4.7 - 6.2	N	9420.00	< 118	1030.00	**1480.00**	563.00	-	1.00000	0.32500	1060.00	44.10	9300.00	5280.00	171.00	2550.00	4820.00	17700.00	15900.00	6790.00	< 5.8	-
U07-10S	U07-10S-REG-GW_20210329		2021-03-29	4.7 - 6.2	N	441	< 10.0	**10.5**	**1.32**	**0.376**	-	0.000773	< 0.000084	< 1.07	< 0.0842	**22.9**	182	< 1.00	205	352	4580	166	**15.0**	< 1.00	5430
U07-10S	DUP-10-FD-GW_20210329	U07-10S-REG-GW_20210329	2021-03-29	4.7 - 6.2	FD	485	< 10.6	**7.84**	**1.20**	**0.492**	-	0.000850	0.000104	0.717	0.0351	**22.7**	169	0.151	231	398	5180	182	**14.4**	< 1.10	6070
U07-10S	U07-10S_DUP-10-20210329	U07-10S-20210329	2021-03-29	4.7 - 6.2	FD	485.00	< 10.6	**7.84**	**1.20**	**0.49**	-	0.00085	0.00027	0.72	0.04	**22.70**	169.00	0.15	231.00	398.00	5180.00	182.00	**14.40**	< 1.1	-
U07-10S	U07-10S-20210329		2021-03-29	4.7 - 6.2	N	441.00	< 10	**10.50**	**1.32**	**0.38**	-	0.00077	0.00027	< 1.07	< 0.0842	**22.90**	182.00	< 1	205.00	352.00	4580.00	166.00	**15.00**	< 1	-
U07-10S	U07-10S-REG-GW_20210825		2021-08-25	4.7 - 6.2	N	866	**15.6**	57.1	**46.2**	16.9	-	0.0361	0.00405	32.1	1.26	317	388	4.90	347	603	8040	843	237	< 4.60	10900
U07-10S	U07-10S-20210825		2021-08-25	4.7 - 6.2	N	866.00	**15.60**	57.10	**46.20**	16.90	-	0.03610	0.01150	32.10	1.26	317.00	388.00	4.90	347.00	603.00	8040.00	843.00	237.00	< 4.6	-
U07-10S	U07-10S-REG-GW_20220324		2022-03-24	4.7 - 6.2	N	612	**12.7**	< 9.45	**1.27**	**0.295**	-	0.000661	0.000076	0.712	< 0.0500	**22.5**	207	0.097	303	678	7860	212	**14.7**	< 11.0	8940
U07-10S	U07-10S_20230314		2023-03-14	4.7 - 6.2	N	576	**8.56**	**14.1**	**1.09**	**0.357**	-	0.000776	0.000065	< 0.460	0.0215	**23.5**	204	0.087	286	517	6200	212	**15.0**	< 0.900	7250
U07-10S	U07-10S-20230821		2023-08-21	4.7 - 6.2	N	692	< 970	< 18.6	< 24.5	**0.816**	-	0.00150	0.000116	1.68	0.0344	**38.3**	247	0.167	334	655	7520	299	**26.2**	< 3.90	8830
U07-10I	U7-10I-20140528		2014-05-28	6.65 - 8.15	N	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10I	U7-10I-20140827		2014-08-27	6.65 - 8.15	N	< 0.05	< 0.05	< 0.05	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	0.14	< 0.05	< 0.05	< 0.05	-
U07-10I	U7-10I-20150410		2015-04-10	6.65 - 8.15	N	0.08	< 0.05	< 0.2	0.14	0.09	0.21	-	-	0.10	< 0.02	0.43	0.05	0.06	-	-	0.26	0.24	**0.39**	< 0.05	-
U07-10I	U7-10I-20150902		2015-09-02	6.65 - 8.15	N	< 0.05	< 0.05	0.21	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	0.11	< 0.05	< 0.05	-	-	0.06	< 0.05	0.09	< 0.05	-
U07-10I	U07-10I-20150915		2015-09-15	6.65 - 8.15	N	< 0.05	< 0.05	0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	0.10	< 0.05	< 0.05	< 0.05	-
U07-10I	U07-10I-20151015		2015-10-15	6.65 - 8.15	N	< 0.05	< 0.05	0.05	< 0.05	0.03	< 0.1	-	-	< 0.05	< 0.05	0.05	< 0.05	< 0.05	-	-	0.12	0.06	0.06	< 0.05	-
U07-10I	U7-10I-20160315		2016-03-15	6.65 - 8.15	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U07-10I	U07-10I-20160315		2016-03-15	6.65 - 8.15	N	0.68	< 0.05	0.07	0.07	0.02	< 0.1	-	-	< 0.05	< 0.05	0.38	0.36	< 0.05	-	-	1.84	0.96	**0.29**	< 0.05	-
U07-10I	U7-10I-20160921		2016-09-21	6.65 - 8.15	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U07-10I	U07-10I-20160921		2016-09-21	6.65 - 8.15	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	0.27	< 0.05	< 0.05	< 0.05	-
U07-10I	U07-10I-20170425		2017-04-25	6.65 - 8.15	N	0.22	< 0.05	0.10	0.37	**0.15**	0.32	-	-	0.30	< 0.02	1.35	0.15	0.06	-	-	0.48	0.44	**1.07**	< 0.05	-
U07-10I	U07-10I-20170921		2017-09-21	6.65 - 8.15	N	0.63	< 0.05	0.08	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	0.18	0.39	< 0.05	-	-	9.14	0.47	0.12	< 0.2	-
U07-10I	U07-10I-20180416		2018-04-16	6.65 - 8.15	N	< 0.05	< 0.05	< 0.05	< 0.05	0.02	< 0.1	-	-	< 0.05	0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10I	U07-10I-REG-GW_20180910		2018-09-10	6.65 - 8.15	N	0.032	< 0.01	0.016	0.018	< 0.02	-	0.000016	0.000021	< 0.03	< 0.005	0.060	0.055	< 0.01	0.096	0.064	< 0.2	0.039	0.054	< 0.06	0.47
U07-10I	U07-10I-20180910		2018-09-10	6.65 - 8.15	N	0.03	< 0.01	0.02	0.02	< 0.02	0.02	-	-	< 0.03	< 0.005	0.06	0.06	< 0.01	0.10	0.06	< 0.2	0.04	0.05	< 0.06	-
U07-10I	U07-10I-REG-GW_20190409		2019-04-09	6.65 - 8.15	N	0.049	< 0.01	0.016	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.026	0.039	< 0.01	0.078	< 0.05	< 0.07	0.093	0.018	< 0.05	0.32
U07-10I	U07-10I-20190409		2019-04-09	6.65 - 8.15	N	0.05	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.03	0.04	< 0.01	0.08	< 0.05	< 0.07	0.09	0.02	< 0.05	-
U07-10I	L2354359-4		2019-09-25	6.65 - 8.15	N	0.154	< 0.01	0.013	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.038	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.4	< 0.41
U07-10I	U07-10I-20190925		2019-09-25	6.65 - 8.15	N	0.15	< 0.01	0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.04	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.4	-
U07-10I	L2431889-8		2020-03-24	6.65 - 8.15	N	0.063	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.013	0.021	< 0.01	< 0.05	< 0.05	< 0.06	< 0.02	0.012	< 0.05	< 0.11
U07-10I	U07-10I-20200324		2020-03-24	6.65 - 8.15	N	0.06	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	0.02	< 0.01	< 0.05	< 0.05	< 0.06	< 0.02	0.01	< 0.05	-
U07-10I	VA20B3370-003		2020-08-20	6.65 - 8.15	N	1.44	< 0.020	0.071	0.118	0.0411	-	0.000084	0.000012	0.080	< 0.0050	0.582	0.318	< 0.030	0.644	0.260	< 1.20	0.867	**0.453**	< 0.300	-
U07-10I	U07-10I-20200820		2020-08-20	6.65 - 8.15	N	1.10	< 0.01	0.032	< 0.01	< 0.007	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.019	0.117	< 0.01	0.613	0.035	< 0.5	0.029	0.017	< 0.3	-
U07-10I	U07-10I-REG-GW_20210329		2021-03-29	6.65 - 8.15	N	1.58	< 0.010	0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.244	< 0.010	0.596	0.032	< 0.250	< 0.020	< 0.010	< 0.300	1.86
U07-10I	U07-10I-20210329		2021-03-29	6.65 - 8.15	N	1.58	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.24	< 0.01	0.60	0.03	< 0.25	< 0.02	< 0.01	< 0.3	-
U07-10I	U07-10I-REG-GW_20210825		2021-08-25	6.65 - 8.15	N	8.07	< 0.030	0.408	0.110	0.0341	-	0.000083	0.000014	0.089	< 0.0050	0.760	1.40	0.013	6.72	0.555	1.76	1.67	**0.570**	< 1.30	15.0
U07-10I	U07-10I-20210825		2021-08-25	6.65 - 8.15	N	8.07	< 0.03	0.41	0.11	0.03	-	0.00008	0.00002	0.09	< 0.005	0.76	1.40	0.01	6.72	0.56	1.76	1.67	**0.57**	< 1.3	-
U07-10I	U07-10I-REG-GW_20220324		2022-03-24	6.65 - 8.15	N	4.19	< 0.010	0.017	0.015	< 0.0050	-	< 0.000015	< 0.000010	0.015	< 0.0050	0.054	0.826	< 0.010	0.680	< 0.010	< 0.090	0.040	0.045	< 0.290	5.20
U07-10I	U07-10I-20220823		2022-08-23	6.65 - 8.15	N	9.23	< 0.020	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.013	1.68	< 0.010	8.98	0.639	< 1.50	0.058	< 0.010	< 1.40	11.0
U07-10I	U07-10I_20230314		2023-03-14	6.65 - 8.15	N	4.67	< 0.030	0.029	0.023	0.0120	-	0.000029	< 0.000010	< 0.020	< 0.0050	0.087	1.36	< 0.010	0.676	0.029	< 0.350	0.121	0.073	< 0.490	6.40
U07-10I	U07-10I-20230821		2023-08-21	6.65 - 8.15	N	10.8	< 0.038	< 0.086	0.067	0.0260	-	0.000050	< 0.000010	< 0.048	< 0.0050	0.390	2.66	< 0.010	8.78	1.12	< 2.25	0.847	**0.318**	< 1.60	15.2
U07-10D	U7-10D-20140528		2014-05-28	8.5 - 10.65	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U7-10D-20140827		2014-08-27	8.5 - 10.65	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U7-10D-20150410		2015-04-10	8.5 - 10.65	N	0.06	< 0.01	0.03	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	< 0.01	0.02	< 0.01	-	-	0.06	< 0.02	< 0.01	< 0.05	-
U07-10D	U7-10D-20150902		2015-09-02	8.5 - 10.65	N	0.32	< 0.05	0.09	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.11	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-

AECOM

TABLE 1-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW and CSR-SCH-3.2C3-GENWAT-AW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.01	0.000015	0.00001	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
U07-10D	U07-10D-20150915		2015-09-15	8.5 - 10.65	N	0.23	< 0.05	0.06	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.12	< 0.05	-	-	0.15	< 0.05	< 0.05	< 0.05	-
U07-10D	U07-10D_DUP-1-20151015	U07-10D-20151015	2015-10-15	8.5 - 10.65	FD	0.19	< 0.05	0.06	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	0.18	0.09	< 0.05	-	-	< 0.05	< 0.05	0.16	< 0.05	-
U07-10D	U07-10D-20151015		2015-10-15	8.5 - 10.65	N	0.18	< 0.05	< 0.05	< 0.05	0.02	< 0.1	-	-	< 0.05	< 0.05	0.27	0.08	< 0.05	-	-	0.05	< 0.05	**0.21**	< 0.05	-
U07-10D	U7-10D-20160315		2016-03-15	8.5 - 10.65	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U07-10D	U07-10D-20160315		2016-03-15	8.5 - 10.65	N	0.39	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	0.17	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U7-10D-20160921		2016-09-21	8.5 - 10.65	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U07-10D	U07-10D-20160921		2016-09-21	8.5 - 10.65	N	0.31	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.005	< 0.05	0.16	< 0.05	-	-	0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U07-10D_DUP-14-20170426	U07-10D-20170426	2017-04-26	8.5 - 10.65	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U07-10D-20170426		2017-04-26	8.5 - 10.65	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U07-10D-20170921		2017-09-21	8.5 - 10.65	N	2.96	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	0.64	< 0.05	-	-	< 0.3	< 0.05	< 0.05	< 0.3	-
U07-10D	U07-10D-20180416		2018-04-16	8.5 - 10.65	N	< 0.05	< 0.05	< 0.05	< 0.05	0.01	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
U07-10D	U07-10D-20180925		2018-09-25	8.5 - 10.65	N	0.31	< 0.01	< 0.02	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	0.13	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U07-10D	U07-10D-REG-GW_20180925		2018-09-25	8.5 - 10.65	N	0.305	< 0.01	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.130	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	0.44
U07-10D	DUP-9-FD-GW_20180925	U07-10D-REG-GW_20180925	2018-09-25	8.5 - 10.65	FD	0.371	< 0.01	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.174	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	0.55
U07-10D	U07-10D_DUP-9-20180925	U07-10D-20180925	2018-09-25	8.5 - 10.65	FD	0.37	< 0.01	< 0.03	< 0.01	< 0.005	< 0.015	-	-	< 0.01	< 0.005	< 0.01	0.17	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U07-10D	U07-10D-REG-GW_20190409		2019-04-09	8.5 - 10.65	N	0.256	< 0.01	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.013	0.176	< 0.01	< 0.05	< 0.05	< 0.05	0.047	< 0.01	< 0.05	0.49
U07-10D	U07-10D-20190409		2019-04-09	8.5 - 10.65	N	0.26	< 0.01	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	0.18	< 0.01	< 0.05	< 0.05	< 0.05	0.05	< 0.01	< 0.05	-
U07-10D	L2354359-5		2019-09-25	8.5 - 10.65	N	0.854	< 0.01	0.024	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.013	0.483	< 0.01	< 0.05	< 0.05	0.063	< 0.02	< 0.01	< 0.05	1.44
U07-10D	U07-10D-20190925		2019-09-25	8.5 - 10.65	N	0.85	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.01	0.48	< 0.01	< 0.05	< 0.05	0.06	< 0.02	< 0.01	< 0.05	-
U07-10D	L2431889-9		2020-03-24	8.5 - 10.65	N	1.05	< 0.01	0.017	0.019	0.0164	-	0.000017	0.000022	0.022	< 0.005	0.033	0.296	0.019	< 0.05	< 0.05	0.054	0.021	0.035	< 0.05	1.62
U07-10D	U07-10D-20200324		2020-03-24	8.5 - 10.65	N	1.05	< 0.01	0.02	0.02	0.02	-	0.00002	< 0.00001	0.02	< 0.005	0.03	0.30	0.02	< 0.05	< 0.05	0.05	0.02	0.04	< 0.05	-
U07-10D	VA20B3370-004		2020-08-20	8.5 - 10.65	N	7.06	0.012	0.056	0.039	0.0122	-	0.000015	< 0.000010	0.024	< 0.0050	0.221	2.17	< 0.010	0.490	0.099	< 0.500	0.344	0.162	< 0.200	-
U07-10D	U07-10D-20200820		2020-08-20	8.5 - 10.65	N	7.06	0.01	0.06	0.04	0.01	-	0.00002	< 0.00001	0.02	< 0.005	0.22	2.17	< 0.01	0.49	0.10	< 0.5	0.34	0.16	< 0.2	-
U07-10D	U07-10D-REG-GW_20210329		2021-03-29	8.5 - 10.65	N	0.343	< 0.010	0.015	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.070	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	0.428
U07-10D	U07-10D-20210329		2021-03-29	8.5 - 10.65	N	0.34	< 0.01	0.02	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.07	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U07-10D	U07-10D-REG-GW_20210825		2021-08-25	8.5 - 10.65	N	29.8	< 0.030	0.067	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.090	7.58	< 0.010	7.31	0.424	< 1.50	0.338	0.048	< 0.950	37.9
U07-10D	U07-10D-20210825		2021-08-25	8.5 - 10.65	N	29.80	< 0.03	0.07	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	0.09	7.58	< 0.01	7.31	0.42	< 1.5	0.34	0.05	< 0.95	-
U07-10D	U07-10D-REG-GW_20220324		2022-03-24	8.5 - 10.65	N	0.285	< 0.010	0.021	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.018	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	0.324
U07-10D	U07-10D-20220823		2022-08-23	8.5 - 10.65	N	25.7	< 0.030	0.067	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.065	6.01	< 0.010	7.36	0.659	< 1.30	0.233	0.035	< 0.850	32.2
U07-10D	U07-10D_20230314		2023-03-14	8.5 - 10.65	N	5.09	< 0.010	0.016	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.026	1.22	< 0.010	0.129	0.016	< 0.060	< 0.020	0.019	< 0.050	6.39
U07-10D	U07-10D-20230821		2023-08-21	8.5 - 10.65	N	37.7	< 0.031	0.100	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	0.131	10.3	< 0.010	6.44	0.320	< 0.910	0.328	0.073	< 0.900	48.7
MW03-07	MW03-07-20140604		2014-06-04	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20140904		2014-09-04	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20150422		2015-04-22	0.6 - 2.2	N	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.02	-	-	< 0.01	< 0.01	< 0.01	0.02	< 0.01	-	-	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-07	MW03-07-20150915		2015-09-15	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	0.08	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07_DUP-8-20160317	MW03-07-20160317	2016-03-17	0.6 - 2.2	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20160317		2016-03-17	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20160923		2016-09-23	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.01	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20170413		2017-04-13	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-20170830		2017-08-30	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-REG-GW_20180412		2018-04-12	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.00005	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW03-07	MW03-07-20180412		2018-04-12	0.6 - 2.2	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	-	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-07	MW03-07-REG-GW_20180904		2018-09-04	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	0.011	0.0120	-	0.000016	0.000011	0.010	< 0.005	0.020	0.036	0.012	< 0.05	< 0.05	< 0.05	< 0.02	0.021	< 0.05	-
MW03-07	MW03-07-20180904		2018-09-04	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	0.01	0.01	0.02	-	-	0.01	< 0.005	0.02	0.04	0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.02	< 0.05	-
MW03-07	MW03-07-REG-GW_20190402		2019-04-02	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.037	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-07	MW03-07-20190402		2019-04-02	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.04	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-07	L2354359-6		2019-09-25	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.071	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-07	MW03-07-20190925		2019-09-25	0.6 - 2.2	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.07	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-07	VA20A3631-002		2020-03-19	0.6 - 2.2	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.059	< 0.010	0.015	0.026	< 0.060	< 0.020	< 0.010	< 0.050	-
MW03-07	MW03-07-20200319		2020-03-19	0.6 - 2.2	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.06	< 0.01	0.02	0.03	< 0.06	< 0.02	< 0.01	< 0.05	-
MW03-07	VA20B3702-003		2020-08-26	0.6 - 2.2	N	0.012	0.013	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.073	< 0.010	0.011	0.018	< 0.050	< 0.020	< 0.010	< 0.050	0.086
MW03-07	MW03-07-20200826		2020-08-26	0.6 - 2.2	N	0.01	0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.07	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-07	MW03-07-REG-GW_20210330		2021-03-30	0.6 - 2.2	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.031	< 0.010	< 0.010	0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-07	MW03-07-20210330		2021-03-30	0.6 - 2.2	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.03	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-07	MW03-07_20210830		2021-08-30	0.6 - 2.2	N	< 0.010	< 0.014	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.074	< 0.010	0.014	0.031	0.056	< 0.020	< 0.010	< 0.050	0.130
MW03-07	MW03-07-20210830		2021-08-30	0.6 - 2.2	N	< 0.01	< 0.014	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.00001	< 0.01	< 0.005	< 0.01	0.07	< 0.01	0.01	0.03	0.06	< 0.02	< 0.01	< 0.05	-
MW03-07	MW03-07-REG-GW_20220328		2022-03-28	0.6 - 2.2	N	0.063	< 0.012	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.112	< 0.010	0.025	0.013	< 0.050	0.021	< 0.010	< 0.050	0.196
MW03-07	MW03-07-20220823		2022-08-23	0.6 - 2.2	N	0.012	< 0.030	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.247	< 0.010	0.018	0.017	< 0.050	< 0.020	0.012	< 0.050	0.271
MW03-07	MW03-07_20230307		2023-03-07	0.6 - 2.2	N	0.046	< 0.015	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.114	< 0.010	0.011	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	0.114
MW03-07	MW03-07-20230821		2023-08-21	0.6 - 2.2	N	0.138	0.019	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.000010	< 0.010	< 0.0050	< 0.010	0.289	< 0.010	0.013	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	0.427

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 14 Amendments, July 2022)
FD	Field duplicate sample
N	Normal environmental sample
mbgs	Metres below ground surface
mg/L	Milligrams per litre
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
-	Sample not analyzed for indicated parameter
--	No standard/guideline

Notes:
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Marine Water and BC CSR Schedule 3.2 - Aquatic Life - Freshwater
Exceeds Parkland Refinery Site Specific Screening Levels (SSSLs)
Detection Limit Exceeds Applicable Standard/Guideline

AECOM

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
PW03-1A	2014-03-04	4.040	38.159	2.420	35.739	ND	NA	
PW03-1A	2014-04-29	4.030	38.159	2.100	36.059	ND	NA	
PW03-1A	2014-06-19	4.030	38.159	ND	NA	ND	NA	Roadbox upheaved, may require maintenance, contact Project Manager; Dry
PW03-1A	2014-08-12	4.030	38.159	ND	NA	ND	NA	Dry
PW03-1A	2014-09-24	4.040	38.159	ND	NA	ND	NA	Dry; Sediment on probe
PW03-1A	2015-01-13	4.050	38.159	2.690	35.469	ND	NA	
PW03-1A	2015-04-07	4.040	38.159	2.610	35.549	ND	NA	
PW03-1A	2015-05-06	4.040	38.159	3.945	34.214	ND	NA	Dry; Insufficient water to sample
PW03-1A	2015-05-25	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2015-08-06	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2015-08-24	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2015-11-09	4.040	38.159	2.510	35.649	ND	NA	
PW03-1A	2016-03-09	3.040	38.159	2.060	36.099	ND	NA	Clear
PW03-1A	2016-03-23	4.305	38.159	2.705	35.454	ND	NA	
PW03-1A	2016-05-25	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2016-08-23	4.045	38.159	ND	NA	ND	NA	Dry
PW03-1A	2016-09-16	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2016-11-08	4.040	38.159	2.190	35.969	ND	NA	
PW03-1A	2017-02-14	4.040	38.159	2.020	36.139	ND	NA	
PW03-1A	2017-04-03	4.040	38.159	1.910	36.249	ND	NA	Clear
PW03-1A	2017-06-08	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2017-09-06	4.050	38.159	ND	NA	ND	NA	Dry
PW03-1A	2017-10-31	4.040	38.159	ND	NA	ND	NA	Dry
PW03-1A	2017-11-30	4.050	38.159	1.960	36.199	ND	NA	Dry
PW03-1A	2018-04-30	4.045	38.159	3.380	34.779	ND	NA	Grey silty, purged dry
PW03-1A	2018-08-21	4.080	38.159	ND	NA	ND	NA	Dry
PW03-1A	2019-03-26	4.030	38.159	3.825	34.334	ND	NA	very silty/cloudy; sampled on recharge
PW03-1A	2019-09-17	4.050	38.159	ND	NA	ND	NA	dry, silt on probe
PW03-1A	2020-03-26	4.039	38.159	3.913	34.246	ND	NA	Not enough water column to sample
PW03-1A	2020-04-08	3.990	38.159	2.531	35.628	ND	NA	Clear
PW03-1A	2020-08-10	4.034	38.159	ND	NA	ND	NA	Dry
PW03-1A	2021-08-17	4.040	38.159	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-1A	2022-03-02	4.042	38.159	2.445	35.714	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-1A	2022-08-10	4.035	38.159	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
PW03-1A	2023-03-30	4.049	38.159	3.368	34.791	ND	NA	Clear; no odour
PW03-1A	2023-08-28	4.040	38.159	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-1B	2014-03-04	3.080	38.129	1.320	36.809	ND	NA	
PW03-1B	2014-04-29	3.060	38.129	1.620	36.509	ND	NA	Clear
PW03-1B	2014-06-19	3.060	38.129	ND	NA	ND	NA	Dry
PW03-1B	2014-08-12	3.060	38.129	ND	NA	ND	NA	Dry
PW03-1B	2014-09-24	3.075	38.129	ND	NA	ND	NA	Dry; Sediment on probe
PW03-1B	2015-01-13	3.075	38.129	2.150	35.979	ND	NA	
PW03-1B	2015-04-07	3.080	38.129	2.115	36.014	ND	NA	
PW03-1B	2015-05-06	3.070	38.129	ND	NA	ND	NA	Dry; Silt on probe
PW03-1B	2015-05-25	4.180	38.129	ND	NA	ND	NA	Dry
PW03-1B	2015-08-06	3.080	38.129	ND	NA	ND	NA	Dry
PW03-1B	2015-08-24	3.060	38.129	ND	NA	ND	NA	Dry
PW03-1B	2015-11-09	3.075	38.129	1.340	36.789	ND	NA	
PW03-1B	2016-03-09	3.080	38.129	1.410	36.719	ND	NA	Bentonite on probe tip
PW03-1B	2016-03-23	3.080	38.129	2.430	35.699	ND	NA	
PW03-1B	2016-05-25	3.070	38.129	ND	NA	ND	NA	Dry
PW03-1B	2016-08-24	3.080	38.129	ND	NA	ND	NA	Dry
PW03-1B	2016-09-16	3.090	38.129	ND	NA	ND	NA	Dry
PW03-1B	2016-11-08	3.080	38.129	1.390	36.739	ND	NA	
PW03-1B	2017-02-14	3.070	38.129	1.430	36.699	ND	NA	
PW03-1B	2017-04-03	3.080	38.129	1.440	36.689	ND	NA	Clear
PW03-1B	2017-06-08	3.070	38.129	ND	NA	ND	NA	Dry
PW03-1B	2017-09-06	3.070	38.129	ND	NA	ND	NA	Dry
PW03-1B	2017-10-31	3.080	38.129	2.580	35.549	ND	NA	
PW03-1B	2017-11-30	3.080	38.129	1.270	36.859	ND	NA	
PW03-1B	2018-04-30	3.080	38.129	2.740	35.389	ND	NA	Clear
PW03-1B	2018-08-21	3.088	38.129	ND	NA	ND	NA	Dry
PW03-1B	2019-03-26	3.078	38.129	ND	NA	ND	NA	Dry
PW03-1B	2019-03-27	3.073	38.129	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
PW03-1B	2019-04-16	3.073	38.129	1.642	36.487	ND	NA	Clear
PW03-1B	2019-09-17	3.091	38.129	ND	NA	ND	NA	Dry
PW03-1B	2020-03-26	3.075	38.129	3.048	35.081	ND	NA	Not enough water to sample, silt on probe
PW03-1B	2020-04-08	3.079	38.129	1.961	36.168	ND	NA	Clear, DUP-12
PW03-1B	2020-08-10	3.075	38.129	2.974	35.155	ND	NA	silt on probe, insufficient water to sample
PW03-1B	2021-08-17	3.082	38.129	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-1B	2022-03-02	3.071	38.129	1.401	36.728	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-1B	2022-08-10	3.075	38.129	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
PW03-1B	2023-03-30	3.072	38.129	ND	NA	ND	NA	Water level meter: Solinst 122Serial: 31334
PW03-1B	2023-04-12	3.081	38.129	1.318	36.811	ND	NA	Clear; no odour
PW03-1B	2023-08-28	3.078	38.129	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-2A	2014-03-04	4.470	37.644	3.300	34.344	ND	NA	
PW03-2A	2014-04-29	4.440	37.644	2.630	35.014	ND	NA	Clear
PW03-2A	2014-06-19	4.450	37.644	ND	NA	ND	NA	Dry
PW03-2A	2014-08-12	4.440	37.644	ND	NA	ND	NA	Dry
PW03-2A	2014-09-24	4.440	37.644	ND	NA	ND	NA	Dry
PW03-2A	2015-01-13	4.485	37.644	ND	NA	ND	NA	Dry
PW03-2A	2015-04-07	4.475	37.644	4.240	33.404	ND	NA	Dry
PW03-2A	2015-05-06	4.435	37.644	ND	NA	ND	NA	Dry; Silt on probe
PW03-2A	2015-05-25	4.440	37.644	ND	NA	ND	NA	Dry
PW03-2A	2015-08-06	4.450	37.644	ND	NA	ND	NA	Dry
PW03-2A	2015-08-24	4.440	37.644	ND	NA	ND	NA	Dry
PW03-2A	2015-11-09	4.445	37.644	3.270	34.374	ND	NA	
PW03-2A	2016-03-09	4.450	37.644	3.120	34.524	ND	NA	Clear
PW03-2A	2016-03-23	4.460	37.644	4.130	33.514	ND	NA	
PW03-2A	2016-05-25	4.460	37.644	ND	NA	ND	NA	Dry
PW03-2A	2016-08-24	4.450	37.644	ND	NA	ND	NA	Dry
PW03-2A	2016-09-16	4.450	37.644	ND	NA	ND	NA	Dry
PW03-2A	2016-11-08	4.460	37.644	3.340	34.304	ND	NA	
PW03-2A	2017-02-14	4.460	37.644	3.280	34.364	ND	NA	
PW03-2A	2017-04-03	4.460	37.644	2.180	35.464	ND	NA	Clear
PW03-2A	2017-06-08	4.460	37.644	ND	NA	ND	NA	Dry
PW03-2A	2017-09-06	4.460	37.644	ND	NA	ND	NA	Dry
PW03-2A	2017-10-31	4.470	37.644	ND	NA	ND	NA	Dry
PW03-2A	2017-11-30	4.470	37.644	2.760	34.884	ND	NA	--
PW03-2A	2018-04-30	4.475	37.644	4.420	33.224	ND	NA	Dry; brownish silty bottom
PW03-2A	2018-08-21	4.463	37.644	ND	NA	ND	NA	Dry
PW03-2A	2019-03-26	4.468	37.644	ND	NA	ND	NA	Dry
PW03-2A	2019-03-27	4.464	37.644	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
PW03-2A	2019-04-16	4.457	37.644	3.265	34.379	ND	NA	Clear; issues with RKI Eagle, could not monitor for headspace vapour
PW03-2A	2019-05-21	4.462	37.644	ND	NA	ND	NA	Dry
PW03-2A	2019-09-17	4.467	37.644	ND	NA	ND	NA	Dry
PW03-2A	2019-11-21	4.482	37.644	3.253	34.391	ND	NA	
PW03-2A	2020-02-18	4.463	37.644	3.929	33.715	ND	NA	
PW03-2A	2020-03-26	4.464	37.644	ND	NA	ND	NA	Dry
PW03-2A	2020-04-08	4.476	37.644	3.752	33.892	ND	NA	Sample clear with trace orange solids; went dry after filling BTEX vials, amber bottles sampled on recharge
PW03-2A	2020-05-20	4.483	37.644	ND	NA	ND	NA	dry
PW03-2A	2020-08-10	4.461	37.644	ND	NA	ND	NA	Dry, silt on probe
PW03-2A	2020-11-18	4.475	37.644	3.192	34.452	ND	NA	
PW03-2A	2021-02-04	4.490	37.644	2.647	34.997	ND	NA	
PW03-2A	2021-08-11	4.457	37.644	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-2A	2022-03-02	4.476	37.644	2.561	35.083	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-2A	2022-08-03	4.500	37.644	ND	NA	ND	NA	dry
PW03-2A	2022-08-10	4.453	37.644	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 016675
PW03-2A	2022-11-17	NM	37.644	3.928	33.716	ND	NA	
PW03-2A	2023-02-15	NM	37.644	3.337	34.307	ND	NA	
PW03-2A	2023-03-30	4.487	37.644	4.261	33.383	ND	NA	Clear; no odour
PW03-2A	2023-06-06	4.475	37.644	ND	NA	ND	NA	Dry
PW03-2A	2023-08-09	4.473	37.644	ND	NA	ND	NA	Dry
PW03-2A	2023-08-28	4.467	37.644	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-2A	2023-11-15	4.476	37.644	3.149	34.495	ND	NA	
PW03-2B	2014-03-04	3.130	37.809	1.850	35.959	ND	NA	
PW03-2B	2014-04-29	3.110	37.809	2.550	35.259	ND	NA	Clear
PW03-2B	2014-06-19	3.135	37.809	ND	NA	ND	NA	Dry
PW03-2B	2014-08-12	3.130	37.809	ND	NA	ND	NA	Dry
PW03-2B	2014-09-24	3.130	37.809	3.095	34.714	ND	NA	
PW03-2B	2015-01-13	3.140	37.809	2.720	35.089	ND	NA	

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
PW03-2B	2015-04-07	3.140	37.809	2.415	35.394	ND	NA	
PW03-2B	2015-05-06	3.135	37.809	ND	NA	ND	NA	Dry; Silt on probe
PW03-2B	2015-05-25	3.150	37.809	ND	NA	ND	NA	Dry
PW03-2B	2015-08-06	3.140	37.809	ND	NA	ND	NA	Dry
PW03-2B	2015-08-24	3.130	37.809	ND	NA	ND	NA	Dry
PW03-2B	2015-11-09	3.130	37.809	1.250	36.559	ND	NA	
PW03-2B	2016-03-09	3.140	37.809	1.260	36.549	ND	NA	Clear
PW03-2B	2016-03-23	3.125	37.809	2.860	34.949	ND	NA	
PW03-2B	2016-05-25	3.130	37.809	ND	NA	ND	NA	Dry
PW03-2B	2016-08-24	3.110	37.809	ND	NA	ND	NA	Dry
PW03-2B	2016-09-16	3.110	37.809	ND	NA	ND	NA	Dry
PW03-2B	2016-11-08	3.130	37.809	1.620	36.189	ND	NA	
PW03-2B	2017-02-14	3.130	37.809	1.270	36.539	ND	NA	
PW03-2B	2017-04-03	3.120	37.809	1.360	36.449	ND	NA	Clear
PW03-2B	2017-06-08	3.130	37.809	ND	NA	ND	NA	Dry
PW03-2B	2017-09-06	3.130	37.809	ND	NA	ND	NA	Dry
PW03-2B	2017-10-31	3.130	37.809	2.600	35.209	ND	NA	
PW03-2B	2017-11-30	3.140	37.809	1.090	36.719	ND	NA	
PW03-2B	2018-04-30	3.141	37.809	3.083	34.726	ND	NA	Dry; brownish silty bottom
PW03-2B	2018-08-21	3.141	37.809	ND	NA	ND	NA	Dry
PW03-2B	2019-03-26	3.150	37.809	2.880	34.929	ND	NA	very silty/cloudy
PW03-2B	2019-09-17	3.152	37.809	ND	NA	ND	NA	dry, silt on probe
PW03-2B	2020-03-26	3.125	37.809	2.839	34.970	ND	NA	Not enough water to sample
PW03-2B	2020-04-08	3.124	37.809	1.681	36.128	ND	NA	Clear
PW03-2B	2020-08-10	3.137	37.809	ND	NA	ND	NA	Dry
PW03-2B	2021-08-17	3.138	37.809	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-2B	2022-03-02	3.142	37.809	1.146	36.663	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-2B	2022-08-10	3.112	37.809	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
PW03-2B	2023-03-30	3.137	37.809	2.400	35.409	ND	NA	Clear; no odour
PW03-2B	2023-08-28	3.054	37.809	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-3	2014-03-04	4.170	39.162	3.625	35.537	ND	NA	
PW03-3	2014-04-29	4.160	39.162	3.110	36.052	ND	NA	Clear
PW03-3	2014-06-19	4.160	39.162	ND	NA	ND	NA	Dry
PW03-3	2014-08-12	4.170	39.162	ND	NA	ND	NA	Dry
PW03-3	2014-09-24	4.170	39.162	4.070	35.092	ND	NA	
PW03-3	2015-01-13	4.180	39.162	3.135	36.027	ND	NA	
PW03-3	2015-04-07	4.180	39.162	3.220	35.942	ND	NA	
PW03-3	2015-05-06	4.175	39.162	ND	NA	ND	NA	Dry; Silt on the probe
PW03-3	2015-05-25	3.080	39.162	ND	NA	ND	NA	Dry
PW03-3	2015-08-06	4.170	39.162	ND	NA	ND	NA	Dry
PW03-3	2015-08-24	4.180	39.162	ND	NA	ND	NA	Dry
PW03-3	2015-11-09	4.175	39.162	ND	NA	ND	NA	Dry
PW03-3	2016-03-09	4.180	39.162	2.800	36.362	ND	NA	Bentonite on probe tip
PW03-3	2016-03-23	4.170	39.162	3.470	35.692	ND	NA	
PW03-3	2016-05-25	4.170	39.162	ND	NA	ND	NA	Dry
PW03-3	2016-08-24	4.120	39.162	ND	NA	ND	NA	Dry
PW03-3	2016-09-16	4.120	39.162	ND	NA	ND	NA	Dry
PW03-3	2016-11-08	4.180	39.162	ND	NA	ND	NA	Dry
PW03-3	2017-02-14	4.170	39.162	2.380	36.782	ND	NA	
PW03-3	2017-03-31	4.170	39.162	1.880	37.282	ND	NA	Clear
PW03-3	2017-06-08	4.170	39.162	ND	NA	ND	NA	Dry
PW03-3	2017-09-06	4.180	39.162	ND	NA	ND	NA	Dry
PW03-3	2017-10-31	4.170	39.162	3.980	35.182	ND	NA	
PW03-3	2017-11-30	4.180	39.162	2.030	37.132	ND	NA	
PW03-3	2018-04-30	4.197	39.162	3.423	35.739	ND	NA	Cloudy
PW03-3	2018-08-21	4.151	39.162	ND	NA	ND	NA	Dry
PW03-3	2019-03-26	4.192	39.162	3.582	35.580	ND	NA	slightly silty (brown+grey)
PW03-3	2019-09-17	4.155	39.162	ND	NA	ND	NA	Dr, silt on probe
PW03-3	2020-03-26	4.167	39.162	3.641	35.521	ND	NA	Purged dry at 2L, poor recharge, couldn't sample
PW03-3	2020-04-07	4.174	39.162	3.008	36.154	ND	NA	2nd sampling attempt of 2020 wet season PMP, could not sample next day, will return to sample
PW03-3	2020-04-09	4.184	39.162	3.164	35.998	ND	NA	Silt on probe, sample clear, 3rd sampling attempt of 2020 wet season PMP
PW03-3	2020-08-10	4.168	39.162	ND	NA	ND	NA	Dry
PW03-3	2021-08-17	4.152	39.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-3	2022-03-21	4.171	39.162	2.238	36.924	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
PW03-3	2022-08-10	4.177	39.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
PW03-3	2023-03-30	4.186	39.162	3.440	35.722	ND	NA	Clear; no odour
PW03-3	2023-08-28	4.171	39.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-4	2014-03-04	3.880	37.028	2.720	34.308	ND	NA	
PW03-4	2014-04-29	3.890	37.028	1.700	35.328	ND	NA	Slightly turbid
PW03-4	2014-06-19	3.780	37.028	ND	NA	ND	NA	Dry
PW03-4	2014-08-12	3.870	37.028	ND	NA	ND	NA	Dry
PW03-4	2014-09-24	3.780	37.028	ND	NA	ND	NA	Dry
PW03-4	2015-01-13	3.875	37.028	2.900	34.128	ND	NA	
PW03-4	2015-04-07	3.880	37.028	2.560	34.468	ND	NA	
PW03-4	2015-05-06	3.795	37.028	ND	NA	ND	NA	Dry; Silt on probe
PW03-4	2015-05-25	3.870	37.028	ND	NA	ND	NA	Dry
PW03-4	2015-08-06	3.800	37.028	ND	NA	ND	NA	Dry
PW03-4	2015-08-24	3.800	37.028	ND	NA	ND	NA	Dry
PW03-4	2015-11-09	3.860	37.028	2.975	34.053	ND	NA	
PW03-4	2016-03-09	3.810	37.028	2.590	34.438	ND	NA	Clear
PW03-4	2016-03-23	3.840	37.028	3.130	33.898	ND	NA	
PW03-4	2016-05-25	3.810	37.028	ND	NA	ND	NA	Dry
PW03-4	2016-08-24	3.800	37.028	ND	NA	ND	NA	Dry
PW03-4	2016-09-16	3.800	37.028	ND	NA	ND	NA	Dry
PW03-4	2016-11-08	3.800	37.028	2.300	34.728	ND	NA	
PW03-4	2017-02-14	3.810	37.028	2.400	34.628	ND	NA	
PW03-4	2017-04-03	3.790	37.028	2.660	34.368	ND	NA	Clear
PW03-4	2017-06-08	3.830	37.028	ND	NA	ND	NA	Dry
PW03-4	2017-09-06	3.840	37.028	ND	NA	ND	NA	Dry
PW03-4	2017-10-31	3.830	37.028	ND	NA	ND	NA	Dry
PW03-4	2017-11-30	3.850	37.028	2.400	34.628	ND	NA	
PW03-4	2018-04-02	3.847	37.028	2.583	34.445	ND	NA	
PW03-4	2018-04-30	3.842	37.028	3.710	33.318	ND	NA	Dry
PW03-4	2018-06-12	3.850	37.028	ND	NA	ND	NA	Dry
PW03-4	2018-08-21	3.852	37.028	ND	NA	ND	NA	Dry
PW03-4	2018-11-20	3.852	37.028	2.663	34.365	ND	NA	
PW03-4	2019-02-25	3.864	37.028	2.964	34.064	ND	NA	
PW03-4	2019-03-26	3.838	37.028	3.804	33.224	ND	NA	Dry
PW03-4	2019-03-27	3.838	37.028	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
PW03-4	2019-04-16	3.848	37.028	2.770	34.258	ND	NA	Very silty; issues with RKI Eagle, could not monitor for headspace vapour
PW03-4	2019-05-21	3.839	37.028	ND	NA	ND	NA	Dry
PW03-4	2019-09-17	3.857	37.028	ND	NA	ND	NA	Dry
PW03-4	2019-11-21	3.842	37.028	2.709	34.319	ND	NA	
PW03-4	2020-02-18	3.835	37.028	2.911	34.117	ND	NA	
PW03-4	2020-03-26	3.851	37.028	ND	NA	ND	NA	Dry
PW03-4	2020-04-07	3.839	37.028	2.810	34.218	ND	NA	2nd sampling attempt of 2020 wet season PMP, could not sample next day, will return to sample
PW03-4	2020-04-09	3.852	37.028	2.977	34.051	ND	NA	3rd sampling attempt of 2020 wet season PMP, sample clear
PW03-4	2020-05-20	3.864	37.028	ND	NA	ND	NA	Dry
PW03-4	2020-08-10	3.885	37.028	ND	NA	ND	NA	Dry
PW03-4	2020-11-18	3.854	37.028	2.337	34.691	ND	NA	
PW03-4	2021-02-04	3.866	37.028	2.772	34.256	ND	NA	
PW03-4	2021-08-11	3.857	37.028	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-4	2022-03-02	3.862	37.028	2.774	34.254	ND	NA	Water level meter: Serial:
PW03-4	2022-08-03	3.800	37.280	ND	NA	ND	NA	dry
PW03-4	2022-08-10	3.837	37.280	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 016675
PW03-4	2022-11-17	NM	37.280	3.688	33.592	ND	NA	
PW03-4	2023-02-15	NM	37.280	2.880	34.400	ND	NA	
PW03-4	2023-03-30	3.873	37.280	3.695	33.585	ND	NA	Clear; no odour
PW03-4	2023-06-06	3.876	37.280	ND	NA	ND	NA	Dry
PW03-4	2023-08-09	3.858	37.280	ND	NA	ND	NA	Dry
PW03-4	2023-08-28	3.864	37.280	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-4	2023-11-15	3.866	37.280	2.764	34.516	ND	NA	
PW03-5	2014-03-04	8.480	37.647	5.540	32.107	ND	NA	
PW03-5	2014-04-29	6.450	37.647	2.870	34.777	ND	NA	Slightly turbid
PW03-5	2014-06-19	8.470	37.647	7.650	29.997	ND	NA	
PW03-5	2014-08-12	8.450	37.647	ND	NA	ND	NA	Dry
PW03-5	2014-09-24	8.455	37.647	ND	NA	ND	NA	Dry
PW03-5	2015-01-13	8.470	37.647	5.560	32.087	ND	NA	
PW03-5	2015-04-07	8.450	37.647	5.520	32.127	ND	NA	
PW03-5	2015-05-06	8.470	37.647	7.420	30.227	ND	NA	
PW03-5	2015-05-25	8.470	37.647	8.030	29.617	ND	NA	

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
PW03-5	2015-08-06	8.450	37.647	ND	NA	ND	NA	Dry
PW03-5	2015-08-24	8.460	37.647	ND	NA	ND	NA	Dry
PW03-5	2015-11-09	8.465	37.647	5.890	31.757	ND	NA	
PW03-5	2016-03-09	8.460	37.647	4.500	33.147	ND	NA	Biofouling on the probe; DUP-3
PW03-5	2016-03-23	8.460	37.647	5.375	32.272	ND	NA	
PW03-5	2016-05-25	8.460	37.647	7.980	29.667	ND	NA	
PW03-5	2016-08-24	8.470	37.647	ND	NA	ND	NA	Dry
PW03-5	2016-09-16	8.470	37.647	ND	NA	ND	NA	Dry
PW03-5	2016-11-08	8.470	37.647	4.630	33.017	ND	NA	Dry
PW03-5	2017-02-14	8.460	37.647	5.050	32.597	ND	NA	
PW03-5	2017-04-03	8.450	37.647	4.100	33.547	ND	NA	Clear
PW03-5	2017-06-08	8.420	37.647	7.430	30.217	ND	NA	
PW03-5	2017-09-06	8.430	37.647	ND	NA	ND	NA	Dry
PW03-5	2017-10-31	8.430	37.647	8.190	29.457	ND	NA	
PW03-5	2017-11-30	8.470	37.647	4.480	33.167	ND	NA	
PW03-5	2018-04-02	8.434	37.647	3.532	34.115	ND	NA	
PW03-5	2018-04-30	8.472	37.647	5.831	31.816	ND	NA	Silty; DUP-11
PW03-5	2018-06-12	8.430	37.647	8.060	29.587	ND	NA	
PW03-5	2018-08-21	8.482	37.647	ND	NA	ND	NA	Dry
PW03-5	2018-11-20	8.473	37.647	5.663	31.984	ND	NA	
PW03-5	2019-02-25	8.483	37.647	5.759	31.888	ND	NA	
PW03-5	2019-03-26	8.461	37.647	6.834	30.813	ND	NA	slightly silty (light brown); DUP-05
PW03-5	2019-05-21	8.466	37.647	6.954	30.693	ND	NA	
PW03-5	2019-09-17	8.468	37.647	ND	NA	ND	NA	Dry, silt on probe
PW03-5	2019-11-21	8.472	37.647	5.373	32.274	ND	NA	
PW03-5	2020-02-18	8.443	37.647	5.040	32.607	ND	NA	
PW03-5	2020-03-26	8.463	37.647	6.758	30.889	ND	NA	clear
PW03-5	2020-05-20	8.476	37.647	7.170	30.477	ND	NA	
PW03-5	2020-08-10	8.474	37.647	8.372	29.275	ND	NA	Silt on probe, insufficient water to sample
PW03-5	2020-11-18	8.472	37.647	5.046	32.601	ND	NA	
PW03-5	2021-02-04	8.489	37.647	4.751	32.896	ND	NA	
PW03-5	2021-08-11	8.423	37.647	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-5	2022-03-02	8.434	37.647	5.008	32.639	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-5	2022-05-04	NM	37.647	6.358	31.289	ND	NA	
PW03-5	2022-08-03	8.400	37.647	7.957	29.690	ND	NA	
PW03-5	2022-08-10	8.454	37.647	8.079	29.568	ND	NA	Clear; no odour
PW03-5	2022-11-17	NM	37.647	7.207	30.440	ND	NA	
PW03-5	2023-02-15	NM	37.647	5.199	32.448	ND	NA	
PW03-5	2023-03-30	8.510	37.647	6.775	30.872	ND	NA	Clear; no odour
PW03-5	2023-06-06	8.462	37.647	7.890	29.757	ND	NA	
PW03-5	2023-08-09	8.458	37.647	ND	NA	ND	NA	Dry
PW03-5	2023-08-28	8.475	37.647	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-5	2023-11-15	8.440	37.647	6.328	31.319	ND	NA	
PW03-6	2014-03-04	2.840	38.141	1.470	36.671	ND	NA	
PW03-6	2014-04-23	2.830	38.141	1.810	36.331	ND	NA	Clear
PW03-6	2014-06-19	2.840	38.141	ND	NA	ND	NA	Dry; 5 m east of well a danger tree is located in the treeline (south)
PW03-6	2014-08-12	2.830	38.141	ND	NA	ND	NA	Dry
PW03-6	2014-09-24	2.840	38.141	ND	NA	ND	NA	Dry; Sediment on probe
PW03-6	2015-01-13	2.845	38.141	2.255	35.886	ND	NA	
PW03-6	2015-04-07	2.845	38.141	2.120	36.021	ND	NA	
PW03-6	2015-05-06	2.840	38.141	ND	NA	ND	NA	Dry; Silt on the probe
PW03-6	2015-05-25	2.850	38.141	ND	NA	ND	NA	Dry
PW03-6	2015-08-06	2.840	38.141	ND	NA	ND	NA	Dry
PW03-6	2015-08-24	2.820	38.141	ND	NA	ND	NA	Dry
PW03-6	2015-11-09	2.815	38.141	1.270	36.871	ND	NA	
PW03-6	2016-03-09	2.840	38.141	1.860	36.281	ND	NA	Clear
PW03-6	2016-03-23	2.825	38.141	2.680	35.461	ND	NA	
PW03-6	2016-05-25	2.840	38.141	ND	NA	ND	NA	Dry
PW03-6	2016-08-24	2.820	38.141	ND	NA	ND	NA	Dry
PW03-6	2016-09-16	2.820	38.141	ND	NA	ND	NA	Dry
PW03-6	2016-11-08	2.820	38.141	1.270	36.871	ND	NA	
PW03-6	2017-02-14	2.840	38.141	1.560	36.581	ND	NA	
PW03-6	2017-03-31	2.880	38.141	1.190	36.951	ND	NA	Clear; DUP-5
PW03-6	2017-06-08	2.820	38.141	ND	NA	ND	NA	Dry
PW03-6	2017-09-06	2.830	38.141	ND	NA	ND	NA	Dry
PW03-6	2017-10-31	2.840	38.141	2.800	35.341	ND	NA	
PW03-6	2017-11-30	2.840	38.141	1.190	36.951	ND	NA	
PW03-6	2018-04-02	2.846	38.141	1.773	36.368	ND	NA	
PW03-6	2018-04-30	2.843	38.141	ND	NA	ND	NA	Dry, brownish silty bottom
PW03-6	2018-06-12	2.850	38.141	ND	NA	ND	NA	Dry
PW03-6	2018-08-21	2.854	38.141	ND	NA	ND	NA	Dry
PW03-6	2018-11-20	2.837	38.141	1.804	36.337	ND	NA	
PW03-6	2019-02-25	3.860	38.141	ND	NA	ND	NA	Dry
PW03-6	2019-03-26	2.831	38.141	ND	NA	ND	NA	Dry
PW03-6	2019-03-27	2.847	38.141	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
PW03-6	2019-04-16	2.832	38.141	2.493	35.648	ND	NA	Silty; sampled on recharge
PW03-6	2019-05-21	2.813	38.141	ND	NA	ND	NA	Dry
PW03-6	2019-09-17	2.845	38.141	ND	NA	ND	NA	Dry
PW03-6	2019-11-21	2.831	38.141	1.575	36.566	ND	NA	
PW03-6	2020-02-18	2.849	38.141	2.717	35.424	ND	NA	
PW03-6	2020-03-26	2.841	38.141	ND	NA	ND	NA	Dry, silt on probe
PW03-6	2020-04-07	2.841	38.141	ND	NA	ND	NA	Dry, 2nd sampling attempt of 2020 wet season PMP
PW03-6	2020-05-20	2.852	38.141	ND	NA	ND	NA	
PW03-6	2020-08-10	2.843	38.141	ND	NA	ND	NA	Dry
PW03-6	2020-11-18	2.845	38.141	1.944	36.197	ND	NA	
PW03-6	2021-02-04	2.857	38.141	1.819	36.322	ND	NA	
PW03-6	2021-08-11	2.824	38.141	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
PW03-6	2022-03-02	2.844	38.141	1.443	36.698	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
PW03-6	2022-08-03	2.800	38.141	ND	NA	ND	NA	dry
PW03-6	2022-08-10	2.835	38.141	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
PW03-6	2022-11-17	2.845	38.141	ND	NA	ND	NA	Dry
PW03-6	2023-02-15	NM	38.141	2.175	35.966	ND	NA	
PW03-6	2023-03-30	2.859	38.141	ND	NA	ND	NA	Water level meter: Solinst 122Serial: 31334
PW03-6	2023-04-12	2.849	38.141	1.501	36.640	ND	NA	Clear; no odour
PW03-6	2023-06-06	2.848	38.141	ND	NA	ND	NA	Dry
PW03-6	2023-08-09	2.835	38.141	ND	NA	ND	NA	Dry
PW03-6	2023-08-28	2.842	38.141	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
PW03-6	2023-11-15	2.853	38.141	2.215	35.926	ND	NA	
U8	2014-03-04	6.240	39.205	3.580	35.625	ND	NA	
U8	2014-04-29	6.210	39.205	4.080	35.125	ND	NA	Clear
U8	2014-06-19	6.240	39.205	ND	NA	ND	NA	Dry; Silt on probe
U8	2014-08-12	6.230	39.205	ND	NA	ND	NA	Dry
U8	2014-09-24	6.215	39.205	ND	NA	ND	NA	Dry; Sediment on probe
U8	2015-01-13	6.200	39.205	4.350	34.855	ND	NA	
U8	2015-04-07	6.220	39.205	4.350	34.855	ND	NA	
U8	2015-05-06	6.215	39.205	ND	NA	ND	NA	Dry; Silt on the probe
U8	2015-05-21	6.240	39.205	ND	NA	ND	NA	Dry
U8	2015-08-06	6.220	39.205	ND	NA	ND	NA	Dry
U8	2015-08-24	6.220	39.205	ND	NA	ND	NA	Dry
U8	2015-11-09	6.220	39.205	4.220	34.985	ND	NA	Dry
U8	2016-03-22	6.220	39.205	4.320	34.885	ND	NA	
U8	2016-05-24	6.230	39.205	ND	NA	ND	NA	
U8	2016-08-23	6.220	39.205	ND	NA	ND	NA	Dry
U8	2016-09-16	6.220	39.205	ND	NA	ND	NA	Dry
U8	2016-11-08	6.220	39.205	4.190	35.015	ND	NA	
U8	2016-12-21	6.780	39.205	3.560	35.645	ND	NA	Clear
U8	2017-02-14	6.230	39.205	2.870	36.335	ND	NA	
U8	2017-04-11	6.220	39.205	3.730	35.475	ND	NA	Clear
U8	2017-06-08	6.220	39.205	6.120	33.085	ND	NA	Dry
U8	2017-09-06	6.230	39.205	ND	NA	ND	NA	Dry
U8	2017-10-31	6.220	39.205	ND	NA	ND	NA	Dry
U8	2017-11-30	6.220	39.205	3.490	35.715	ND	NA	
U8	2018-04-30	6.230	39.205	5.223	33.982	ND	NA	Clear; sampled on the following day
U8	2018-08-21	6.238	39.205	ND	NA	ND	NA	Dry
U8	2019-03-21	6.230	39.205	5.232	33.973	ND	NA	clear
U8	2019-09-10	15.224	39.205	ND	NA	ND	NA	dry
U8	2019-10-09	6.241	39.205	ND	NA	ND	NA	dry, remonitored by Justin Becker as previous measurement did not make sense
U8	2020-03-25	6.218	39.205	5.406	33.799	ND	NA	Clear
U8	2020-08-11	6.209	39.205	ND	NA	ND	NA	Dry
U8	2021-08-17	6.241	39.205	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
U8	2022-03-02	6.227	39.205	3.912	35.293	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
U8	2022-08-10	6.215	39.205	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
U8	2023-03-29	6.230	39.205	5.320	33.885	ND	NA	Clear; no odour
U8	2023-08-24	6.212	39.205	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
U9	2014-03-04	6.300	39.424	3.610	35.814	ND	NA	
U9	2014-04-29	6.290	39.424	4.120	35.304	ND	NA	Clear
U9	2014-06-19	6.290	39.424	ND	NA	ND	NA	Dry
U9	2014-08-12	6.290	39.424	ND	NA	ND	NA	Dry
U9	2014-09-24	6.280	39.424	ND	NA	ND	NA	Dry; Sediment on probe
U9	2015-01-13	6.290	39.424	4.510	34.914	ND	NA	
U9	2015-04-07	6.290	39.424	4.730	34.694	ND	NA	
U9	2015-05-06	6.290	39.424	ND	NA	ND	NA	Dry; Silt on the probe
U9	2015-05-21	6.290	39.424	ND	NA	ND	NA	Dry
U9	2015-08-06	6.290	39.424	ND	NA	ND	NA	Dry
U9	2015-08-24	6.280	39.424	ND	NA	ND	NA	Dry
U9	2015-11-09	6.290	39.424	4.430	34.994	ND	NA	Dry
U9	2016-03-22	6.280	39.424	4.680	34.744	ND	NA	
U9	2016-05-24	5.290	39.424	ND	NA	ND	NA	
U9	2016-08-23	6.290	39.424	ND	NA	ND	NA	Dry
U9	2016-09-16	6.290	39.424	ND	NA	ND	NA	Dry
U9	2016-11-08	6.210	39.424	4.280	35.144	ND	NA	
U9	2016-12-21	6.310	39.424	4.480	34.944	ND	NA	Clear
U9	2017-02-14	5.290	39.424	4.090	35.334	ND	NA	
U9	2017-04-11	6.280	39.424	3.690	35.734	ND	NA	Clear
U9	2017-06-08	6.300	39.424	ND	NA	ND	NA	Dry
U9	2017-09-06	6.295	39.424	ND	NA	ND	NA	Dry
U9	2017-10-31	6.310	39.424	6.110	33.314	ND	NA	
U9	2017-11-30	6.300	39.424	3.930	35.494	ND	NA	
U9	2018-04-30	6.294	39.424	5.894	33.530	ND	NA	purged dry; sampled on recharge; cloudy orange
U9	2018-08-21	6.293	39.424	ND	NA	ND	NA	Dry
U9	2019-03-21	6.280	39.424	6.080	33.344	ND	NA	silty; orange tinged
U9	2019-09-10	6.212	39.424	ND	NA	ND	NA	Dry
U9	2020-03-25	6.291	39.424	6.183	33.241	ND	NA	Minor biofoul, orange; not enough water to sample
U9	2020-04-07	6.300	39.424	4.993	34.431	ND	NA	Silt on probe, sample clear, Dup-9
U9	2020-08-11	6.294	39.424	ND	NA	ND	NA	Dry, silt on probe
U9	2021-08-17	6.294	39.424	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
U9	2022-03-02	6.281	39.424	3.955	35.469	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
U9	2022-08-10	6.285	39.424	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
U9	2023-03-29	6.308	39.424	6.044	33.380	ND	NA	Clear; no odour
U9	2023-08-24	6.287	39.424	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
G2-11A	2014-05-12	6.000	50.341	5.650	44.691	ND	NA	Clear
G2-11A	2014-08-18	6.010	50.341	5.650	44.691	ND	NA	Clear
G2-11A	2015-05-11	6.005	50.341	5.600	44.741	ND	NA	Clear
G2-11A	2015-09-16	6.030	50.341	5.510	44.831	ND	NA	Clear; Hydrocarbon odour; DUP-16
G2-11A	2016-04-04	5.990	50.341	5.480	44.861	ND	NA	Clear
G2-11A	2016-09-01	6.010	50.341	5.810	44.531	ND	NA	Clear
G2-11A	2017-04-12	6.020	50.341	5.390	44.951	ND	NA	Dup-9
G2-11A	2017-08-28	6.000	50.341	5.630	44.711	ND	NA	Clear; Purged dry
G2-11A	2018-04-30	6.011	50.341	5.518	44.823	ND	NA	Clear; DUP-12
G2-11A	2018-08-28	6.008	50.341	5.230	45.111	ND	NA	clear
G2-11A	2019-03-26	6.009	50.341	5.563	44.778	ND	NA	Clear; PAHs bottles sampled on recharge; DUP-06
G2-11A	2019-09-17	6.010	50.341	5.538	44.803	ND	NA	Clear;
G2-11A	2020-04-06	6.017	50.341	5.451	44.890	ND	NA	Clear; DUP-11
G2-11A	2020-08-17	6.021	50.341	5.608	44.733	ND	NA	Clear
G2-11A	2021-08-17	6.009	50.341	6.009	44.332	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G2-11A	2022-03-16	6.027	50.341	5.423	44.918	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G2-11A	2022-08-10	6.010	50.341	5.579	44.762	ND	NA	Clear; no odour
G2-11A	2023-03-28	6.020	50.341	5.505	44.836	ND	NA	Clear; no odour
G2-11A	2023-08-24	5.980	50.341	5.618	44.723	ND	NA	Clear; no odour
G2-11B	2014-05-12	8.380	50.347	5.630	44.717	ND	NA	Clear; DUP-19
G2-11B	2014-08-18	8.400	50.347	5.780	44.567	ND	NA	Clear
G2-11B	2015-05-11	8.400	50.347	5.720	44.627	ND	NA	Clear
G2-11B	2015-09-16	8.425	50.347	5.620	44.727	ND	NA	Clear
G2-11B	2016-04-04	8.370	50.347	5.620	44.727	ND	NA	Clear
G2-11B	2016-09-01	8.370	50.347	5.770	44.577	ND	NA	Clear
G2-11B	2017-04-12	8.400	50.347	5.550	44.797	ND	NA	Clear
G2-11B	2017-08-28	8.390	50.347	5.780	44.567	ND	NA	Clear
G2-11B	2018-04-30	8.381	50.347	5.650	44.697	ND	NA	Clear
G2-11B	2018-08-28	8.411	50.347	5.758	44.589	ND	NA	Clear
G2-11B	2019-03-26	8.387	50.347	5.646	44.701	ND	NA	Clear
G2-11B	2019-09-17	8.402	50.347	5.703	44.644	ND	NA	Clear; DUP-4
G2-11B	2020-04-06	8.370	50.347	5.592	44.755	ND	NA	Clear with trace orange suspended solids
G2-11B	2020-08-17	8.420	50.347	5.772	44.575	ND	NA	Clear
G2-11B	2021-09-01	8.393	50.347	5.764	44.583	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G2-11B	2022-03-16	8.391	50.347	5.544	44.803	ND	NA	Water level meter: Solinst 107Serial:
G2-11B	2022-08-10	8.395	50.347	5.764	44.583	ND	NA	Clear; no odour
G2-11B	2023-03-28	8.390	50.347	5.600	44.747	ND	NA	Clear; no odour
G2-11B	2023-08-24	8.396	50.347	5.793	44.554	ND	NA	Clear; no odour
MW02-02	2014-03-04	5.230	42.258	4.430	37.828	ND	NA	
MW02-02	2014-05-01	5.200	42.258	4.450	37.808	ND	NA	Clear
MW02-02	2014-06-19	5.215	42.258	4.810	37.448	ND	NA	
MW02-02	2014-08-07	5.210	42.258	5.190	37.068	ND	NA	Dry
MW02-02	2014-09-24	5.205	42.258	ND	NA	ND	NA	Dry
MW02-02	2015-01-13	5.210	42.258	4.435	37.823	ND	NA	
MW02-02	2015-04-07	5.210	42.258	4.550	37.708	ND	NA	
MW02-02	2015-05-11	5.200	42.258	4.870	37.388	ND	NA	Clear
MW02-02	2015-05-21	5.220	42.258	5.030	37.228	ND	NA	
MW02-02	2015-08-06	5.210	42.258	ND	NA	ND	NA	Dry
MW02-02	2015-08-25	5.210	42.258	ND	NA	ND	NA	Dry
MW02-02	2015-09-22	5.220	42.258	ND	NA	ND	NA	Dry
MW02-02	2015-11-09	4.680	42.258	4.110	38.148	ND	NA	
MW02-02	2016-03-22	NM	42.258	ND	NA	ND	NA	Barlett removing hazardous trees in area - could not access well
MW02-02	2016-03-31	5.220	42.258	4.470	37.788	ND	NA	Clear
MW02-02	2016-05-25	5.220	42.258	ND	NA	ND	NA	Dry
MW02-02	2016-08-23	5.220	42.258	ND	NA	ND	NA	Dry
MW02-02	2016-09-09	5.220	42.258	ND	NA	ND	NA	Dry
MW02-02	2016-11-07	5.220	42.258	4.180	38.078	ND	NA	
MW02-02	2017-02-07	5.210	42.258	4.760	37.498	ND	NA	
MW02-02	2017-04-05	5.220	42.258	4.400	37.858	ND	NA	Clear
MW02-02	2017-06-07	5.720	42.258	5.120	37.138	ND	NA	
MW02-02	2017-09-06	5.100	42.258	ND	NA	ND	NA	Dry
MW02-02	2017-10-30	5.224	42.258	ND	NA	ND	NA	Dry
MW02-02	2017-11-30	5.230	42.258	4.040	38.218	ND	NA	
MW02-02	2018-04-04	5.213	42.258	4.433	37.825	ND	NA	
MW02-02	2018-04-26	4.680	42.258	4.600	37.658	ND	NA	Dry
MW02-02	2018-06-11	5.220	42.258	ND	NA	ND	NA	Dry
MW02-02	2018-08-21	5.221	42.258	ND	NA	ND	NA	Dry
MW02-02	2018-11-18	5.226	42.258	4.101	38.157	ND	NA	
MW02-02	2019-02-21	5.224	42.258	4.417	37.841	ND	NA	Missing J-plug
MW02-02	2019-03-19	5.221	42.258	4.640	37.618	ND	NA	clear; well cap was missing, replaced
MW02-02	2019-05-16	4.672	42.258	ND	NA	ND	NA	dry
MW02-02	2019-09-10	5.222	42.258	ND	NA	ND	NA	Dry, silt on probe
MW02-02	2019-11-21	5.212	42.258	4.111	38.147	ND	NA	
MW02-02	2020-02-18	5.210	42.258	4.258	38.000	ND	NA	
MW02-02	2020-04-06	5.222	42.258	4.324	37.934	ND	NA	Clear
MW02-02	2020-05-20	5.213	42.258	ND	NA	ND	NA	Dry
MW02-02	2020-08-12	5.214	42.258	ND	NA	ND	NA	Dry, silt on probe
MW02-02	2020-11-18	5.211	42.258	4.242	38.016	ND	NA	
MW02-02	2021-02-04	5.227	42.258	4.142	38.116	ND	NA	
MW02-02	2021-08-03	5.206	42.258	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW02-02	2022-03-14	5.214	42.258	4.396	37.862	ND	NA	Water level meter: Serial:
MW02-02	2022-05-04	NM	42.258	4.709	37.549	ND	NA	
MW02-02	2022-08-03	5.200	42.258	ND	NA	ND	NA	dry
MW02-02	2022-08-09	5.209	42.258	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
MW02-02	2022-11-17	NM	42.258	4.460	37.798	ND	NA	
MW02-02	2023-02-15	NM	42.258	4.347	37.911	ND	NA	
MW02-02	2023-03-28	5.225	42.258	4.458	37.800	ND	NA	Clear; no odour
MW02-02	2023-06-06	5.215	42.258	ND	NA	ND	NA	Dry
MW02-02	2023-08-09	5.207	42.258	ND	NA	ND	NA	Dry
MW02-02	2023-08-24	5.211	42.258	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
MW02-02	2023-11-15	5.207	42.258	4.181	38.077	ND	NA	
MW02-03	2014-03-04	6.050	41.387	4.060	37.327	ND	NA	

AECOM

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
MW02-03	2014-05-01	6.040	41.387	3.780	37.607	ND	NA	Clear; DUP-13
MW02-03	2014-06-19	6.045	41.387	4.040	37.347	ND	NA	
MW02-03	2014-08-07	6.040	41.387	4.370	37.017	ND	NA	Clear; DUP-4
MW02-03	2014-09-24	6.040	41.387	4.745	36.642	ND	NA	
MW02-03	2015-01-13	6.055	41.387	3.340	38.047	ND	NA	
MW02-03	2015-04-07	6.040	41.387	4.360	37.027	ND	NA	
MW02-03	2015-05-11	6.040	41.387	5.075	36.312	ND	NA	Clear; DUP-13
MW02-03	2015-05-21	6.060	41.387	5.200	36.187	ND	NA	
MW02-03	2015-08-06	6.040	41.387	ND	NA	ND	NA	Dry
MW02-03	2015-08-25	6.035	41.387	ND	NA	ND	NA	Dry
MW02-03	2015-09-22	6.055	41.387	ND	NA	ND	NA	Dry; Sediment on probe
MW02-03	2015-11-09	6.040	41.387	4.600	36.787	ND	NA	
MW02-03	2016-03-22	NM	41.387	ND	NA	ND	NA	Barlett removing hazardous trees in area - could not access well
MW02-03	2016-03-31	6.040	41.387	4.430	36.957	ND	NA	Clear
MW02-03	2016-05-25	5.500	41.387	5.460	35.927	ND	NA	
MW02-03	2016-08-23	6.040	41.387	ND	NA	ND	NA	Dry
MW02-03	2016-09-09	6.030	41.387	ND	NA	ND	NA	Dry
MW02-03	2016-11-07	6.050	41.387	4.310	37.077	ND	NA	
MW02-03	2017-02-07	5.500	41.387	4.620	36.767	ND	NA	
MW02-03	2017-04-05	6.030	41.387	4.150	37.237	ND	NA	Clear
MW02-03	2017-06-07	6.050	41.387	5.050	36.337	ND	NA	
MW02-03	2017-09-06	5.980	41.387	ND	NA	ND	NA	Dry
MW02-03	2017-10-30	6.068	41.387	ND	NA	ND	NA	Dry
MW02-03	2017-11-30	6.050	41.387	4.280	37.107	ND	NA	Dry
MW02-03	2018-04-26	6.050	41.387	4.704	36.683	ND	NA	Clear
MW02-03	2019-03-19	6.053	41.387	4.903	36.484	ND	NA	clear; slightly orange tinged
MW02-03	2019-09-10	6.055	41.387	ND	NA	ND	NA	Dry, silt on probe
MW02-03	2020-04-06	6.056	41.387	4.525	36.862	ND	NA	Clear Dup-7
MW02-03	2020-08-12	6.041	41.387	ND	NA	ND	NA	Dry, silt on probe
MW02-03	2021-08-17	6.038	41.387	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW02-03	2022-03-14	6.044	41.387	4.816	36.571	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW02-03	2022-08-09	6.050	41.387	5.705	35.682	ND	NA	Clear; no odour
MW02-03	2023-03-21	6.063	41.387	4.682	36.705	ND	NA	Clear; no odour
MW02-03	2023-08-24	6.049	41.387	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
MW02-04	2014-03-04	6.030	41.685	3.840	37.845	ND	NA	
MW02-04	2014-05-01	6.010	41.685	3.070	38.615	ND	NA	Clear
MW02-04	2014-06-19	6.020	41.685	3.720	37.965	ND	NA	
MW02-04	2014-08-07	6.020	41.685	3.845	37.840	ND	NA	Clear
MW02-04	2015-01-13	6.030	41.685	2.820	38.865	ND	NA	
MW02-04	2015-04-07	6.025	41.685	5.485	36.200	ND	NA	
MW02-04	2015-05-11	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2015-05-21	6.020	41.685	ND	NA	ND	NA	Dry
MW02-04	2015-08-06	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2015-08-25	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2015-09-22	6.025	41.685	ND	NA	ND	NA	Dry; Sediment on probe
MW02-04	2015-11-09	6.015	41.685	5.130	36.555	ND	NA	
MW02-04	2016-03-22	NM	41.685	ND	NA	ND	NA	Barlett removing hazardous trees in area - could not access well
MW02-04	2016-03-31	6.010	41.685	4.250	37.435	ND	NA	Clear
MW02-04	2016-05-25	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2016-08-23	6.000	41.685	ND	NA	ND	NA	Dry
MW02-04	2016-09-07	NM	41.685	ND	NA	ND	NA	Dry
MW02-04	2016-11-07	6.010	41.685	3.820	37.865	ND	NA	
MW02-04	2017-02-07	6.020	41.685	5.110	36.575	ND	NA	
MW02-04	2017-04-05	6.000	41.685	3.000	38.685	ND	NA	Clear
MW02-04	2017-06-07	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2017-09-06	6.000	41.685	ND	NA	ND	NA	Dry
MW02-04	2017-10-30	6.019	41.685	ND	NA	ND	NA	Dry
MW02-04	2017-11-29	6.020	41.685	3.980	37.705	ND	NA	
MW02-04	2018-04-04	6.017	41.685	4.265	37.420	ND	NA	
MW02-04	2018-04-19	6.002	41.685	3.915	37.770	ND	NA	Silty
MW02-04	2018-06-11	6.010	41.685	ND	NA	ND	NA	Dry
MW02-04	2018-08-21	6.015	41.685	ND	NA	ND	NA	Dry
MW02-04	2018-11-19	6.023	41.685	3.879	37.806	ND	NA	
MW02-04	2019-02-21	6.028	41.685	5.588	36.097	ND	NA	
MW02-04	2019-03-19	6.022	41.685	5.803	35.882	ND	NA	tried to sample; insufficient water
MW02-04	2019-03-27	6.016	41.685	5.907	35.778	ND	NA	tried to sample; insufficient water; second sampling attempt of 2019 wet PMP
MW02-04	2019-04-16	6.012	41.685	5.803	35.882	ND	NA	tried to sample; insufficient water; third sampling attempt of 2019 wet PMP; issues with RKI Eagle, could not monitor for headspace vapour
MW02-04	2019-05-16	6.019	41.685	ND	NA	ND	NA	Dry
MW02-04	2019-09-10	6.014	41.685	ND	NA	ND	NA	Dry, silt on probe
MW02-04	2019-11-21	6.004	41.685	4.093	37.592	ND	NA	
MW02-04	2020-04-07	6.022	41.685	4.846	36.839	ND	NA	Went dry at 2.5L on 04/06/20, sampled on recharge next day; clear
MW02-04	2020-05-20	6.005	41.685	ND	NA	ND	NA	Dry
MW02-04	2020-08-12	6.019	41.685	ND	NA	ND	NA	Dry
MW02-04	2020-11-18	6.003	41.685	5.131	36.554	ND	NA	
MW02-04	2021-02-04	6.026	41.685	3.923	37.762	ND	NA	
MW02-04	2021-08-03	5.989	41.685	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW02-04	2022-03-10	6.008	41.685	5.367	36.318	ND	NA	Purged dry before sample taken - will wait for rain
MW02-04	2022-03-17	6.106	41.685	4.499	37.186	ND	NA	went dry when sampling, 2nd time this has happened
MW02-04	2022-05-04	NM	41.685	5.950	35.735	ND	NA	
MW02-04	2022-08-03	6.000	41.685	ND	NA	ND	NA	dry
MW02-04	2022-08-09	6.011	41.685	ND	NA	ND	NA	dry
MW02-04	2022-11-17	NM	41.685	5.844	35.841	ND	NA	
MW02-04	2023-02-15	NM	41.685	3.787	37.898	ND	NA	
MW02-04	2023-03-21	6.430	41.685	4.993	36.692	ND	NA	Clear; no odour
MW02-04	2023-06-06	6.006	41.685	ND	NA	ND	NA	Dry
MW02-04	2023-08-09	6.003	41.685	ND	NA	ND	NA	Dry
MW02-04	2023-08-24	6.006	41.685	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
MW02-04	2023-11-15	6.013	41.685	3.981	37.704	ND	NA	
MW03-02	2014-03-04	8.630	41.756	4.640	37.116	ND	NA	
MW03-02	2014-04-30	8.620	41.756	4.740	37.016	ND	NA	Clear
MW03-02	2014-06-19	8.625	41.756	5.600	36.156	ND	NA	
MW03-02	2014-08-12	8.630	41.756	7.675	34.081	ND	NA	Clear
MW03-02	2014-09-18	9.520	41.756	ND	NA	ND	NA	Dry
MW03-02	2014-09-24	8.620	41.756	7.015	34.741	ND	NA	
MW03-02	2014-11-12	8.620	41.756	5.110	36.646	ND	NA	
MW03-02	2015-01-13	8.635	41.756	5.135	36.621	ND	NA	
MW03-02	2015-04-07	6.820	41.756	5.500	36.256	ND	NA	
MW03-02	2015-05-07	8.620	41.756	6.060	35.696	ND	NA	Clear
MW03-02	2015-05-21	8.635	41.756	7.290	34.466	ND	NA	
MW03-02	2015-08-06	8.625	41.756	7.945	33.811	ND	NA	
MW03-02	2015-08-25	8.625	41.756	8.200	33.556	ND	NA	DUP-5
MW03-02	2015-11-09	8.625	41.756	5.705	36.051	ND	NA	
MW03-02	2016-03-22	8.610	41.756	5.435	36.321	ND	NA	Clear
MW03-02	2016-05-25	8.620	41.756	7.510	34.246	ND	NA	
MW03-02	2016-08-23	8.570	41.756	8.430	33.326	ND	NA	
MW03-02	2016-09-16	8.560	41.756	8.460	33.296	ND	NA	Dry
MW03-02	2016-11-08	8.620	41.756	5.800	35.956	ND	NA	
MW03-02	2016-12-21	8.590	41.756	4.760	36.996	ND	NA	Clear
MW03-02	2017-02-14	8.620	41.756	4.990	36.766	ND	NA	
MW03-02	2017-04-10	8.580	41.756	4.530	37.226	ND	NA	Clear
MW03-02	2017-06-07	8.620	41.756	6.790	34.966	ND	NA	
MW03-02	2017-09-06	8.590	41.756	8.540	33.216	ND	NA	Dry
MW03-02	2017-10-30	8.600	41.756	8.550	33.206	ND	NA	
MW03-02	2017-11-30	8.630	41.756	5.400	36.356	ND	NA	
MW03-02	2018-04-02	8.639	41.756	5.416	36.340	ND	NA	
MW03-02	2018-04-26	8.630	41.756	6.420	35.336	ND	NA	Clear
MW03-02	2018-06-12	8.590	41.756	ND	NA	ND	NA	Dry
MW03-02	2018-08-21	8.631	41.756	ND	NA	ND	NA	Dry
MW03-02	2018-11-20	8.632	41.756	6.117	35.639	ND	NA	
MW03-02	2019-02-21	8.624	41.756	6.924	34.832	ND	NA	
MW03-02	2019-03-20	8.635	41.756	7.400	34.356	ND	NA	clear
MW03-02	2019-05-16	8.615	41.756	8.047	33.709	ND	NA	
MW03-02	2019-09-10	8.619	41.756	8.563	33.193	ND	NA	Dry
MW03-02	2019-11-21	8.617	41.756	6.975	34.781	ND	NA	
MW03-02	2020-02-18	8.589	41.756	5.784	35.972	ND	NA	
MW03-02	2020-03-26	8.484	41.756	7.453	34.303	ND	NA	clear
MW03-02	2020-05-20	8.622	41.756	8.546	33.210	ND	NA	
MW03-02	2020-08-11	8.611	41.756	8.548	33.208	ND	NA	Insufficient water for sampling
MW03-02	2020-11-18	8.623	41.756	7.126	34.630	ND	NA	
MW03-02	2021-02-04	8.632	41.756	5.376	36.380	ND	NA	

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
MW03-02	2021-08-03	8.609	41.756	8.549	33.207	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW03-02	2022-03-16	8.598	41.756	5.771	35.985	ND	NA	Water level meter: Solinst 107Serial:
MW03-02	2022-05-04	NM	41.756	7.676	34.080	ND	NA	
MW03-02	2022-08-03	8.600	41.756	8.556	33.200	ND	NA	
MW03-02	2022-08-09	NM	41.756	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
MW03-02	2022-11-17	8.594	41.756	ND	NA	ND	NA	Dry
MW03-02	2023-02-15	NM	41.756	5.537	36.219	ND	NA	
MW03-02	2023-03-29	8.610	41.756	7.266	34.490	ND	NA	Clear; no odour
MW03-02	2023-06-06	8.593	41.756	ND	NA	ND	NA	Dry
MW03-02	2023-08-09	8.615	41.756	ND	NA	ND	NA	Dry
MW03-02	2023-08-24	8.615	41.756	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
MW03-02	2023-11-15	8.615	41.756	7.894	33.862	ND	NA	
MW03-03	2014-03-04	13.930	45.392	9.895	35.497	ND	NA	
MW03-03	2014-05-01	13.920	45.392	5.980	39.412	ND	NA	Clear
MW03-03	2014-06-19	13.920	45.392	8.800	36.592	ND	NA	
MW03-03	2014-08-13	13.915	45.392	9.775	35.617	ND	NA	Clear
MW03-03	2014-09-24	13.930	45.392	13.630	31.762	ND	NA	
MW03-03	2015-01-12	NM	45.392	7.140	38.252	ND	NA	
MW03-03	2015-04-15	13.930	45.392	12.755	32.637	ND	NA	
MW03-03	2015-05-11	13.910	45.392	13.890	31.502	ND	NA	Dry
MW03-03	2015-05-21	13.950	45.392	ND	NA	ND	NA	Dry
MW03-03	2015-08-06	13.910	45.392	ND	NA	ND	NA	Dry
MW03-03	2015-08-25	14.080	45.392	ND	NA	ND	NA	Dry
MW03-03	2015-09-22	13.955	45.392	ND	NA	ND	NA	Dry
MW03-03	2015-11-10	13.910	45.392	ND	NA	ND	NA	Dry
MW03-03	2016-03-22	13.930	45.392	9.060	36.332	ND	NA	
MW03-03	2016-03-31	13.900	45.392	9.240	36.152	ND	NA	Clear
MW03-03	2016-05-25	13.930	45.392	11.750	33.642	ND	NA	
MW03-03	2016-08-23	13.920	45.392	ND	NA	ND	NA	Dry
MW03-03	2016-09-07	13.930	45.392	ND	NA	ND	NA	Dry
MW03-03	2016-11-07	13.910	45.392	12.420	32.972	ND	NA	
MW03-03	2017-02-07	13.930	45.392	12.570	32.822	ND	NA	
MW03-03	2017-04-05	13.910	45.392	9.560	35.832	ND	NA	Clear
MW03-03	2017-06-07	13.920	45.392	13.520	31.872	ND	NA	
MW03-03	2017-08-15	13.920	45.392	13.530	31.862	ND	NA	Purged 2L dry on Aug 15
MW03-03	2017-10-30	13.939	45.392	ND	NA	ND	NA	Dry - silt at bottom
MW03-03	2017-11-28	13.940	45.392	ND	NA	ND	NA	Dry
MW03-03	2018-04-04	13.948	45.392	10.116	35.276	ND	NA	
MW03-03	2018-04-19	13.910	45.392	9.520	35.872	ND	NA	Clear; Bailed
MW03-03	2018-06-11	13.920	45.392	ND	NA	ND	NA	Dry
MW03-03	2018-08-21	13.918	45.392	ND	NA	ND	NA	Dry
MW03-03	2018-11-19	13.942	45.392	ND	NA	ND	NA	Dry
MW03-03	2019-02-19	13.933	45.392	13.731	31.661	ND	NA	
MW03-03	2019-03-19	13.922	45.392	ND	NA	ND	NA	Dry
MW03-03	2019-03-27	13.920	45.392	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
MW03-03	2019-04-16	13.908	45.392	ND	NA	ND	NA	Dry; third sampling attempt of 2019 wet season PMP; issues with RKI Eagle, could not monitor for headspace vapour
MW03-03	2019-05-13	13.911	45.392	13.620	31.772	ND	NA	
MW03-03	2019-09-10	13.936	45.392	ND	NA	ND	NA	Dry
MW03-03	2019-11-21	13.906	45.392	ND	NA	ND	NA	Dry
MW03-03	2020-04-07	13.922	45.392	13.761	31.631	ND	NA	Not enough water to sample
MW03-03	2020-05-20	13.912	45.392	ND	NA	ND	NA	Dry
MW03-03	2020-08-13	13.891	45.392	ND	NA	ND	NA	Dry
MW03-03	2020-11-17	13.913	45.392	ND	NA	ND	NA	Dry
MW03-03	2021-02-04	13.938	45.392	12.959	32.433	ND	NA	
MW03-03	2021-08-11	13.903	45.392	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW03-03	2022-03-16	13.980	45.392	0.000	45.392	ND	NA	Clear; no odour
MW03-03	2022-03-16	13.980	45.392	0.000	45.392	ND	NA	Well went dry
MW03-03	2022-03-21	13.926	45.392	13.689	31.703	ND	NA	Well went dry
MW03-03	2022-05-05	NM	45.392	13.845	31.547	ND	NA	
MW03-03	2022-08-03	13.900	45.392	13.333	32.059	ND	NA	
MW03-03	2022-08-09	13.913	45.392	13.284	32.108	ND	NA	dry
MW03-03	2022-11-17	NM	45.392	13.316	32.076	ND	NA	
MW03-03	2023-02-15	NM	45.392	10.317	35.075	ND	NA	
MW03-03	2023-03-28	13.932	45.392	13.675	31.717	ND	NA	Water level meter: Solinst 122Serial: 31334
MW03-03	2023-06-06	13.910	45.392	ND	NA	ND	NA	Dry
MW03-03	2023-08-09	13.906	45.392	ND	NA	ND	NA	Dry
MW03-03	2023-08-24	13.914	45.392	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
MW03-03	2023-11-15	13.908	45.392	12.689	32.703	ND	NA	
A2MW09-05I	2014-03-04	11.390	39.320	4.575	34.745	ND	NA	
A2MW09-05I	2014-04-30	11.380	39.320	4.760	34.560	ND	NA	Clear
A2MW09-05I	2014-06-19	11.430	39.320	6.810	32.510	ND	NA	Minor biofouling
A2MW09-05I	2014-08-12	11.410	39.320	8.180	31.140	ND	NA	DUP-6
A2MW09-05I	2014-09-24	11.420	39.320	8.885	30.435	ND	NA	
A2MW09-05I	2015-01-13	11.410	39.320	4.990	34.330	ND	NA	
A2MW09-05I	2015-04-07	11.430	39.320	5.120	34.200	ND	NA	
A2MW09-05I	2015-05-06	11.400	39.320	6.990	32.330	ND	NA	DUP-12; Slightly turbid; Sampled May.7
A2MW09-05I	2015-05-21	11.405	39.320	7.800	31.520	ND	NA	
A2MW09-05I	2015-08-06	11.430	39.320	9.040	30.280	ND	NA	
A2MW09-05I	2015-08-24	11.390	39.320	9.140	30.180	ND	NA	Turbid; Purged 15 L
A2MW09-05I	2015-11-09	11.405	39.320	4.985	34.335	ND	NA	
A2MW09-05I	2016-03-22	11.390	39.320	5.145	34.175	ND	NA	
A2MW09-05I	2016-05-24	11.390	39.320	8.160	31.160	ND	NA	
A2MW09-05I	2016-08-23	11.390	39.320	8.400	30.920	ND	NA	
A2MW09-05I	2016-08-25	11.410	39.320	8.450	30.870	ND	NA	Clear
A2MW09-05I	2016-11-08	11.410	39.320	4.690	34.630	ND	NA	
A2MW09-05I	2016-12-21	11.760	39.320	4.860	34.460	ND	NA	Clear
A2MW09-05I	2017-02-14	11.390	39.320	4.620	34.700	ND	NA	
A2MW09-05I	2017-04-12	11.380	39.320	4.480	34.840	ND	NA	Clear
A2MW09-05I	2017-06-08	11.390	39.320	7.170	32.150	ND	NA	
A2MW09-05I	2017-09-06	11.410	39.320	10.110	29.210	ND	NA	Clear; DUP-6
A2MW09-05I	2017-10-31	11.390	39.320	7.750	31.570	ND	NA	
A2MW09-05I	2017-11-30	11.420	39.320	4.750	34.570	ND	NA	
A2MW09-05I	2018-04-02	11.427	39.320	4.906	34.414	ND	NA	grey sediment at bottom
A2MW09-05I	2018-04-26	11.407	39.320	5.561	33.759	ND	NA	Clear; DUP-10
A2MW09-05I	2018-05-30	11.411	39.320	8.434	30.886	ND	NA	Clear; DUP-14
A2MW09-05I	2018-06-12	11.430	39.320	8.840	30.480	ND	NA	
A2MW09-05I	2018-08-21	11.492	39.320	9.518	29.802	ND	NA	Clear
A2MW09-05I	2018-11-20	11.414	39.320	5.393	33.927	ND	NA	
A2MW09-05I	2019-02-21	11.403	39.320	6.052	33.268	ND	NA	
A2MW09-05I	2019-03-26	11.400	39.320	6.883	32.437	ND	NA	silty; slightly cloudy; sampled on recharge; sampled for NSA+Methane; DUP-04
A2MW09-05I	2019-05-21	11.430	39.320	7.479	31.841	ND	NA	
A2MW09-05I	2019-09-10	11.432	39.320	9.231	30.089	ND	NA	clear, HC odour; DUP-2
A2MW09-05I	2019-11-21	11.431	39.320	5.026	34.294	ND	NA	
A2MW09-05I	2020-02-18	11.383	39.320	5.274	34.046	ND	NA	
A2MW09-05I	2020-03-25	11.394	39.320	6.741	32.579	ND	NA	Could not sample, will return
A2MW09-05I	2020-04-08	11.406	39.320	5.758	33.562	ND	NA	Sample clear, 2nd sampling attempt of 2020 wet season PMP
A2MW09-05I	2020-05-20	11.452	39.320	7.768	31.552	ND	NA	
A2MW09-05I	2020-08-11	11.396	39.320	8.821	30.499	ND	NA	Clear, DUP-01
A2MW09-05I	2020-11-18	11.396	39.320	5.333	33.987	ND	NA	
A2MW09-05I	2021-02-04	1.411	39.320	4.814	34.506	ND	NA	
A2MW09-05I	2021-08-17	11.405	39.320	9.172	30.148	ND	NA	DUP-01 Taken
A2MW09-05I	2022-03-03	11.407	39.320	5.166	34.154	ND	NA	Water level meter: Serial:
A2MW09-05I	2022-04-07	11.407	39.320	4.852	34.468	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A2MW09-05I	2022-05-04	NM	39.320	6.576	32.744	ND	NA	
A2MW09-05I	2022-08-03	11.400	39.320	8.744	30.576	ND	NA	
A2MW09-05I	2022-08-10	11.392	39.320	8.814	30.506	ND	NA	slightly cloudy, no odor
A2MW09-05I	2022-10-18	11.381	39.320	8.889	30.431	ND	NA	clear, no odor
A2MW09-05I	2022-11-17	11.436	39.320	6.867	32.453	ND	NA	
A2MW09-05I	2023-02-15	NM	39.320	5.266	34.054	ND	NA	
A2MW09-05I	2023-03-29	11.414	39.320	6.425	32.895	ND	NA	Clear; no odour
A2MW09-05I	2023-06-06	11.399	39.320	8.086	31.234	ND	NA	
A2MW09-05I	2023-08-09	11.396	39.320	8.892	30.428	ND	NA	
A2MW09-05I	2023-08-24	11.395	39.320	8.983	30.337	ND	NA	Clear, no odour
A2MW09-05I	2023-11-15	11.397	39.320	5.988	33.332	ND	NA	
A2MW09-06S	2014-03-04	6.130	39.049	4.795	34.254	ND	NA	
A2MW09-06S	2014-04-30	6.120	39.049	4.260	34.789	ND	NA	Clear
A2MW09-06S	2014-06-19	6.120	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2014-08-12	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2014-09-24	6.120	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-01-13	6.145	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-04-07	6.150	39.049	6.145	32.904	ND	NA	

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A2MW09-06S	2015-05-06	6.120	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-05-21	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-08-06	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-08-24	6.120	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2015-11-09	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2016-03-22	6.130	39.049	6.070	32.979	ND	NA	
A2MW09-06S	2016-05-24	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2016-08-23	6.100	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2016-11-08	6.130	39.049	5.960	33.089	ND	NA	
A2MW09-06S	2016-12-21	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2017-02-14	6.130	39.049	5.410	33.639	ND	NA	
A2MW09-06S	2017-04-11	6.120	39.049	5.060	33.989	ND	NA	Clear
A2MW09-06S	2017-06-07	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2017-09-06	6.350	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2017-10-31	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2017-11-30	6.160	39.049	5.850	33.199	ND	NA	
A2MW09-06S	2018-04-02	6.140	39.049	5.296	33.753	ND	NA	
A2MW09-06S	2018-04-26	6.160	39.049	5.934	33.115	ND	NA	Dry after parameter; no recharge water
A2MW09-06S	2018-06-12	6.130	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2018-08-21	6.137	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2018-11-20	6.137	39.049	6.082	32.967	ND	NA	
A2MW09-06S	2019-02-21	6.140	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2019-03-26	6.150	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2019-03-27	6.128	39.049	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
A2MW09-06S	2019-04-16	6.121	39.049	5.974	33.075	ND	NA	Insufficient water water to sample; third sampling attempt of 2019 wet season PMP; issues with RKI Eagle, could not monitor for headspace vapour
A2MW09-06S	2019-05-21	6.117	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2019-09-10	6.134	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2019-11-21	6.125	39.049	5.708	33.341	ND	NA	
A2MW09-06S	2020-02-18	6.132	39.049	5.529	33.520	ND	NA	
A2MW09-06S	2020-03-25	6.124	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2020-04-07	6.133	39.049	ND	NA	ND	NA	Dry, silt on probe, second sampling attempt of 2020 wet season PMP
A2MW09-06S	2020-05-20	6.148	39.049	ND	NA	ND	NA	
A2MW09-06S	2020-08-11	6.122	39.049	ND	NA	ND	NA	Dry
A2MW09-06S	2020-11-18	6.126	39.049	5.354	33.695	ND	NA	
A2MW09-06S	2021-02-04	6.135	39.049	4.246	34.803	ND	NA	
A2MW09-06S	2021-08-03	6.121	39.049	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-06S	2022-03-03	6.127	39.049	5.419	33.630	ND	NA	purged when parameters stabilized well went dry
A2MW09-06S	2022-03-21	6.122	39.049	4.479	34.570	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
A2MW09-06S	2022-08-03	6.100	38.490	ND	NA	ND	NA	dry
A2MW09-06S	2022-08-10	6.124	38.490	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 016675
A2MW09-06S	2022-11-17	6.124	38.490	ND	NA	ND	NA	Dry
A2MW09-06S	2023-02-15	NM	38.490	5.718	32.772	ND	NA	
A2MW09-06S	2023-03-29	6.145	38.490	ND	NA	ND	NA	Water level meter: Solinst 122Serial: 31334
A2MW09-06S	2023-04-12	6.140	38.490	3.972	34.518	ND	NA	Clear; no odour
A2MW09-06S	2023-06-06	6.128	38.490	ND	NA	ND	NA	Dry
A2MW09-06S	2023-08-09	6.125	38.490	ND	NA	ND	NA	Dry
A2MW09-06S	2023-08-24	6.123	38.490	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-06S	2023-11-15	6.122	38.490	ND	NA	ND	NA	Dry
A2MW09-06I	2014-03-04	11.570	39.366	5.180	34.186	ND	NA	
A2MW09-06I	2014-04-30	11.560	39.366	5.660	33.706	ND	NA	Clear; DUP-12
A2MW09-06I	2014-06-19	11.570	39.366	8.050	31.316	ND	NA	
A2MW09-06I	2014-08-12	11.580	39.366	8.970	30.396	ND	NA	Clear
A2MW09-06I	2014-09-24	11.560	39.366	10.730	28.636	ND	NA	
A2MW09-06I	2015-01-13	11.575	39.366	6.790	32.576	ND	NA	
A2MW09-06I	2015-04-07	11.570	39.366	6.905	32.461	ND	NA	
A2MW09-06I	2015-05-06	11.570	39.366	8.820	30.546	ND	NA	Clear
A2MW09-06I	2015-05-21	11.600	39.366	9.390	29.976	ND	NA	
A2MW09-06I	2015-08-06	11.600	39.366	10.150	29.216	ND	NA	
A2MW09-06I	2015-08-24	11.570	39.366	10.220	29.146	ND	NA	DUP-4; Turbid; Purged 8 L
A2MW09-06I	2015-11-09	11.850	39.366	7.260	32.106	ND	NA	
A2MW09-06I	2016-03-22	11.580	39.366	6.775	32.591	ND	NA	
A2MW09-06I	2016-05-24	11.580	39.366	9.430	29.936	ND	NA	
A2MW09-06I	2016-08-23	11.580	39.366	9.830	29.536	ND	NA	
A2MW09-06I	2016-08-25	11.580	39.366	9.950	29.416	ND	NA	Clear
A2MW09-06I	2016-11-08	11.850	39.366	6.520	32.846	ND	NA	
A2MW09-06I	2017-02-14	11.580	39.366	6.150	33.216	ND	NA	
A2MW09-06I	2017-04-11	11.570	39.366	5.980	33.386	ND	NA	Clear
A2MW09-06I	2017-06-07	11.580	39.366	8.790	30.576	ND	NA	
A2MW09-06I	2017-09-06	11.590	39.366	10.110	29.256	ND	NA	Clear
A2MW09-06I	2017-10-31	11.600	39.366	9.610	29.756	ND	NA	
A2MW09-06I	2017-11-30	11.570	39.366	6.480	32.886	ND	NA	
A2MW09-06I	2018-04-02	11.497	39.366	6.098	33.268	ND	NA	
A2MW09-06I	2018-04-26	11.580	39.366	6.876	32.490	ND	NA	Clear, went dry, sampled after recharged
A2MW09-06I	2018-06-12	11.500	39.366	9.550	29.816	ND	NA	
A2MW09-06I	2018-08-21	11.657	39.366	10.186	29.180	ND	NA	Clear
A2MW09-06I	2018-11-20	11.586	39.366	7.227	32.139	ND	NA	
A2MW09-06I	2019-02-21	11.588	39.366	7.926	31.440	ND	NA	
A2MW09-06I	2019-03-26	11.565	39.366	8.454	30.912	ND	NA	Clear
A2MW09-06I	2019-05-21	11.584	39.366	8.691	30.675	ND	NA	
A2MW09-06I	2019-09-10	11.597	39.366	10.006	29.360	ND	NA	clear
A2MW09-06I	2019-11-21	11.562	39.366	6.521	32.845	ND	NA	
A2MW09-06I	2020-02-18	11.543	39.366	6.676	32.690	ND	NA	
A2MW09-06I	2020-03-26	11.570	39.366	8.099	31.267	ND	NA	clear
A2MW09-06I	2020-05-20	11.586	39.366	8.960	30.406	ND	NA	
A2MW09-06I	2020-08-11	11.569	39.366	9.535	29.831	ND	NA	clear, DUP-02
A2MW09-06I	2020-11-18	11.568	39.366	7.208	32.158	ND	NA	
A2MW09-06I	2021-02-04	11.601	39.366	6.244	33.122	ND	NA	
A2MW09-06I	2021-08-17	11.570	39.366	9.772	29.594	ND	NA	hc odour
A2MW09-06I	2022-03-03	11.572	39.366	6.815	32.551	ND	NA	Water level meter: Serial:
A2MW09-06I	2022-05-04	NM	39.366	7.862	31.504	ND	NA	
A2MW09-06I	2022-08-03	11.600	39.366	9.306	30.060	ND	NA	cloudy
A2MW09-06I	2022-08-10	11.571	39.366	9.349	30.017	ND	NA	cloudy
A2MW09-06I	2022-11-17	11.596	39.366	8.566	30.800	ND	NA	
A2MW09-06I	2023-02-15	NM	39.366	6.192	33.174	ND	NA	
A2MW09-06I	2023-03-29	11.607	39.366	7.583	31.783	ND	NA	Clear; no odour
A2MW09-06I	2023-06-06	11.573	39.366	8.491	30.875	ND	NA	
A2MW09-06I	2023-08-09	11.567	39.366	9.200	30.166	ND	NA	
A2MW09-06I	2023-08-24	11.566	39.366	9.655	29.711	ND	NA	Clear, no odour
A2MW09-06I	2023-11-15	11.569	39.366	8.308	31.058	ND	NA	
A2MW09-10	2014-03-04	6.030	39.835	4.955	34.880	ND	NA	
A2MW09-10	2014-03-26	NM	39.835	4.975	34.860	ND	NA	BC: Clear; Biofouling
A2MW09-10	2014-04-30	6.070	39.835	4.970	34.865	ND	NA	
A2MW09-10	2014-06-19	6.070	39.835	ND	NA	ND	NA	Dry; Hydrocarbon odour; Minor biofouling
A2MW09-10	2014-07-08	6.070	39.835	6.060	33.775	ND	NA	BC: Too shallow, no sheen on interface probe
A2MW09-10	2014-08-12	6.070	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2014-09-24	6.060	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2014-11-12	6.070	39.835	4.910	34.925	ND	NA	BC: Clear
A2MW09-10	2015-01-13	6.075	39.835	5.225	34.610	ND	NA	
A2MW09-10	2015-04-07	6.065	39.835	5.305	34.530	ND	NA	
A2MW09-10	2015-05-06	6.070	39.835	5.890	33.945	ND	NA	Dry; Purged 150 mL; No recovery
A2MW09-10	2015-05-21	6.080	39.835	5.960	33.875	ND	NA	
A2MW09-10	2015-08-06	6.070	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2015-08-25	6.070	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2015-11-09	6.075	39.835	5.185	34.650	ND	NA	Light biofouling
A2MW09-10	2016-03-22	6.070	39.835	5.280	34.555	ND	NA	
A2MW09-10	2016-05-26	6.080	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2016-08-23	6.080	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2016-09-09	6.080	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2016-11-08	6.080	39.835	4.960	34.875	ND	NA	
A2MW09-10	2016-12-21	6.090	39.835	5.130	34.705	ND	NA	Clear
A2MW09-10	2017-02-14	6.080	39.835	4.950	34.885	ND	NA	
A2MW09-10	2017-04-18	6.080	39.835	4.960	34.875	ND	NA	Clear; Strong hydrocarbon odour
A2MW09-10	2017-06-08	6.080	39.835	5.900	33.935	ND	NA	
A2MW09-10	2017-09-06	6.080	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2017-10-31	6.090	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2017-11-30	6.070	39.835	5.110	34.725	ND	NA	
A2MW09-10	2018-04-02	6.091	39.835	5.296	34.539	ND	NA	
A2MW09-10	2018-04-26	6.007	39.835	5.918	33.917	ND	NA	Dry
A2MW09-10	2018-06-12	6.090	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2018-08-21	6.083	39.835	ND	NA	ND	NA	Dry

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A2MW09-10	2018-11-20	6.093	39.835	5.531	34.304	ND	NA	
A2MW09-10	2019-02-20	6.082	39.835	5.878	33.957	ND	NA	
A2MW09-10	2019-03-21	6.086	39.835	6.036	33.799	ND	NA	Dry
A2MW09-10	2019-03-27	6.078	39.835	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
A2MW09-10	2019-04-16	6.056	39.835	5.973	33.862	ND	NA	Insufficient water water to sample; third sampling attempt of 2019 wet season PMP; issues with RKI Eagle, could not monitor for headspace vapour
A2MW09-10	2019-05-16	6.038	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2019-09-10	6.075	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2019-11-21	6.068	39.835	5.237	34.598	ND	NA	
A2MW09-10	2020-02-18	6.077	39.835	5.511	34.324	ND	NA	Minor biofoul, orange
A2MW09-10	2020-03-25	6.064	39.835	6.064	33.771	ND	NA	Not enough water to sample, silt on probe
A2MW09-10	2020-04-07	6.074	39.835	5.825	34.010	ND	NA	Not enough water to sample, silt on probe, 2nd sampling attempt of 2020 wet season PMP
A2MW09-10	2020-04-09	6.071	39.835	5.923	33.912	ND	NA	Not enough water to sample, orange biofoul on probe, 3rd sampling attempt of 2020 wet season PMP
A2MW09-10	2020-05-20	6.081	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2020-08-11	6.060	39.835	ND	NA	ND	NA	Dry, No signs of NAPL, silt on probe
A2MW09-10	2020-11-18	6.068	39.835	5.417	34.418	ND	NA	
A2MW09-10	2021-02-04	6.085	39.835	5.119	34.716	ND	NA	
A2MW09-10	2021-08-03	6.044	39.835	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-10	2022-03-03	6.069	39.835	5.201	34.634	ND	NA	Water level meter: Serial:
A2MW09-10	2022-05-04	NM	39.835	6.061	33.774	ND	NA	
A2MW09-10	2022-08-03	6.000	39.835	6.058	33.777	ND	NA	
A2MW09-10	2022-08-10	6.068	39.835	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-10	2022-11-17	6.067	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2023-02-15	NM	39.835	5.647	34.188	ND	NA	
A2MW09-10	2023-03-29	6.084	39.835	ND	NA	ND	NA	Water level meter: Solinst 122Serial: 31334
A2MW09-10	2023-04-12	6.081	39.835	5.208	34.627	ND	NA	Clear, no odour
A2MW09-10	2023-06-06	6.048	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2023-08-09	6.035	39.835	ND	NA	ND	NA	Dry
A2MW09-10	2023-08-24	6.059	39.835	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-10	2023-11-15	6.067	39.835	5.867	33.968	ND	NA	Dry
A2MW09-11	2014-02-24	6.060	40.162	2.630	37.532	ND	NA	BC: Globules; Strong odour
A2MW09-11	2014-03-04	6.060	40.162	2.700	37.462	ND	NA	Sheen in water
A2MW09-11	2014-03-24	NM	40.162	2.725	37.437	ND	NA	BC: Globules
A2MW09-11	2014-04-22	NM	40.162	2.410	37.752	ND	NA	BC: No sheen
A2MW09-11	2014-04-30	6.050	40.162	3.140	37.022	ND	NA	Sheen; Clear
A2MW09-11	2014-06-19	6.060	40.162	4.750	35.412	ND	NA	Hydrocarbon odour
A2MW09-11	2014-07-08	6.055	40.162	ND	NA	6.045	NA	BC: Too shallow, DTW not detected - solid tone detected, definite sheen on probe
A2MW09-11	2014-07-29	6.055	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2014-08-12	6.060	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2014-09-17	6.060	40.162	ND	NA	ND	NA	Dry; Hydrocarbon odour
A2MW09-11	2014-09-18	6.060	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2014-09-24	6.050	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2014-10-29	NM	40.162	3.140	37.022	ND	NA	BC: Clear; Hydrocarbon odour
A2MW09-11	2014-11-12	6.060	40.162	3.060	37.102	ND	NA	BC: Clear
A2MW09-11	2014-12-17	NM	40.162	2.755	37.407	ND	NA	BC: Clear
A2MW09-11	2015-01-13	NM	40.162	3.135	37.027	ND	NA	Light hydrocarbon odour
A2MW09-11	2015-01-14	NM	40.162	ND	NA	ND	NA	BC: Globules
A2MW09-11	2015-03-19	NM	40.162	3.010	37.152	ND	NA	BC: Sheen
A2MW09-11	2015-04-07	6.050	40.162	3.065	37.097	ND	NA	
A2MW09-11	2015-05-06	6.060	40.162	4.870	35.292	ND	NA	Clear; Hydrocarbon odour. Sampled May.7
A2MW09-11	2015-05-19	NM	40.162	5.065	35.097	5.055	ND	BC: Globules; Strong hydrocarbon odour; NAPL on probe
A2MW09-11	2015-05-21	6.065	40.162	5.175	34.987	ND	NA	
A2MW09-11	2015-06-01	6.060	40.162	5.810	34.352	ND	NA	BC: Globules; Hydrocarbon odour; NAPL on probe
A2MW09-11	2015-08-06	6.055	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2015-08-25	6.055	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2015-09-28	NM	40.162	5.895	34.267	ND	NA	BC: Sheen; NAPL odour
A2MW09-11	2015-11-09	6.065	40.162	2.605	37.557	ND	NA	Hydrocarbon odour
A2MW09-11	2015-12-02	NM	40.162	ND	NA	ND	NA	Could not access due to potentially hazardous trees.
A2MW09-11	2016-03-22	6.060	40.162	3.395	36.767	ND	NA	
A2MW09-11	2016-05-25	6.070	40.162	3.940	36.222	ND	NA	Dry
A2MW09-11	2016-08-23	6.060	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2016-09-09	6.060	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2016-11-08	6.070	40.162	2.800	37.362	ND	NA	
A2MW09-11	2016-12-21	6.070	40.162	3.130	37.032	ND	NA	Clear
A2MW09-11	2017-02-08	6.070	40.162	2.510	37.652	ND	NA	
A2MW09-11	2017-04-18	6.050	40.162	2.760	37.402	ND	NA	Clear; DUP-11; Hydrocarbon ordour
A2MW09-11	2017-06-07	6.060	40.162	4.620	35.542	ND	NA	
A2MW09-11	2017-09-06	6.065	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2017-10-31	6.070	40.162	3.740	36.422	ND	NA	
A2MW09-11	2017-11-30	6.070	40.162	2.410	37.752	ND	NA	
A2MW09-11	2018-02-14	6.060	40.162	2.780	37.382	ND	NA	
A2MW09-11	2018-04-02	6.071	40.162	1.528	38.634	ND	NA	
A2MW09-11	2018-04-26	6.060	40.162	3.050	37.112	ND	NA	Clear; historical depth of the well is wrong
A2MW09-11	2018-06-12	6.070	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2018-08-21	6.064	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2018-11-20	6.063	40.162	2.784	37.378	ND	NA	
A2MW09-11	2019-02-20	9.063	40.162	2.672	37.490	ND	NA	
A2MW09-11	2019-03-19	6.068	40.162	3.103	37.059	ND	NA	Clear; Strong hydrocarbon odour; orange stain on tubing; DUP-02
A2MW09-11	2019-03-21	6.065	40.162	3.235	36.927	ND	NA	Sheen especially on BTEX vial; hydrocarbon odour; sampled for methane and NSA
A2MW09-11	2019-04-17	6.056	40.162	2.553	37.609	ND	NA	Clear; second sample of 2019 wet season PMP
A2MW09-11	2019-05-16	6.046	40.162	3.818	36.344	ND	NA	
A2MW09-11	2019-09-10	6.092	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2019-11-21	6.053	40.162	2.561	37.601	ND	NA	HC Odour
A2MW09-11	2020-02-18	6.053	40.162	2.748	37.414	ND	NA	
A2MW09-11	2020-03-25	6.054	40.162	3.421	36.741	ND	NA	Could not sample, will return
A2MW09-11	2020-04-08	6.069	40.162	2.881	37.281	ND	NA	Clear, DUP-10
A2MW09-11	2020-05-20	6.060	40.162	3.573	36.589	ND	NA	
A2MW09-11	2020-08-11	6.055	40.162	ND	NA	ND	NA	Dry, no sings of NAPl
A2MW09-11	2020-11-18	6.058	40.162	2.512	37.650	ND	NA	
A2MW09-11	2021-02-04	6.067	40.162	2.380	37.782	ND	NA	levelogger in well
A2MW09-11	2021-08-03	6.055	40.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-11	2022-03-03	6.065	40.162	2.372	37.790	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
A2MW09-11	2022-05-04	NM	40.162	3.303	36.859	ND	NA	
A2MW09-11	2022-08-03	6.000	40.162	ND	NA	ND	NA	dry
A2MW09-11	2022-08-10	6.054	40.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-11	2022-11-17	NM	40.162	3.967	36.195	ND	NA	
A2MW09-11	2023-02-15	NM	40.162	2.884	37.278	ND	NA	
A2MW09-11	2023-03-29	6.077	40.162	3.142	37.020	ND	NA	Clear, no odour
A2MW09-11	2023-06-06	6.054	40.162	5.625	34.537	ND	NA	
A2MW09-11	2023-08-09	6.051	40.162	ND	NA	ND	NA	Dry
A2MW09-11	2023-08-24	6.052	40.162	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-11	2023-11-15	6.054	40.162	2.950	37.212	ND	NA	
A2MW09-12	2014-03-04	6.080	40.561	2.580	37.981	ND	NA	
A2MW09-12	2014-04-30	6.060	40.561	2.980	37.581	ND	NA	Clear
A2MW09-12	2014-06-19	6.070	40.561	5.015	35.546	ND	NA	Silt on probe
A2MW09-12	2014-08-12	6.060	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2014-09-18	6.060	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2014-09-24	6.055	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2014-11-12	6.070	40.561	2.660	37.901	ND	NA	
A2MW09-12	2015-01-13	6.070	40.561	2.775	37.786	ND	NA	
A2MW09-12	2015-04-07	6.065	40.561	2.770	37.791	ND	NA	
A2MW09-12	2015-05-07	6.060	40.561	4.590	35.971	ND	NA	Clear
A2MW09-12	2015-05-21	6.080	40.561	5.010	35.551	ND	NA	
A2MW09-12	2015-08-06	6.065	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2015-08-25	6.050	40.561	ND	NA	ND	NA	Dry; Sediment on probe
A2MW09-12	2015-11-09	6.060	40.561	2.565	37.996	ND	NA	
A2MW09-12	2016-03-22	6.075	40.561	2.810	37.751	ND	NA	Clear
A2MW09-12	2016-05-25	6.080	40.561	5.330	35.231	ND	NA	
A2MW09-12	2016-08-23	6.070	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2016-09-09	6.070	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2016-11-08	6.060	40.561	2.570	37.991	ND	NA	
A2MW09-12	2017-02-08	6.080	40.561	2.560	38.001	ND	NA	
A2MW09-12	2017-04-18	6.080	40.561	2.750	37.811	ND	NA	
A2MW09-12	2017-06-07	6.060	40.561	4.480	36.081	ND	NA	
A2MW09-12	2017-09-06	6.050	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2017-10-31	6.090	40.561	6.090	34.471	ND	NA	Dry
A2MW09-12	2017-11-30	6.080	40.561	2.540	38.021	ND	NA	
A2MW09-12	2018-02-14	6.080	40.561	2.800	37.761	ND	NA	clear
A2MW09-12	2018-04-02	6.073	40.561	2.668	37.893	ND	NA	
A2MW09-12	2018-04-26	6.080	40.561	3.010	37.551	ND	NA	Clear
A2MW09-12	2018-06-12	6.070	40.561	ND	NA	ND	NA	Dry

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A2MW09-12	2018-08-21	6.068	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2018-11-20	6.083	40.561	2.702	37.859	ND	NA	
A2MW09-12	2019-02-20	6.073	40.561	2.813	37.748	ND	NA	
A2MW09-12	2019-03-19	6.080	40.561	3.663	36.898	ND	NA	Clear
A2MW09-12	2019-03-21	6.083	40.561	3.924	36.637	ND	NA	Clear, sample for methane + NSA
A2MW09-12	2019-05-16	6.080	40.561	4.577	35.984	ND	NA	
A2MW09-12	2019-09-10	6.068	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2019-11-21	6.068	40.561	2.554	38.007	ND	NA	
A2MW09-12	2020-02-18	6.055	40.561	2.804	37.757	ND	NA	
A2MW09-12	2020-03-26	6.065	40.561	3.890	36.671	ND	NA	Clear
A2MW09-12	2020-05-20	6.074	40.561	5.012	35.549	ND	NA	
A2MW09-12	2020-08-11	6.064	40.561	ND	NA	ND	NA	Dry, silt on probe
A2MW09-12	2020-11-18	6.066	40.561	5.870	34.691	ND	NA	
A2MW09-12	2021-02-04	6.069	40.561	2.483	38.078	ND	NA	
A2MW09-12	2021-08-03	6.054	40.561	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-12	2022-03-03	6.071	40.561	2.572	37.989	ND	NA	Water level meter: Serial:
A2MW09-12	2022-05-04	NM	40.561	3.991	36.570	ND	NA	
A2MW09-12	2022-08-03	6.000	40.561	ND	NA	ND	NA	dry
A2MW09-12	2022-08-10	6.069	40.561	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-12	2022-11-17	NM	40.561	5.778	34.783	ND	NA	
A2MW09-12	2023-02-15	NM	40.561	2.745	37.816	ND	NA	
A2MW09-12	2023-03-29	6.084	40.561	3.619	36.942	ND	NA	Clear, no odour
A2MW09-12	2023-06-06	6.068	40.561	5.332	35.229	ND	NA	
A2MW09-12	2023-08-09	6.060	40.561	ND	NA	ND	NA	Dry
A2MW09-12	2023-08-24	6.065	40.561	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-12	2023-11-15	6.068	40.561	3.706	36.855	ND	NA	
A2MW09-13	2014-03-04	6.015	42.575	2.700	39.875	ND	NA	
A2MW09-13	2014-05-01	6.010	42.575	2.630	39.945	ND	NA	Clear
A2MW09-13	2014-06-19	6.030	42.575	3.740	38.835	ND	NA	
A2MW09-13	2014-08-07	6.015	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2014-09-24	6.010	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2015-01-13	6.020	42.575	2.460	40.115	ND	NA	
A2MW09-13	2015-04-07	6.020	42.575	3.030	39.545	ND	NA	
A2MW09-13	2015-05-11	6.000	42.575	4.000	38.575	ND	NA	Clear
A2MW09-13	2015-05-21	6.030	42.575	5.150	37.425	ND	NA	
A2MW09-13	2015-07-27	6.010	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2015-08-06	6.015	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2015-08-25	6.010	42.575	ND	NA	ND	NA	Dry; Sediment on probe
A2MW09-13	2015-11-09	6.015	42.575	2.930	39.645	ND	NA	
A2MW09-13	2016-03-22	6.030	42.575	2.835	39.740	ND	NA	Silt on probe
A2MW09-13	2016-05-25	6.030	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2016-08-23	6.030	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2016-09-09	6.030	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2016-11-08	6.020	42.575	2.760	39.815	ND	NA	
A2MW09-13	2017-02-14	6.030	42.575	3.100	39.475	ND	NA	
A2MW09-13	2017-04-10	6.020	42.575	2.730	39.845	ND	NA	Clear
A2MW09-13	2017-06-07	6.030	42.575	4.470	38.105	ND	NA	
A2MW09-13	2017-09-06	6.020	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2017-10-30	6.038	42.575	3.172	39.403	ND	NA	
A2MW09-13	2017-11-30	6.030	42.575	2.740	39.835	ND	NA	
A2MW09-13	2018-04-02	6.032	42.575	2.683	39.892	ND	NA	
A2MW09-13	2018-04-26	6.040	42.575	2.810	39.765	ND	NA	Clear
A2MW09-13	2018-06-11	6.040	42.575	ND	NA	ND	NA	
A2MW09-13	2018-08-21	6.021	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2018-11-20	6.027	42.575	2.833	39.742	ND	NA	
A2MW09-13	2019-02-21	6.032	42.575	3.294	39.281	ND	NA	
A2MW09-13	2019-03-19	6.037	42.575	5.178	37.397	ND	NA	silty; slightly orange tinged
A2MW09-13	2019-05-16	6.019	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2019-09-10	6.032	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2019-11-21	6.020	42.575	2.724	39.851	ND	NA	
A2MW09-13	2020-02-18	6.002	42.575	2.674	39.901	ND	NA	
A2MW09-13	2020-03-26	6.026	42.575	5.298	37.277	ND	NA	Purged dry at 1.5L, poor recharge, no sample taken
A2MW09-13	2020-04-07	6.033	42.575	4.323	38.252	ND	NA	Purged dry at 2L, poor recharge, no sample taken, 2nd sampling attempt of 2020 wet season PMP
A2MW09-13	2020-05-20	6.028	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2020-08-12	6.026	42.575	ND	NA	ND	NA	Dry, silt on probe
A2MW09-13	2020-11-18	6.030	42.575	3.032	39.543	ND	NA	
A2MW09-13	2021-02-04	6.033	42.575	2.765	39.810	ND	NA	
A2MW09-13	2021-08-03	6.005	42.575	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-13	2022-03-03	6.032	42.575	3.181	39.394	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
A2MW09-13	2022-05-04	NM	42.575	5.622	36.953	ND	NA	
A2MW09-13	2022-08-03	6.000	42.575	6.000	36.575	ND	NA	
A2MW09-13	2022-08-10	6.032	42.575	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-13	2022-11-17	NM	42.575	2.765	39.810	ND	NA	
A2MW09-13	2023-02-15	NM	42.575	2.662	39.913	ND	NA	
A2MW09-13	2023-03-29	6.040	42.575	3.199	39.376	ND	NA	Clear, no odour
A2MW09-13	2023-06-06	6.042	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2023-08-09	6.015	42.575	ND	NA	ND	NA	Dry
A2MW09-13	2023-08-24	6.028	42.575	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-13	2023-11-15	6.034	42.575	2.695	39.880	ND	NA	
A2MW09-14	2014-03-04	6.120	42.164	3.340	38.824	ND	NA	
A2MW09-14	2014-05-01	6.180	42.164	3.180	38.984	ND	NA	Clear; Biofouling
A2MW09-14	2014-06-19	6.110	42.164	4.335	37.829	ND	NA	
A2MW09-14	2014-08-07	6.110	42.164	5.680	36.484	ND	NA	Biofouling
A2MW09-14	2014-09-24	6.100	42.164	5.255	36.909	ND	NA	
A2MW09-14	2015-01-13	6.115	42.164	3.095	39.069	ND	NA	
A2MW09-14	2015-04-07	6.100	42.164	4.080	38.084	ND	NA	
A2MW09-14	2015-05-11	6.105	42.164	4.105	38.059	ND	NA	Clear
A2MW09-14	2015-05-21	6.110	42.164	3.960	38.204	ND	NA	
A2MW09-14	2015-07-27	6.110	42.164	5.850	36.314	ND	NA	
A2MW09-14	2015-08-06	6.100	42.164	5.950	36.214	ND	NA	
A2MW09-14	2015-08-25	6.095	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2015-11-09	6.110	42.164	4.880	37.284	ND	NA	
A2MW09-14	2016-03-31	6.110	42.164	3.940	38.224	ND	NA	Clear
A2MW09-14	2016-05-25	6.110	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2016-08-23	6.110	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2016-09-09	6.110	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2016-11-08	6.110	42.164	3.430	38.734	ND	NA	
A2MW09-14	2017-02-14	6.110	42.164	4.470	37.694	ND	NA	
A2MW09-14	2017-04-10	6.110	42.164	3.970	38.194	ND	NA	Clear
A2MW09-14	2017-06-07	6.110	42.164	4.820	37.344	ND	NA	
A2MW09-14	2017-09-06	6.120	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2017-10-30	6.118	42.164	4.717	37.447	ND	NA	
A2MW09-14	2017-11-30	6.120	42.164	3.900	38.264	ND	NA	
A2MW09-14	2018-04-02	6.117	42.164	3.836	38.328	ND	NA	
A2MW09-14	2018-04-26	6.110	42.164	3.950	38.214	ND	NA	Clear
A2MW09-14	2018-06-11	6.110	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2018-08-21	6.113	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2018-11-20	6.118	42.164	4.264	37.900	ND	NA	
A2MW09-14	2019-02-21	6.118	42.164	4.427	37.737	ND	NA	
A2MW09-14	2019-03-19	6.117	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2019-03-27	6.108	42.164	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
A2MW09-14	2019-04-16	6.106	42.164	ND	NA	ND	NA	Dry; third sampling attempt of 2019 wet season PMP; issues with RKI Eagle, could not monitor for headspace vapour
A2MW09-14	2019-05-16	6.097	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2019-09-10	6.108	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2019-11-21	6.105	42.164	4.552	37.612	ND	NA	
A2MW09-14	2020-02-18	6.100	42.164	3.848	38.316	ND	NA	
A2MW09-14	2020-04-07	6.113	42.164	5.913	36.251	ND	NA	Not enough water to sample, silt on probe
A2MW09-14	2020-04-09	6.101	42.164	6.019	36.145	ND	NA	Not enough water to sample, 2nd sampling attempt of 2020 wet season PMP
A2MW09-14	2020-05-20	6.109	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2020-08-12	6.108	42.164	ND	NA	ND	NA	Dry, silt on probe
A2MW09-14	2020-11-18	6.107	42.164	6.025	36.139	ND	NA	
A2MW09-14	2021-02-04	6.115	42.164	3.268	38.896	ND	NA	
A2MW09-14	2021-08-03	6.079	42.164	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-14	2022-03-03	6.106	42.164	5.498	36.666	ND	NA	went to sample after purge, water turned turbid, didn't sample today
A2MW09-14	2022-03-03	6.106	42.164	5.498	36.666	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039415
A2MW09-14	2022-08-03	6.100	42.164	ND	NA	ND	NA	dry
A2MW09-14	2022-08-10	6.104	42.164	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-14	2022-11-17	NM	42.164	4.581	37.583	ND	NA	
A2MW09-14	2023-02-15	NM	42.164	4.265	37.899	ND	NA	
A2MW09-14	2023-03-28	6.115	42.164	4.886	37.278	ND	NA	Clear; no odour
A2MW09-14	2023-06-06	6.108	42.164	ND	NA	ND	NA	Dry

AECOM

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
A2MW09-14	2023-08-09	6.100	42.164	ND	NA	ND	NA	Dry
A2MW09-14	2023-08-24	6.099	42.164	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-14	2023-11-15	6.102	42.164	4.636	37.528	ND	NA	
A2MW09-15	2014-03-04	5.530	41.448	4.980	36.468	ND	NA	
A2MW09-15	2014-05-01	5.510	41.448	2.300	39.148	ND	NA	Clear
A2MW09-15	2014-06-19	5.525	41.448	2.460	38.988	ND	NA	
A2MW09-15	2014-08-07	5.525	41.448	2.560	38.888	ND	NA	Clear
A2MW09-15	2014-09-24	5.510	41.448	5.410	36.038	ND	NA	
A2MW09-15	2015-01-13	5.520	41.448	2.195	39.253	ND	NA	
A2MW09-15	2015-04-07	5.515	41.448	2.840	38.608	ND	NA	
A2MW09-15	2015-05-11	5.552	41.448	2.650	38.798	ND	NA	Clear
A2MW09-15	2015-05-21	5.530	41.448	2.580	38.868	ND	NA	
A2MW09-15	2015-07-27	5.510	41.448	3.190	38.258	ND	NA	
A2MW09-15	2015-08-06	5.525	41.448	3.350	38.098	ND	NA	
A2MW09-15	2015-08-25	5.490	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2015-11-09	5.495	41.448	2.830	38.618	ND	NA	
A2MW09-15	2016-03-22	NM	41.448	ND	NA	ND	NA	Barlett removing hazardous trees in area - could not access well
A2MW09-15	2016-05-10	5.500	41.448	2.570	38.878	ND	NA	Discussed safety concerns with Gary Cheung (AECOM) and Chris Boys (CCL) to devise a critical procedure for sampling; Clear
A2MW09-15	2016-05-25	6.050	41.448	2.480	38.968	ND	NA	
A2MW09-15	2016-08-23	5.500	41.448	2.290	39.158	ND	NA	
A2MW09-15	2016-09-01	5.500	41.448	2.880	38.568	ND	NA	Clear
A2MW09-15	2016-11-07	5.500	41.448	4.220	37.228	ND	NA	
A2MW09-15	2017-02-14	5.490	41.448	4.200	37.248	ND	NA	
A2MW09-15	2017-04-10	5.490	41.448	4.220	37.228	ND	NA	Clear
A2MW09-15	2017-06-07	5.490	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2017-09-06	5.490	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2017-10-30	5.490	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2017-11-30	5.500	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2018-04-04	5.383	41.448	3.603	37.845	ND	NA	minor biofouling
A2MW09-15	2018-04-26	5.490	41.448	4.020	37.428	ND	NA	from orange to clear; purged dry
A2MW09-15	2018-06-11	5.740	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2018-08-21	5.499	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2018-11-18	5.492	41.448	5.433	36.015	ND	NA	Dry
A2MW09-15	2019-02-21	5.479	41.448	5.444	36.004	ND	NA	
A2MW09-15	2019-03-19	5.465	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2019-03-27	5.479	41.448	ND	NA	ND	NA	Dry; second sampling attempt of 2019 wet season PMP
A2MW09-15	2019-04-16	5.473	41.448	ND	NA	ND	NA	Dry; third sampling attempt of 2019 wet season PMP; issues with RKI Eagle, could not monitor for headspace vapour
A2MW09-15	2019-05-16	5.433	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2019-09-10	5.482	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2019-11-21	5.481	41.448	5.233	36.215	ND	NA	
A2MW09-15	2020-02-18	5.472	41.448	3.648	37.800	ND	NA	Minor biofoul, orange
A2MW09-15	2020-04-07	5.492	41.448	5.367	36.081	ND	NA	Not enough water to sample, silt on probe
A2MW09-15	2020-04-09	5.487	41.448	5.220	36.228	ND	NA	Orange biofoul on probe, purged dry at 0.5L, no sample taken
A2MW09-15	2020-05-20	5.494	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2020-08-12	5.478	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2020-11-18	5.492	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2021-02-04	5.501	41.448	3.477	37.971	ND	NA	
A2MW09-15	2021-08-03	5.471	41.448	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
A2MW09-15	2022-03-03	5.515	41.448	2.601	38.847	ND	NA	Water level meter: Serial:
A2MW09-15	2022-05-04	NM	41.448	3.260	38.188	ND	NA	
A2MW09-15	2022-08-03	5.900	41.448	ND	NA	ND	NA	dry, silt on probe
A2MW09-15	2022-08-10	5.462	41.448	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 26299
A2MW09-15	2022-11-17	NM	41.448	2.811	38.637	ND	NA	
A2MW09-15	2023-02-15	NM	41.448	3.681	37.767	ND	NA	Sediment at bottom of casing
A2MW09-15	2023-03-28	5.510	41.448	2.657	38.791	ND	NA	Clear; no odour
A2MW09-15	2023-06-06	5.483	41.448	ND	NA	ND	NA	Sediment at bottom; dry
A2MW09-15	2023-08-09	5.491	41.448	ND	NA	ND	NA	Dry
A2MW09-15	2023-08-24	5.496	41.448	ND	NA	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 12479
A2MW09-15	2023-11-15	5.505	41.448	2.672	38.776	ND	NA	
MW11-3S	2014-03-04	8.120	42.590	3.525	39.065	ND	NA	
MW11-3S	2014-05-07	6.200	42.590	4.280	38.310	ND	NA	Clear
MW11-3S	2014-06-19	8.120	42.590	5.310	37.280	ND	NA	
MW11-3S	2014-08-13	8.120	42.590	5.800	36.790	ND	NA	Clear
MW11-3S	2015-01-12	NM	42.590	3.440	39.150	ND	NA	
MW11-3S	2015-04-15	8.100	42.590	4.710	37.880	ND	NA	
MW11-3S	2015-05-11	8.110	42.590	5.430	37.160	ND	NA	Clear
MW11-3S	2015-05-21	8.115	42.590	5.700	36.890	ND	NA	
MW11-3S	2015-08-06	8.120	42.590	6.710	35.880	ND	NA	
MW11-3S	2015-08-25	8.110	42.590	6.800	35.790	ND	NA	Clear
MW11-3S	2015-09-21	8.130	42.590	5.571	37.019	ND	NA	Clear; PHCs obtained earlier in Fall PMP
MW11-3S	2015-11-10	8.110	42.590	3.090	39.500	ND	NA	
MW11-3S	2016-03-22	8.110	42.590	3.570	39.020	ND	NA	
MW11-3S	2016-05-25	8.110	42.590	5.410	37.180	ND	NA	
MW11-3S	2016-08-22	8.120	42.590	5.750	36.840	ND	NA	Clear; DUP-5
MW11-3S	2016-11-07	8.110	42.590	2.550	40.040	ND	NA	
MW11-3S	2017-02-07	8.110	42.590	4.660	37.930	ND	NA	
MW11-3S	2017-04-04	8.110	42.590	3.300	39.290	ND	NA	Clear; DUP-6
MW11-3S	2017-06-07	8.110	42.590	5.250	37.340	ND	NA	
MW11-3S	2017-08-15	8.140	42.590	6.140	36.450	ND	NA	Clear
MW11-3S	2017-10-30	8.103	42.590	4.755	37.835	ND	NA	
MW11-3S	2017-11-28	8.116	42.590	3.022	39.568	ND	NA	
MW11-3S	2018-04-04	8.124	42.590	3.967	38.623	ND	NA	
MW11-3S	2018-04-19	8.120	42.590	3.295	39.295	ND	NA	Clear
MW11-3S	2018-06-11	8.120	42.590	6.150	36.440	ND	NA	
MW11-3S	2018-08-21	8.129	42.590	6.748	35.842	ND	NA	Dup-1
MW11-3S	2018-11-19	8.113	42.590	3.482	39.108	ND	NA	
MW11-3S	2019-02-19	8.140	42.590	4.400	38.190	ND	NA	
MW11-3S	2019-03-18	8.047	42.590	5.162	37.428	ND	NA	Clear
MW11-3S	2019-05-13	8.118	42.590	5.491	37.099	ND	NA	
MW11-3S	2019-09-09	8.129	42.590	6.728	35.862	ND	NA	slightly cloudy
MW11-3S	2019-11-21	8.110	42.590	5.381	37.209	ND	NA	
MW11-3S	2020-04-01	8.113	42.590	3.721	38.869	ND	NA	Clear
MW11-3S	2020-05-20	8.104	42.590	5.476	37.114	ND	NA	
MW11-3S	2020-08-17	8.116	42.590	6.071	36.519	ND	NA	Clear
MW11-3S	2020-11-17	8.099	42.590	3.573	39.017	ND	NA	
MW11-3S	2021-02-04	8.113	42.590	3.479	39.111	ND	NA	
MW11-3S	2021-08-16	8.109	42.590	6.356	36.234	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-3S	2022-03-16	8.106	42.590	3.451	39.139	ND	NA	Water level meter: Serial:
MW11-3S	2022-05-05	NM	42.590	5.032	37.558	ND	NA	
MW11-3S	2022-08-03	8.100	42.590	5.881	36.709	ND	NA	Clear; no odour
MW11-3S	2022-08-09	8.105	42.590	5.888	36.702	ND	NA	Clear; no odour
MW11-3S	2022-11-17	NM	42.590	4.378	38.212	ND	NA	
MW11-3S	2023-02-15	NM	42.590	3.560	39.030	ND	NA	
MW11-3S	2023-03-27	8.111	42.590	4.617	37.973	ND	NA	Clear; no odour
MW11-3S	2023-06-06	8.108	42.590	5.896	36.694	ND	NA	
MW11-3S	2023-08-10	8.107	42.590	6.095	36.495	ND	NA	
MW11-3S	2023-08-24	8.106	42.590	6.277	36.313	ND	NA	Clear; no odour
MW11-3S	2023-11-15	8.105	42.590	3.671	38.919	ND	NA	
MW11-3I	2014-03-04	12.240	42.580	4.080	38.500	ND	NA	
MW11-3I	2014-05-07	12.210	42.580	4.510	38.070	ND	NA	Clear
MW11-3I	2014-06-19	12.235	42.580	5.445	37.135	ND	NA	
MW11-3I	2014-08-13	12.220	42.580	5.900	36.680	ND	NA	
MW11-3I	2015-01-12	NM	42.580	3.500	39.080	ND	NA	
MW11-3I	2015-04-15	12.210	42.580	4.830	37.750	ND	NA	
MW11-3I	2015-05-11	12.210	42.580	5.575	37.005	ND	NA	Clear
MW11-3I	2015-05-21	12.240	42.580	5.845	36.735	ND	NA	
MW11-3I	2015-08-06	12.335	42.580	6.950	35.630	ND	NA	
MW11-3I	2015-08-26	12.230	42.580	7.055	35.525	ND	NA	Clear
MW11-3I	2015-09-21	12.280	42.580	6.220	36.360	ND	NA	Clear; PHCs obtained earlier in Fall PMP
MW11-3I	2015-11-10	12.215	42.580	3.745	38.835	ND	NA	
MW11-3I	2016-03-22	12.210	42.580	3.820	38.760	ND	NA	
MW11-3I	2016-05-25	12.210	42.580	5.540	37.040	ND	NA	
MW11-3I	2016-08-22	12.150	42.580	5.810	36.770	ND	NA	Clear
MW11-3I	2016-11-07	12.220	42.580	3.170	39.410	ND	NA	
MW11-3I	2017-02-07	12.210	42.580	4.630	37.950	ND	NA	
MW11-3I	2017-04-04	12.210	42.580	3.600	38.980	ND	NA	Clear
MW11-3I	2017-06-07	12.220	42.580	5.400	37.180	ND	NA	
MW11-3I	2017-08-15	12.250	42.580	6.270	36.310	ND	NA	Clear
MW11-3I	2017-10-30	12.223	42.580	5.158	37.422	ND	NA	
MW11-3I	2017-11-28	12.228	42.580	3.213	39.367	ND	NA	

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
MW11-3I	2018-04-04	12.152	42.580	4.037	38.543	ND	NA	
MW11-3I	2018-04-19	12.223	42.580	3.684	38.896	ND	NA	Clear
MW11-3I	2018-06-11	12.150	42.580	6.450	36.130	ND	NA	
MW11-3I	2018-08-21	12.348	42.580	7.057	35.523	ND	NA	Clear
MW11-3I	2018-11-19	12.127	42.580	3.837	38.743	ND	NA	
MW11-3I	2019-02-19	12.218	42.580	4.713	37.867	ND	NA	
MW11-3I	2019-03-18	12.152	42.580	5.273	37.307	ND	NA	Clear
MW11-3I	2019-05-13	12.223	42.580	5.711	36.869	ND	NA	
MW11-3I	2019-09-09	12.207	42.580	7.082	35.498	ND	NA	Clear
MW11-3I	2019-11-21	12.220	42.580	5.943	36.637	ND	NA	
MW11-3I	2020-04-01	12.231	42.580	4.338	38.242	ND	NA	Clear
MW11-3I	2020-05-20	12.223	42.580	5.788	36.792	ND	NA	
MW11-3I	2020-08-17	12.230	42.580	6.365	36.215	ND	NA	Clear
MW11-3I	2020-11-17	12.215	42.580	4.156	38.424	ND	NA	
MW11-3I	2021-02-04	12.237	42.580	3.918	38.662	ND	NA	
MW11-3I	2021-08-16	12.217	42.580	6.589	35.991	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-3I	2022-03-14	12.222	42.580	4.650	37.930	ND	NA	Water level meter: Serial:
MW11-3I	2022-05-05	NM	42.580	5.225	37.355	ND	NA	
MW11-3I	2022-08-03	12.200	42.580	6.068	36.512	ND	NA	cloudy
MW11-3I	2022-08-09	12.218	42.580	6.103	36.477	ND	NA	cloudy
MW11-3I	2022-11-17	NM	42.580	4.676	37.904	ND	NA	
MW11-3I	2023-02-15	NM	42.580	3.805	38.775	ND	NA	
MW11-3I	2023-03-27	12.215	42.580	4.848	37.732	ND	NA	Clear; no odour
MW11-3I	2023-06-06	12.217	42.580	6.084	36.496	ND	NA	
MW11-3I	2023-08-10	12.222	42.580	6.432	36.148	ND	NA	
MW11-3I	2023-08-28	12.222	42.580	6.531	36.049	ND	NA	Clear; no odour
MW11-3I	2023-11-15	12.220	42.580	4.059	38.521	ND	NA	
MW11-3D	2014-03-04	NM	42.590	5.510	37.080	ND	NA	Measured to bottom: 8.95; Something stuck in well
MW11-3D	2014-05-07	20.520	42.590	5.550	37.040	ND	NA	Retrieved/pulled out tubing and bailer from the well
MW11-3D	2014-06-19	20.550	42.590	6.340	36.250	ND	NA	
MW11-3D	2014-08-13	20.550	42.590	6.540	36.050	ND	NA	
MW11-3D	2015-01-12	NM	42.590	4.680	37.910	ND	NA	
MW11-3D	2015-04-15	20.530	42.590	6.485	36.105	ND	NA	
MW11-3D	2015-05-12	20.480	42.590	6.570	36.020	ND	NA	Clear
MW11-3D	2015-05-21	20.560	42.590	6.775	35.815	ND	NA	
MW11-3D	2015-08-06	20.540	42.590	7.530	35.060	ND	NA	
MW11-3D	2015-08-26	20.800	42.590	7.815	34.775	ND	NA	Clear
MW11-3D	2015-09-21	20.590	42.590	6.970	35.620	ND	NA	Clear; PHCs obtained earlier in Fall PMP
MW11-3D	2015-11-10	20.540	42.590	5.455	37.135	ND	NA	
MW11-3D	2016-03-22	20.780	42.590	5.180	37.410	ND	NA	
MW11-3D	2016-05-25	20.780	42.590	6.350	36.240	ND	NA	
MW11-3D	2016-08-22	20.540	42.590	6.820	35.770	ND	NA	Clear
MW11-3D	2016-11-07	20.540	42.590	4.740	37.850	ND	NA	
MW11-3D	2017-02-07	20.780	42.590	5.970	36.620	ND	NA	
MW11-3D	2017-04-04	20.530	42.590	9.990	32.600	ND	NA	Clear
MW11-3D	2017-06-07	20.780	42.590	6.480	36.110	ND	NA	
MW11-3D	2017-08-15	20.560	42.590	6.870	35.720	ND	NA	Clear
MW11-3D	2017-10-30	20.520	42.590	6.254	36.336	ND	NA	
MW11-3D	2017-11-28	20.525	42.590	4.991	37.599	ND	NA	
MW11-3D	2018-04-04	20.483	42.590	5.417	37.173	ND	NA	
MW11-3D	2018-04-19	20.543	42.590	5.110	37.480	ND	NA	Clear
MW11-3D	2018-06-11	20.490	42.590	7.460	35.130	ND	NA	
MW11-3D	2018-08-21	20.583	42.590	7.927	34.663	ND	NA	
MW11-3D	2018-11-19	20.474	42.590	5.517	37.073	ND	NA	
MW11-3D	2019-02-19	20.535	42.590	6.129	36.461	ND	NA	
MW11-3D	2019-03-18	20.506	42.590	6.610	35.980	ND	NA	Clear
MW11-3D	2019-05-13	20.526	42.590	6.693	35.897	ND	NA	
MW11-3D	2019-09-09	20.652	42.590	7.789	34.801	ND	NA	
MW11-3D	2019-11-21	20.525	42.590	5.260	37.330	ND	NA	
MW11-3D	2020-04-01	20.557	42.590	5.553	37.037	ND	NA	Clear
MW11-3D	2020-05-20	20.552	42.590	6.734	35.856	ND	NA	
MW11-3D	2020-08-13	20.533	42.590	6.991	35.599	ND	NA	Clear
MW11-3D	2020-11-17	20.524	42.590	5.483	37.107	ND	NA	
MW11-3D	2021-02-04	20.556	42.590	5.147	37.443	ND	NA	
MW11-3D	2021-08-16	20.533	42.590	7.261	35.329	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-3D	2022-03-14	20.805	42.590	5.845	36.745	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW11-3D	2022-05-05	NM	42.590	6.351	36.239	ND	NA	
MW11-3D	2022-08-03	20.500	42.590	6.738	35.852	ND	NA	Clear; no odour
MW11-3D	2022-08-09	20.535	42.590	6.988	35.602	ND	NA	Clear; no odour
MW11-3D	2022-11-17	NM	42.590	5.619	36.971	ND	NA	
MW11-3D	2023-02-15	NM	42.590	5.294	37.296	ND	NA	
MW11-3D	2023-03-27	20.479	42.590	6.035	36.555	ND	NA	Clear; no odour
MW11-3D	2023-06-06	20.562	42.590	6.991	35.599	ND	NA	
MW11-3D	2023-08-10	20.536	42.590	7.308	35.282	ND	NA	
MW11-3D	2023-08-28	20.506	42.590	7.218	35.372	ND	NA	Clear; no odour
MW11-3D	2023-11-15	20.532	42.590	5.253	37.337	ND	NA	
MW11-4S	2014-03-04	7.910	41.890	4.720	37.170	ND	NA	
MW11-4S	2014-05-07	7.900	41.890	5.400	36.490	ND	NA	Clear
MW11-4S	2014-06-19	7.910	41.890	5.885	36.005	ND	NA	
MW11-4S	2014-08-13	7.890	41.890	6.180	35.710	ND	NA	
MW11-4S	2015-01-12	7.890	41.890	4.820	37.070	ND	NA	
MW11-4S	2015-04-15	7.895	41.890	5.430	36.460	ND	NA	
MW11-4S	2015-05-12	7.810	41.890	5.820	36.070	ND	NA	Clear
MW11-4S	2015-05-21	7.910	41.890	5.955	35.935	ND	NA	
MW11-4S	2015-08-06	7.900	41.890	6.450	35.440	ND	NA	
MW11-4S	2015-08-26	7.900	41.890	6.510	35.380	ND	NA	Clear
MW11-4S	2015-09-21	7.930	41.890	5.540	36.350	ND	NA	Clear; PHCs obtained earlier in Fall PMP
MW11-4S	2015-11-10	7.900	41.890	4.095	37.795	ND	NA	
MW11-4S	2016-03-22	7.910	41.890	4.900	36.990	ND	NA	
MW11-4S	2016-05-25	7.910	41.890	5.690	36.200	ND	NA	
MW11-4S	2016-08-22	7.850	41.890	5.890	36.000	ND	NA	Clear
MW11-4S	2016-11-07	7.910	41.890	4.160	37.730	ND	NA	
MW11-4S	2017-02-07	7.910	41.890	5.330	36.560	ND	NA	
MW11-4S	2017-04-04	7.900	41.890	4.540	37.350	ND	NA	Clear
MW11-4S	2017-06-07	7.900	41.890	5.610	36.280	ND	NA	
MW11-4S	2017-08-15	7.910	41.890	6.190	35.700	ND	NA	Clear; some grey silt
MW11-4S	2017-10-30	7.900	41.890	5.300	36.590	ND	NA	
MW11-4S	2017-11-28	7.875	41.890	4.203	37.687	ND	NA	
MW11-4S	2018-04-04	7.824	41.890	4.862	37.028	ND	NA	
MW11-4S	2018-04-19	7.837	41.890	4.293	37.597	ND	NA	Clear
MW11-4S	2018-06-11	7.820	41.890	6.020	35.870	ND	NA	
MW11-4S	2018-08-20	7.823	41.890	6.429	35.461	ND	NA	Clear
MW11-4S	2018-11-19	7.824	41.890	4.378	37.512	ND	NA	
MW11-4S	2019-02-19	7.910	41.890	5.223	36.667	ND	NA	
MW11-4S	2019-03-18	7.922	41.890	5.473	36.417	ND	NA	Clear
MW11-4S	2019-05-13	7.908	41.890	5.615	36.275	ND	NA	
MW11-4S	2019-09-09	7.915	41.890	6.360	35.530	ND	NA	Clear
MW11-4S	2019-11-21	7.891	41.890	4.220	37.670	ND	NA	
MW11-4S	2020-04-01	7.899	41.890	4.433	37.457	ND	NA	Clear, DUP-8
MW11-4S	2020-05-20	7.897	41.890	5.721	36.169	ND	NA	
MW11-4S	2020-08-13	7.905	41.890	5.918	35.972	ND	NA	Clear
MW11-4S	2020-11-17	7.890	41.890	4.600	37.290	ND	NA	
MW11-4S	2021-02-04	7.908	41.890	4.474	37.416	ND	NA	
MW11-4S	2021-08-16	7.896	41.890	6.209	35.681	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-4S	2022-03-16	7.895	41.890	4.262	37.628	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW11-4S	2022-05-05	NM	41.890	5.415	36.475	ND	NA	
MW11-4S	2022-08-03	7.900	41.890	5.837	36.053	ND	NA	Clear; no odour
MW11-4S	2022-08-09	7.920	41.890	5.855	36.035	ND	NA	Clear; no odour
MW11-4S	2022-11-17	NM	41.890	5.070	36.820	ND	NA	
MW11-4S	2023-02-15	NM	41.890	4.770	37.120	ND	NA	
MW11-4S	2023-03-27	7.909	41.890	5.300	36.590	ND	NA	Clear; no odour
MW11-4S	2023-06-06	7.900	41.890	5.806	36.084	ND	NA	
MW11-4S	2023-08-09	7.901	41.890	ND	NA	ND	NA	Dry
MW11-4S	2023-08-10	7.895	41.890	6.030	35.860	ND	NA	
MW11-4S	2023-08-24	7.896	41.890	6.074	35.816	ND	NA	Clear; no odour
MW11-4S	2023-11-15	7.896	41.890	4.670	37.220	ND	NA	
MW11-4I	2014-03-04	12.320	41.820	5.570	36.250	ND	NA	
MW11-4I	2014-05-07	12.290	41.820	6.210	35.610	ND	NA	Clear; DUP-16
MW11-4I	2014-06-19	12.305	41.820	6.650	35.170	ND	NA	
MW11-4I	2014-08-13	12.300	41.820	7.000	34.820	ND	NA	Slightly turbid; DUP-8
MW11-4I	2015-01-12	NM	41.820	5.600	36.220	ND	NA	

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
MW11-4I	2015-04-15	12.290	41.820	6.305	35.515	ND	NA	
MW11-4I	2015-05-12	12.220	41.820	6.600	35.220	ND	NA	
MW11-4I	2015-05-21	12.305	41.820	6.715	35.105	ND	NA	
MW11-4I	2015-08-06	12.300	41.820	7.350	34.470	ND	NA	
MW11-4I	2015-08-26	12.290	41.820	7.520	34.300	ND	NA	Clear; DUP-6
MW11-4I	2015-09-21	12.335	41.820	6.720	35.100	ND	NA	Clear; PHCs obtained earlier in Fall PMP
MW11-4I	2015-11-10	12.310	41.820	5.265	36.555	ND	NA	
MW11-4I	2016-03-22	12.410	41.820	5.850	35.970	ND	NA	
MW11-4I	2016-05-25	12.410	41.820	6.600	35.220	ND	NA	
MW11-4I	2016-08-22	12.250	41.820	6.750	35.070	ND	NA	Clear
MW11-4I	2016-11-07	12.310	41.820	5.160	36.660	ND	NA	
MW11-4I	2017-02-07	12.410	41.820	6.140	35.680	ND	NA	
MW11-4I	2017-04-04	12.280	41.820	5.450	36.370	ND	NA	Clear
MW11-4I	2017-06-07	12.400	41.820	6.570	35.250	ND	NA	
MW11-4I	2017-08-15	12.300	41.820	7.080	34.740	ND	NA	Clear
MW11-4I	2017-10-30	12.290	41.820	6.214	35.606	ND	NA	
MW11-4I	2017-11-28	12.286	41.820	5.126	36.694	ND	NA	
MW11-4I	2018-04-04	12.303	41.820	4.739	37.081	ND	NA	
MW11-4I	2018-04-19	12.233	41.820	5.327	36.493	ND	NA	Clear; DUP-9
MW11-4I	2018-06-11	12.300	41.820	6.940	34.880	ND	NA	
MW11-4I	2018-08-20	12.368	41.820	7.247	34.573	ND	NA	Clear
MW11-4I	2018-11-19	12.319	41.820	5.343	36.477	ND	NA	
MW11-4I	2019-02-19	12.298	41.820	6.078	35.742	ND	NA	
MW11-4I	2019-03-18	12.302	41.820	6.323	35.497	ND	NA	Clear; DUP-01
MW11-4I	2019-05-13	12.297	41.820	6.467	35.353	ND	NA	
MW11-4I	2019-09-09	12.225	41.820	7.283	34.537	ND	NA	clear
MW11-4I	2019-11-21	12.280	41.820	5.210	36.610	ND	NA	
MW11-4I	2020-04-01	12.288	41.820	5.491	36.329	ND	NA	clear
MW11-4I	2020-05-20	12.298	41.820	6.563	35.257	ND	NA	
MW11-4I	2020-08-13	12.293	41.820	6.805	35.015	ND	NA	clear
MW11-4I	2020-11-17	12.281	41.820	5.572	36.248	ND	NA	
MW11-4I	2021-02-04	12.315	41.820	5.490	36.330	ND	NA	
MW11-4I	2021-08-16	12.305	41.820	7.162	34.658	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-4I	2022-03-16	12.284	41.820	5.495	36.325	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
MW11-4I	2022-05-05	NM	41.820	6.189	35.631	ND	NA	
MW11-4I	2022-08-03	12.300	41.820	6.847	34.973	ND	NA	milky, no odor
MW11-4I	2022-08-09	12.290	41.820	6.961	34.859	ND	NA	milky, no odor
MW11-4I	2022-11-17	NM	41.820	6.015	35.805	ND	NA	
MW11-4I	2023-02-15	NM	41.820	5.762	36.058	ND	NA	
MW11-4I	2023-03-27	12.317	41.820	6.245	35.575	ND	NA	Clear; no odour
MW11-4I	2023-06-06	12.294	41.820	6.787	35.033	ND	NA	
MW11-4I	2023-08-09	12.295	41.820	ND	NA	ND	NA	Dry
MW11-4I	2023-08-10	12.294	41.820	7.094	34.726	ND	NA	
MW11-4I	2023-08-28	12.293	41.820	7.113	34.707	ND	NA	Clear; no odour
MW11-4I	2023-11-15	12.298	41.820	5.667	36.153	ND	NA	
MW11-4D	2014-03-04	20.490	41.900	6.110	35.790	ND	NA	
MW11-4D	2014-05-07	20.430	41.900	6.650	35.250	ND	NA	Clear
MW11-4D	2014-06-19	20.480	41.900	7.105	34.795	ND	NA	
MW11-4D	2014-08-13	20.480	41.900	7.460	34.440	ND	NA	
MW11-4D	2015-01-12	NM	41.900	5.960	35.940	ND	NA	
MW11-4D	2015-04-15	20.450	41.900	6.540	35.360	ND	NA	
MW11-4D	2015-05-12	20.360	41.900	7.050	34.850	ND	NA	Clear
MW11-4D	2015-05-21	20.480	41.900	7.090	34.810	ND	NA	
MW11-4D	2015-08-06	20.460	41.900	7.720	34.180	ND	NA	
MW11-4D	2015-08-26	20.455	41.900	7.990	33.910	ND	NA	Clear
MW11-4D	2015-11-10	20.460	41.900	5.870	36.030	ND	NA	
MW11-4D	2016-03-22	20.720	41.900	6.430	35.470	ND	NA	
MW11-4D	2016-05-25	20.720	41.900	7.090	34.810	ND	NA	
MW11-4D	2016-08-22	20.530	41.900	7.220	34.680	ND	NA	Clear
MW11-4D	2016-11-07	20.460	41.900	5.810	36.090	ND	NA	
MW11-4D	2017-02-07	20.720	41.900	6.580	35.320	ND	NA	
MW11-4D	2017-04-04	20.520	41.900	6.060	35.840	ND	NA	Clear
MW11-4D	2017-06-07	20.700	41.900	7.120	34.780	ND	NA	
MW11-4D	2017-08-15	20.440	41.900	7.540	34.360	ND	NA	Clear; DUP-1
MW11-4D	2017-10-30	20.461	41.900	6.754	35.146	ND	NA	
MW11-4D	2017-11-28	20.469	41.900	5.897	36.003	ND	NA	
MW11-4D	2018-04-04	20.403	41.900	6.297	35.603	ND	NA	
MW11-4D	2018-04-19	20.393	41.900	6.004	35.896	ND	NA	Clear
MW11-4D	2018-06-11	20.400	41.900	7.530	34.370	ND	NA	
MW11-4D	2018-08-20	20.698	41.900	7.670	34.230	ND	NA	Clear
MW11-4D	2018-11-19	20.402	41.900	6.147	35.753	ND	NA	
MW11-4D	2019-02-19	20.403	41.900	6.698	35.202	ND	NA	
MW11-4D	2019-03-18	20.522	41.900	6.908	34.992	ND	NA	Clear
MW11-4D	2019-05-13	20.450	41.900	7.068	34.832	ND	NA	
MW11-4D	2019-09-09	20.490	41.900	7.850	34.050	ND	NA	clear; DUP-1
MW11-4D	2019-11-21	20.457	41.900	5.984	35.916	ND	NA	
MW11-4D	2020-04-01	20.476	41.900	6.200	35.700	ND	NA	clear
MW11-4D	2020-05-20	20.467	41.900	7.133	34.767	ND	NA	
MW11-4D	2020-08-13	20.490	41.900	7.343	34.557	ND	NA	clear
MW11-4D	2020-11-17	20.455	41.900	6.217	35.683	ND	NA	
MW11-4D	2021-02-04	20.496	41.900	6.108	35.792	ND	NA	
MW11-4D	2021-08-16	20.474	41.900	7.715	34.185	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
MW11-4D	2022-03-14	20.464	41.900	6.549	35.351	ND	NA	Water level meter: Serial:
MW11-4D	2022-05-05	NM	41.900	6.808	35.092	ND	NA	
MW11-4D	2022-08-03	20.400	41.900	7.234	34.666	ND	NA	Clear; no odour
MW11-4D	2022-08-09	20.620	41.900	7.427	34.473	ND	NA	Clear; no odour
MW11-4D	2022-11-17	NM	41.900	6.301	35.599	ND	NA	
MW11-4D	2023-02-15	NM	41.900	6.165	35.735	ND	NA	
MW11-4D	2023-03-27	20.481	41.900	6.568	35.332	ND	NA	Clear; no odour
MW11-4D	2023-06-06	20.461	41.900	7.320	34.580	ND	NA	
MW11-4D	2023-08-09	20.453	41.900	ND	NA	ND	NA	
MW11-4D	2023-08-10	20.449	41.900	7.603	34.297	ND	NA	
MW11-4D	2023-08-28	20.442	41.900	7.629	34.271	ND	NA	Clear; no odour
MW11-4D	2023-11-15	20.456	41.900	6.270	35.630	ND	NA	
G2-3B	2014-05-27	10.370	45.742	7.740	38.002	ND	NA	
G2-3B	2014-08-26	10.400	45.742	8.270	37.472	ND	NA	Clear
G2-3B	2015-03-03	10.380	45.742	7.670	38.072	ND	NA	
G2-3B	2015-09-16	10.420	45.742	8.130	37.612	ND	NA	Clear
G2-3B	2016-03-09	10.390	45.742	7.480	38.262	ND	NA	Clear
G2-3B	2016-08-11	10.390	45.742	8.100	37.642	ND	NA	Clear
G2-3B	2017-03-23	10.390	45.742	7.480	38.262	ND	NA	Clear
G2-3B	2018-08-27	10.418	45.742	8.341	37.401	ND	NA	Clear
G2-3B	2019-03-21	10.389	45.742	7.594	38.148	ND	NA	Slightly silty
G2-3B	2019-09-12	11.271	45.742	8.248	37.494	ND	NA	Slightly cloudy
G2-3B	2020-04-02	10.399	45.742	7.472	38.270	ND	NA	clear
G2-3B	2020-08-13	10.408	45.742	7.991	37.751	ND	NA	clear
G2-3B	2020-12-09	10.394	45.742	7.009	38.733	ND	NA	Bailed 3x well volume, clear, DUP-1
G2-3B	2021-02-08	11.267	45.742	7.433	38.309	ND	NA	
G2-3B	2021-08-19	10.411	45.742	8.073	37.669	ND	NA	Clear; no odour
G2-3B	2022-03-10	10.407	45.742	7.539	38.203	ND	NA	Cloudy
G2-3B	2022-08-11	11.258	45.742	8.039	37.703	ND	NA	slightly silty
G2-3B	2023-04-05	10.462	45.742	7.607	38.135	ND	NA	Clear; no odour
G2-3B	2023-08-28	10.405	45.742	8.221	37.521	ND	NA	Clear; no odour
G2-3C	2014-05-27	20.980	45.717	7.800	37.917	ND	NA	Clear
G2-3C	2014-08-26	21.020	45.717	8.235	37.482	ND	NA	Clear; DUP-17
G2-3C	2015-03-03	21.010	45.717	7.650	38.067	ND	NA	
G2-3C	2015-09-16	21.080	45.717	8.110	37.607	ND	NA	Clear
G2-3C	2016-03-09	20.750	45.717	7.420	38.297	ND	NA	Clear
G2-3C	2016-08-11	21.030	45.717	8.600	37.117	ND	NA	Clear
G2-3C	2017-03-28	20.980	45.717	7.450	38.267	ND	NA	Clear
G2-3C	2018-08-27	21.213	45.717	8.324	37.393	ND	NA	Clear, Dup-2
G2-3C	2019-03-21	21.010	45.717	7.543	38.174	ND	NA	Clear
G2-3C	2019-09-17	20.951	45.717	8.110	37.607	ND	NA	Cloudy, some organic debris
G2-3C	2020-04-02	20.973	45.717	7.452	38.265	ND	NA	Clear
G2-3C	2020-08-13	21.010	45.717	7.935	37.782	ND	NA	Bailed 3x well volume, clear
G2-3C	2020-12-09	20.992	45.717	6.988	38.729	ND	NA	Bailed 3x well volume, clear
G2-3C	2021-02-08	20.971	45.717	8.404	37.313	ND	NA	
G2-3C	2021-08-19	20.978	45.717	8.042	37.675	ND	NA	Clear; no odour
G2-3C	2022-03-10	20.966	45.717	7.579	38.138	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G2-3C	2022-08-11	20.965	45.717	8.135	37.582	ND	NA	Clear; no odour
G2-3C	2023-04-05	21.013	45.717	7.531	38.186	ND	NA	Clear; no odour

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TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks
G2-3C	2023-08-28	20.990	45.717	8.226	37.491	ND	NA	Clear; no odour
G2-9A	2014-05-26	9.070	44.639	7.550	37.089	ND	NA	Murky
G2-9A	2014-08-26	9.100	44.639	8.200	36.439	ND	NA	Slightly turbid
G2-9A	2015-03-03	9.080	44.639	7.440	37.199	ND	NA	
G2-9A	2015-09-16	9.110	44.639	8.120	36.519	ND	NA	Clear
G2-9A	2016-03-09	9.070	44.639	6.990	37.649	ND	NA	Clear
G2-9A	2016-08-11	9.080	44.639	8.020	36.619	ND	NA	Clear
G2-9A	2017-03-28	9.090	44.639	6.990	37.649	ND	NA	Clear
G2-9A	2017-08-23	9.100	44.639	8.210	36.429	ND	NA	Clear
G2-9A	2018-05-01	9.063	44.639	7.417	37.222	ND	NA	bailed; silty/grey
G2-9A	2018-08-27	9.138	44.639	8.309	36.330	ND	NA	turbid
G2-9A	2019-03-21	9.068	44.639	7.407	37.232	ND	NA	slightly cloudy (grey)
G2-9A	2019-09-12	9.100	44.639	8.207	36.432	ND	NA	Clear
G2-9A	2020-04-02	9.099	44.639	7.061	37.578	ND	NA	Slihgtly cloudy
G2-9A	2020-08-13	9.099	44.639	7.908	36.731	ND	NA	clear
G2-9A	2020-12-09	9.064	44.639	6.505	38.134	ND	NA	clear
G2-9A	2021-02-08	9.090	44.639	7.068	37.571	ND	NA	
G2-9A	2021-08-18	9.081	44.639	8.071	36.568	ND	NA	clear
G2-9A	2022-03-10	9.082	44.639	7.268	37.371	ND	NA	cloudy
G2-9A	2022-08-10	9.063	44.639	8.035	36.604	ND	NA	Clear; no odour
G2-9A	2023-04-05	9.134	44.639	7.444	37.195	ND	NA	Clear; no odour
G2-9A	2023-08-28	9.083	44.639	8.255	36.384	ND	NA	Clear; no odour
G2-9B	2014-05-26	21.740	44.681	7.830	36.851	ND	NA	Slight turbid; DUP-25
G2-9B	2014-08-26	21.780	44.681	8.530	36.151	ND	NA	Clear
G2-9B	2015-03-03	21.750	44.681	7.790	36.891	ND	NA	DUP-1
G2-9B	2015-09-16	21.540	44.681	8.350	36.331	ND	NA	Clear
G2-9B	2016-03-09	21.780	44.681	7.440	37.241	ND	NA	Turbid
G2-9B	2016-08-11	21.760	44.681	8.310	36.371	ND	NA	
G2-9B	2017-03-28	21.750	44.681	7.450	37.231	ND	NA	Clear
G2-9B	2017-08-23	21.750	44.681	8.560	36.121	ND	NA	Clear
G2-9B	2018-05-02	21.746	44.681	7.733	36.948	ND	NA	Clear
G2-9B	2018-08-27	21.946	44.681	8.622	36.059	ND	NA	Clear
G2-9B	2019-03-20	21.774	44.681	7.718	36.963	ND	NA	Clear
G2-9B	2019-09-12	21.818	44.681	8.493	36.188	ND	NA	Bailed 3x well volume, clear
G2-9B	2020-04-02	21.779	44.681	7.475	37.206	ND	NA	Bailed 3x well volume, clear
G2-9B	2020-08-13	21.758	44.681	8.158	36.523	ND	NA	Bailed 3x well volume, clear
G2-9B	2020-12-09	21.749	44.681	7.077	37.604	ND	NA	Bailed 3x well volume, clear
G2-9B	2021-02-08	21.801	44.681	7.424	37.257	ND	NA	--
G2-9B	2021-08-19	21.728	44.681	8.320	36.361	ND	NA	Clear; no odour
G2-9B	2022-03-10	21.736	44.681	7.591	37.090	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
G2-9B	2022-08-11	21.755	44.681	8.319	36.362	ND	NA	Clear; no odour
G2-9B	2023-04-05	21.773	44.681	7.719	36.962	ND	NA	Clear; no odour
G2-9B	2023-08-28	21.746	44.681	8.383	36.298	ND	NA	Clear; no odour
G2-10	2014-05-15	6.130	45.349	3.500	41.849	ND	NA	Clear
G2-10	2014-08-20	6.140	45.349	5.430	39.919	ND	NA	Clear
G2-10	2015-03-03	6.140	45.349	3.790	41.559	ND	NA	
G2-10	2015-09-16	6.160	45.349	5.610	39.739	ND	NA	Clear
G2-10	2016-03-07	6.150	45.349	3.055	42.294	ND	NA	Clear
G2-10	2016-08-10	6.140	45.349	4.970	40.379	ND	NA	Clear
G2-10	2017-03-28	6.120	45.349	2.830	42.519	ND	NA	Clear
G2-10	2017-08-23	6.150	45.349	5.080	40.269	ND	NA	Clear
G2-10	2018-05-01	6.127	45.349	3.439	41.910	ND	NA	Bailed; silty and grey
G2-10	2018-08-27	6.121	45.349	5.855	39.494	ND	NA	Clear
G2-10	2019-03-21	6.118	45.349	3.643	41.706	ND	NA	silty; slightly orange tinged
G2-10	2019-09-17	6.130	45.349	4.720	40.629	ND	NA	clear
G2-10	2020-04-02	6.142	45.349	3.123	42.226	ND	NA	slightly cloudy, orange
G2-10	2020-08-12	6.122	45.349	4.961	40.388	ND	NA	clear
G2-10	2021-08-24	6.145	45.349	5.061	40.288	ND	NA	Water level meter: Heron H. Oil InterfaceSerial:
G2-10	2022-03-10	6.136	45.349	3.298	42.051	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 039066
G2-10	2022-08-11	6.116	45.349	5.011	40.338	ND	NA	Clear; no odour
G2-10	2023-04-11	6.130	45.349	2.840	42.509	ND	NA	Clear; no odour
G2-10	2023-08-28	6.116	45.349	5.369	39.980	ND	NA	Clear; no odour
WS2-D	2014-05-22	7.695	40.256	5.555	34.701	ND	NA	Clear
WS2-D	2014-08-22	7.700	40.256	7.060	33.196	ND	NA	Clear
WS2-D	2014-11-14	NM	40.256	4.400	35.856	ND	NA	BC: Clear
WS2-D	2015-01-08	NM	40.256	3.605	36.651	ND	NA	BC: Clear
WS2-D	2015-03-05	7.700	40.256	5.095	35.161	ND	NA	Purged dry at 12 L
WS2-D	2015-08-18	7.695	40.256	6.745	33.511	ND	NA	Clear
WS2-D	2016-03-08	7.710	40.256	3.440	36.816	ND	NA	Clear
WS2-D	2016-08-08	7.700	40.256	6.370	33.886	ND	NA	Clear
WS2-D	2016-09-12	7.710	40.256	6.640	33.616	ND	NA	Purged dry at 5 L
WS2-D	2017-03-08	7.700	40.256	3.160	37.096	ND	NA	Clear
WS2-D	2017-08-23	7.710	40.256	6.540	33.716	ND	NA	Clear
WS2-D	2018-05-02	7.715	40.256	4.346	35.910	ND	NA	Clear
WS2-D	2018-08-27	8.710	40.256	6.788	33.468	ND	NA	
WS2-D	2019-03-25	7.708	40.256	4.478	35.778	ND	NA	Clear
WS2-D	2019-09-12	7.724	40.256	6.662	33.594	ND	NA	Clear
WS2-D	2020-04-02	7.704	40.256	3.369	36.887	ND	NA	Clear
WS2-D	2020-08-12	7.701	40.256	6.070	34.186	ND	NA	Clear
WS2-D	2021-08-19	7.695	40.256	6.527	33.729	ND	NA	Clear; no odour
WS2-D	2022-03-16	7.720	40.256	3.105	37.151	ND	NA	Water level meter: Solinst 107Serial:
WS2-D	2022-08-22	7.698	40.256	6.146	34.110	ND	NA	Clear; no odour
WS2-D	2023-04-05	7.726	40.256	4.108	36.148	ND	NA	Clear; no odour
WS2-D	2023-08-24	7.696	40.256	6.532	33.724	ND	NA	Clear; no odour
WS2-D2	2014-05-22	11.730	40.317	6.400	33.917	ND	NA	Clear
WS2-D2	2014-08-22	11.740	40.317	8.100	32.217	ND	NA	Clear
WS2-D2	2014-11-14	NM	40.317	5.620	34.697	ND	NA	BC: Clear
WS2-D2	2015-01-08	NM	40.317	5.050	35.267	ND	NA	BC: Clear
WS2-D2	2015-03-05	11.760	40.317	5.955	34.362	ND	NA	Clear
WS2-D2	2015-08-17	11.810	40.317	7.190	33.127	ND	NA	Clear
WS2-D2	2016-03-10	11.920	40.317	4.500	35.817	ND	NA	Clear
WS2-D2	2016-08-08	11.820	40.317	6.900	33.417	ND	NA	Clear
WS2-D2	2017-03-08	11.870	40.317	4.700	35.617	ND	NA	
WS2-D2	2017-08-23	11.810	40.317	7.120	33.197	ND	NA	Clear
WS2-D2	2018-05-02	11.831	40.317	5.410	34.907	ND	NA	Bailed; cloudy grey; DUP-13
WS2-D2	2018-08-27	11.834	40.317	7.356	32.961	ND	NA	
WS2-D2	2019-03-25	11.936	40.317	5.523	34.794	ND	NA	Clear; DUP-03
WS2-D2	2019-09-12	11.821	40.317	7.240	33.077	ND	NA	Clear; DUP-03
WS2-D2	2020-04-02	11.841	40.317	4.756	35.561	ND	NA	Clear
WS2-D2	2020-08-12	11.906	40.317	6.796	33.521	ND	NA	Clear
WS2-D2	2021-08-19	11.792	40.317	7.188	33.129	ND	NA	Clear; no odour
WS2-D2	2022-03-16	11.818	40.317	4.622	35.695	ND	NA	Water level meter: Heron H. Oil InterfaceSerial: 39066
WS2-D2	2022-08-22	11.828	40.317	6.933	33.384	ND	NA	Clear; no odour
WS2-D2	2023-04-05	11.848	40.317	5.433	34.884	ND	NA	Clear; no odour
WS2-D2	2023-08-24	11.805	40.317	7.213	33.104	ND	NA	Clear; no odour
MW3	2022-08-11	6.182	28.950	2.482	26.468	ND	NA	Clear; no odour
MW3	2023-04-06	6.199	28.950	1.545	27.405	ND	NA	Clear; no odour
MW3	2023-04-11	6.195	28.950	1.463	27.487	ND	NA	Clear; no odour
MW3	2023-08-24	6.166	28.950	3.569	25.381	ND	NA	Clear; no odour
MW5	2022-08-11	5.155	26.880	2.520	24.360	ND	NA	Clear; no odour
MW5	2023-04-06	5.173	26.880	2.148	24.732	ND	NA	Clear; no odour
MW5	2023-08-24	5.158	26.880	3.097	23.783	ND	NA	Clear; no odour
U4-1	2022-08-24	10.280	32.990	8.385	24.605	ND	NA	Clear; no odour
U4-1	2022-08-24	10.280	32.990	8.385	24.605	ND	NA	Clear; no odour
U4-1	2023-04-06	10.298	32.990	7.444	25.546	ND	NA	Clear; no odour
U4-1	2023-08-24	10.279	32.990	8.986	24.004	ND	NA	Clear; no odour
U4-3	2022-08-24	20.854	21.720	14.794	6.926	ND	NA	Clear; no odour
U4-3	2023-04-06	20.878	21.720	14.791	6.929	ND	NA	Clear; no odour
U4-3	2023-04-11	20.876	21.720	14.758	6.962	ND	NA	Clear; no odour
U4-3	2023-08-28	20.845	21.720	15.257	6.463	ND	NA	Clear; no odour

Abbreviations:

BC	Bailer confirmed
DUP	Duplicate
m	metre
mASL	metres above sea level
NA	Not applicable/available
ND	Not detected
NM	Not monitored
NS	Not sampled
TOC	Top of casing

TABLE 2-1a
AREA 2 SUMMARY OF WATER LEVEL MEASUREMENTS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Total Depth of Well (m from TOC)	Top of Casing Elevation (TOC, mASL)[1]	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Depth To Product (DTP, m from TOC)	Apparent Product Thickness (mm)	Remarks

Notes:

1 Elevations are in Parkland Datum = Geodetic Datum + 91.51 feet (27.895 m)

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TABLE 2-1b
AREA 2 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
PW03-1A	2014-04-29	9.09	6.08	0.131	NM	0.43	201.4	0.123	0.09
PW03-1A	2016-03-09	10.37	5.68	0.088	NM	0.78	235.4	0.079	0.06
PW03-1A	2017-04-03	8.73	5.60	0.071	NM	0.26	-66.0	0.067	0.05
PW03-1A	2018-04-30	9.54	5.78	0.090	NM	10.23	135.6	0.084	0.06
PW03-1A	2019-03-26	9.76	6.06	0.120	NM	1.53	67.4	0.110	0.08
PW03-1A	2020-04-08	9.15	5.80	0.061	NM	0.40	-324.4	0.057	0.04
PW03-1A	2021-03-11	9.17	5.63	0.059	NM	1.20	212.3	0.055	0.04
PW03-1A	2022-03-02	9.38	5.37	0.059	NM	2.46	14.4	0.054	0.04
PW03-1A	2023-03-30	9.37	6.08	0.065	NM	3.19	-208.8	0.060	0.04
PW03-1B	2014-04-29	8.75	5.55	0.088	NM	9.15	212.0	0.083	0.06
PW03-1B	2016-03-09	9.69	4.82	0.057	NM	4.95	293.9	0.053	0.04
PW03-1B	2017-04-03	8.24	5.13	0.052	NM	5.80	-19.7	0.050	0.04
PW03-1B	2018-04-30	9.56	5.38	0.072	NM	0.72	125.3	0.066	0.05
PW03-1B	2019-04-16	8.73	4.32	0.033	NM	8.12	234.2	0.033	0.02
PW03-1B	2020-04-08	8.77	6.67	0.088	NM	8.33	27.1	0.083	0.06
PW03-1B	2021-03-11	8.57	6.40	0.088	NM	9.12	131.9	0.082	0.06
PW03-1B	2022-03-02	8.46	5.38	0.035	NM	8.67	225.4	0.033	0.02
PW03-1B	2023-04-12	8.22	6.00	0.068	22.60	8.99	138.0	0.065	0.05
PW03-2A	2014-04-29	9.07	5.05	0.094	NM	1.35	183.6	0.088	0.06
PW03-2A	2016-03-09	9.45	5.45	0.085	NM	3.46	-4.1	0.078	0.06
PW03-2A	2017-04-03	8.60	5.26	0.077	NM	4.90	-10.4	0.073	0.05
PW03-2A	2019-04-16	9.53	4.13	0.070	NM	1.63	281.4	0.064	0.05
PW03-2A	2020-04-08	9.76	5.31	0.068	NM	4.54	109.4	0.063	0.05
PW03-2A	2021-03-11	10.02	5.21	0.075	NM	3.35	152.4	0.068	0.05
PW03-2A	2022-03-02	9.29	5.36	0.057	NM	0.97	10.3	0.053	0.04
PW03-2A	2023-03-30	10.06	5.33	0.068	37.80	4.39	-196.8	0.062	0.04
PW03-2B	2014-04-29	9.31	6.09	0.303	NM	9.40	222.9	0.282	0.21
PW03-2B	2016-03-09	9.12	6.23	0.151	NM	5.35	-41.9	0.141	0.10
PW03-2B	2017-04-03	8.38	6.30	0.167	NM	4.60	-29.8	0.160	0.12
PW03-2B	2019-03-26	9.19	6.45	0.350	NM	7.52	58.8	0.326	0.24
PW03-2B	2020-04-08	8.77	6.58	0.129	NM	3.38	-0.2	0.121	0.09
PW03-2B	2021-03-11	8.89	6.33	0.190	NM	0.66	31.5	0.179	0.13
PW03-2B	2022-03-02	8.43	5.75	0.061	NM	7.57	238.0	0.059	0.04
PW03-2B	2023-03-30	8.86	6.67	0.242	22.90	0.87	-55.7	0.227	0.17
PW03-3	2014-04-29	9.58	5.05	0.078	NM	4.37	48.9	0.072	0.05
PW03-3	2016-03-09	10.14	5.67	0.065	NM	3.67	-79.7	0.058	0.04
PW03-3	2017-03-31	9.25	5.49	0.038	NM	7.30	-32.4	0.036	0.02
PW03-3	2018-04-30	9.88	4.71	0.069	NM	0.52	166.0	0.062	0.04
PW03-3	2019-03-26	10.00	5.84	0.219	NM	0.90	5.8	0.200	0.15
PW03-3	2020-04-09	9.73	5.82	0.048	NM	0.29	20.2	0.044	0.03
PW03-3	2021-03-11	9.56	5.44	0.053	NM	1.99	195.0	0.049	0.03
PW03-3	2022-03-21	9.40	5.23	0.037	NM	3.33	235.0	0.034	0.02
PW03-3	2023-03-30	10.00	5.54	0.055	29.40	2.76	131.4	0.050	0.04
PW03-4	2014-04-29	8.78	7.07	0.111	NM	3.93	140.6	0.111	0.08
PW03-4	2016-03-09	9.69	7.29	0.182	NM	6.72	-34.9	0.167	0.12
PW03-4	2017-04-03	9.19	7.11	0.190	NM	8.06	36.2	0.176	0.13
PW03-4	2019-04-16	9.28	6.18	0.145	NM	8.48	233.1	0.134	0.10
PW03-4	2020-04-09	9.27	7.26	0.177	NM	8.73	161.2	0.165	0.12
PW03-4	2021-03-11	9.19	7.18	0.189	NM	9.45	71.8	0.176	0.13
PW03-4	2022-03-02	9.69	6.98	0.159	NM	9.31	10.4	0.149	0.11
PW03-4	2023-03-30	9.72	7.19	0.199	22.40	8.55	-200.9	0.183	0.13
PW03-5	2014-04-29	10.27	5.95	0.190	NM	1.54	114.2	0.172	0.13
PW03-5	2015-05-06	11.69	6.18	0.501	NM	2.48	224.7	0.437	0.33
PW03-5	2016-03-09	11.60	6.01	0.143	NM	0.58	184.1	0.125	0.09
PW03-5	2017-04-03	10.22	5.93	0.100	NM	0.77	-36.0	0.091	0.07
PW03-5	2018-04-30	10.83	6.09	0.158	NM	1.49	124.5	0.140	0.10
PW03-5	2019-03-26	11.21	6.34	0.262	NM	0.82	40.2	0.232	0.17
PW03-5	2020-03-26	11.00	6.40	0.205	NM	0.56	64.7	0.185	0.14
PW03-5	2021-03-11	11.08	6.14	0.011	NM	0.75	69.5	0.098	0.07
PW03-5	2022-03-02	11.43	6.22	0.126	NM	0.78	176.6	0.110	0.08
PW03-5	2022-08-10	14.70	6.56	0.246	15.20	0.94	43.1	0.199	0.15
PW03-5	2023-03-30	10.93	6.45	0.155	13.40	1.46	67.8	0.138	0.10
PW03-6	2014-04-29	8.69	5.46	0.095	NM	0.43	201.4	0.083	0.06
PW03-6	2016-03-09	9.63	5.90	0.100	NM	5.55	259.2	0.092	0.07
PW03-6	2017-03-31	7.85	5.59	0.045	NM	9.24	-27.5	0.044	0.03
PW03-6	2019-04-16	9.30	5.01	0.052	NM	8.11	195.5	0.048	0.03
PW03-6	2022-03-02	9.53	5.82	0.001	NM	9.66	15.7	0.001	0.00
PW03-6	2022-03-21	7.89	5.52	0.035	NM	9.44	298.7	0.035	0.02
PW03-6	2023-04-12	7.98	5.69	0.062	4.93	7.66	-78.6	0.060	0.04
U8	2014-04-29	11.00	5.38	0.078	NM	1.76	111.1	0.048	0.03
U8	2016-03-22	10.96	5.44	0.051	NM	0.30	82.9	0.046	0.03
U8	2016-12-21	11.15	5.61	0.070	NM	0.26	38.9	0.062	0.04
U8	2017-02-14	11.15	5.61	0.070	NM	0.26	38.9	0.062	0.04
U8	2017-04-11	9.82	7.41	0.038	NM	2.41	-62.4	0.034	0.02
U8	2018-04-30	10.23	5.52	0.061	NM	0.65	90.6	0.055	0.04
U8	2019-03-21	11.73	3.97	0.046	NM	2.29	-29.0	0.040	0.03
U8	2020-03-25	10.75	4.79	0.116	NM	3.64	19.7	0.103	0.08
U8	2021-03-11	9.99	5.15	0.047	NM	0.91	66.9	0.042	0.03
U8	2022-03-02	10.24	5.64	0.072	NM	2.58	-62.2	0.065	0.05
U8	2023-03-29	10.43	5.29	0.048	16.40	2.20	201.5	0.044	0.03
U9	2014-04-29	9.36	5.46	0.053	NM	1.10	147.3	0.050	0.04
U9	2016-03-22	10.42	5.23	0.041	NM	1.10	128.3	0.037	0.03
U9	2016-12-21	11.17	5.49	0.055	NM	0.21	40.8	0.048	0.03
U9	2017-02-14	11.17	5.49	0.055	NM	0.21	40.8	0.048	0.03
U9	2017-04-11	9.67	4.55	0.033	NM	1.68	103.5	0.050	0.02
U9	2018-04-30	9.79	4.84	0.043	NM	2.81	192.8	0.039	0.03
U9	2019-03-21	11.99	5.40	0.042	NM	1.43	137.6	0.036	0.03
U9	2020-04-07	9.65	4.75	0.065	NM	1.69	30.5	0.060	0.04
U9	2021-03-11	10.12	5.09	0.036	NM	0.73	121.4	0.033	0.02
U9	2022-03-02	9.40	5.10	0.036	NM	13.30	18.9	0.034	0.02
U9	2023-03-29	11.69	5.38	0.040	22.70	4.91	169.4	0.035	0.02
G2-11A	2014-05-12	13.23	6.26	0.110	NM	1.73	-92.8	0.930	0.72
G2-11A	2014-08-18	14.63	6.25	1.267	NM	1.16	-25.3	1.027	0.80
G2-11A	2015-05-11	13.39	6.17	1.224	NM	2.49	21.2	1.022	0.80
G2-11A	2015-09-16	14.74	6.15	1.135	NM	0.54	-7.4	0.918	0.71
G2-11A	2016-04-04	12.52	6.41	1.265	NM	0.37	-19.8	1.080	0.84
G2-11A	2016-09-01	14.48	6.34	1.110	NM	1.87	21.2	0.903	0.70
G2-11A	2017-04-12	11.09	6.43	2.610	NM	2.43	-117.3	2.040	1.63
G2-11A	2017-08-28	15.65	6.11	0.950	NM	0.29	16.4	0.790	0.49
G2-11A	2018-04-30	12.15	6.16	1.977	NM	0.32	6.1	1.715	1.37
G2-11A	2018-08-28	13.48	5.99	1.492	NM	1.50	55.9	1.243	0.98
G2-11A	2019-03-26	12.28	6.21	1.639	NM	1.98	-14.1	1.407	1.12
G2-11A	2019-09-17	13.56	6.56	3.141	NM	1.04	-7.9	2.613	2.14
G2-11A	2020-04-06	12.43	6.17	2.031	NM	1.25	-47.3	1.734	1.39
G2-11A	2020-08-17	14.08	5.29	1.330	NM	3.21	54.2	1.092	0.85
G2-11A	2021-03-09	12.10	6.47	1.201	NM	1.01	-83.8	1.036	0.81
G2-11A	2022-03-16	11.66	7.11	1.052	NM	0.61	-3.5	0.917	0.71
G2-11A	2022-08-10	14.20	6.39	1.010	4.22	1.07	6.0	0.826	0.64
G2-11A	2023-03-28	12.32	6.38	1.192	2.57	1.04	-31.6	1.015	0.79
G2-11A	2023-08-24	14.00	6.03	1.069	1.32	0.53	137.8	0.873	0.68
G2-11B	2014-05-12	13.25	5.68	1.400	NM	1.11	-231.0	1.173	0.92
G2-11B	2014-08-18	13.39	5.68	1.613	NM	1.07	-79.7	1.347	1.07
G2-11B	2015-05-11	12.93	6.13	0.990	NM	1.42	20.4	0.860	0.68
G2-11B	2015-09-16	15.48	6.32	15.720	NM	0.13	-15.7	1.248	0.98
G2-11B	2016-04-04	12.83	6.44	1.237	NM	0.81	-55.9	1.047	0.82
G2-11B	2016-09-01	13.71	6.37	1.337	NM	0.45	-0.1	1.108	0.87
G2-11B	2017-04-12	11.82	6.25	1.066	NM	1.22	-39.5	0.926	0.72
G2-11B	2017-08-28	14.17	6.11	1.350	NM	0.45	15.4	1.107	0.87
G2-11B	2018-04-30	12.39	6.23	1.977	NM	1.77	23.4	1.694	1.36
G2-11B	2018-08-28	13.46	6.07	1.680	NM	0.53	59.2	1.401	1.11
G2-11B	2019-03-26	12.49	6.20	1.569	NM	1.13	62.7	1.341	1.05
G2-11B	2019-09-17	12.59	7.36	1.403	NM	1.22	-40.2	1.196	0.94
G2-11B	2020-04-06	12.69	6.25	1.824	NM	0.22	-1.0	1.551	1.24
G2-11B	2020-08-17	14.97	6.32	1.197	NM	0.16	-2.7	0.962	0.75
G2-11B	2021-03-09	12.52	6.20	1.081	NM	1.01	-32.9	0.923	0.72
G2-11B	2021-09-01	13.81	6.38	1.230	NM	1.18	16.3	1.018	0.79
G2-11B	2022-03-16	12.31	6.53	0.966	NM	0.48	-42.1	0.829	0.65
G2-11B	2022-08-10	13.20	6.37	0.960	2.20	2.13	-51.1	0.793	0.61
G2-11B	2023-03-28	13.01	6.38	0.974	2.24	0.57	-1.4	0.822	0.64
G2-11B	2023-08-24	12.80	6.22	0.910	16.50	1.02	115.4	0.767	0.59
MW02-02	2014-05-01	11.10	6.52	0.907	NM	2.42	50.9	0.796	0.62
MW02-02	2015-05-11	12.07	6.82	0.881	NM	7.80	-60.2	0.760	0.59
MW02-02	2016-03-31	12.34	7.05	0.671	NM	0.90	-1.9	0.575	0.44
MW02-02	2017-04-05	10.15	6.12	0.149	NM	NM	179.9	0.152	0.11
MW02-02	2019-03-19	10.78	5.94	0.357	NM	5.95	-26.3	0.318	0.24
MW02-02	2020-04-06	10.90	5.91	0.855	NM	4.69	57.4	0.761	0.59
MW02-02	2021-03-10	10.01	6.06	0.489	NM	2.46	136.8	0.446	0.34
MW02-02	2022-03-14	8.78	6.04	0.417	NM	1.01	132.2	0.390	0.29
MW02-02	2023-03-28	11.73	6.03	0.430	3.60	2.02	88.3	0.374	0.28
MW02-03	2014-05-01	10.88	5.91	0.317	NM	0.36	18.9	0.282	0.21
MW02-03	2014-08-07	12.79	5.83	0.157	NM	0.72	-4.2	0.133	0.10
MW02-03	2015-05-11	11.89	5.39	0.146	NM	0.59	82.7	0.127	0.09
MW02-03	2016-03-31	12.52	5.74	0.315	NM	0.59	126.1	0.268	0.20
MW02-03	2017-04-05	10.10	5.37	0.217	NM	0.32	124.2	0.196	0.15
MW02-03	2018-04-26	11.98	4.82	0.379	NM	0.46	199.6	0.328	0.25
MW02-03	2019-03-19	11.28	4.76	0.261	NM	0.93	-22.4	0.231	0.17
MW02-03	2020-04-06	10.90	4.68	1.001	NM	2.21	78.2	0.890	0.69
MW02-03	2021-03-10	10.91	5.16	0.321	NM	1.72	248.5	0.286	0.21
MW02-03	2022-03-14	10.24	5.00	0.193	NM	0.76	357.9	0.174	0.13
MW02-03	2022-08-09	16.70	5.21	0.262	78.20	1.43	53.9	0.203	0.15
MW02-03	2023-03-21	11.48	5.21	0.219	14.60	1.90	204.5	0.192	0.14
MW02-04	2014-05-01	10.87	6.41	0.371	NM	2.38	27.6	0.330	0.25
MW02-04	2014-08-07	11.54	6.30	0.420	NM	0.83	72.7	0.368	0.28

AECOM

TABLE 2-1b
AREA 2 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
MW02-04	2016-03-31	11.96	6.09	0.217	NM	0.93	153.3	0.187	0.14
MW02-04	2017-04-05	9.50	6.29	0.427	NM	0.32	25.5	0.394	0.30
MW02-04	2018-04-19	10.23	5.87	0.371	NM	2.47	171.0	0.336	0.25
MW02-04	2020-04-07	9.25	5.64	0.677	NM	6.01	59.8	0.628	0.48
MW02-04	2021-03-09	10.52	5.96	0.273	NM	4.52	43.8	0.245	0.18
MW02-04	2022-03-10	9.72	6.15	0.198	NM	6.66	126.5	0.182	0.13
MW02-04	2022-03-17	9.80	6.14	0.144	NM	6.32	193.6	0.140	0.10
MW02-04	2023-03-21	10.91	6.02	0.292	45.30	4.12	98.2	0.259	0.19
MW03-02	2014-04-30	10.05	5.89	0.198	NM	1.82	163.4	0.180	0.13
MW03-02	2014-08-12	12.25	4.54	0.200	NM	1.55	116.5	0.171	0.13
MW03-02	2015-05-07	10.80	5.91	0.216	NM	3.28	149.8	0.193	0.14
MW03-02	2015-08-25	13.60	6.01	0.186	NM	0.55	71.0	0.155	0.11
MW03-02	2016-03-22	10.65	6.77	0.173	NM	1.51	13.2	0.155	0.11
MW03-02	2016-12-21	11.56	5.79	0.145	NM	0.95	62.3	0.127	0.09
MW03-02	2017-02-14	11.56	5.79	0.145	NM	0.95	62.3	0.127	0.09
MW03-02	2017-04-10	9.92	5.45	1.700	NM	2.56	162.5	0.107	0.08
MW03-02	2018-04-26	10.95	5.78	0.175	NM	4.95	181.4	0.155	0.11
MW03-02	2019-03-20	10.42	5.14	0.125	2.66	1.93	0.0	0.113	0.08
MW03-02	2020-03-26	10.66	5.97	0.181	NM	6.10	-3.9	0.162	0.12
MW03-02	2021-03-10	10.43	5.90	0.120	NM	2.75	174.9	0.108	0.08
MW03-03	2016-03-31	13.76	6.72	0.251	NM	8.77	-20.0	0.210	0.16
MW03-03	2017-04-05	12.00	6.35	0.261	NM	1.37	-43.3	0.227	0.17
MW03-03	2018-04-19	13.57	6.19	0.293	NM	1.65	-11.3	0.244	0.18
A2MW09-05I	2014-04-30	10.37	6.19	0.321	NM	0.62	-18.6	0.290	0.22
A2MW09-05I	2014-08-12	13.69	6.85	0.426	NM	2.42	-117.7	0.353	0.26
A2MW09-05I	2015-05-06	11.33	6.63	0.317	NM	2.70	75.0	0.279	0.21
A2MW09-05I	2015-08-24	12.49	6.85	0.364	NM	2.57	12.1	0.313	0.23
A2MW09-05I	2016-03-22	11.45	6.44	0.189	NM	0.23	18.3	0.175	0.13
A2MW09-05I	2016-08-25	11.92	6.90	0.381	NM	1.10	-51.1	0.330	0.25
A2MW09-05I	2016-12-21	11.49	6.46	0.263	NM	0.08	-55.0	0.231	0.17
A2MW09-05I	2017-04-12	10.69	7.20	0.200	NM	0.39	-149.7	0.179	0.13
A2MW09-05I	2017-09-06	12.27	7.29	0.317	NM	3.15	4.4	0.272	0.20
A2MW09-05I	2018-04-26	11.45	6.46	0.234	NM	0.22	-29.2	0.205	0.15
A2MW09-05I	2018-05-30	12.21	6.22	0.227	NM	0.22	-20.3	0.195	0.14
A2MW09-05I	2018-08-21	12.31	6.75	0.276	NM	2.38	44.6	0.229	0.17
A2MW09-05I	2018-08-21	12.31	6.75	0.276	NM	2.38	44.6	0.229	0.17
A2MW09-05I	2019-03-26	10.51	6.31	0.289	NM	0.32	63.2	0.260	0.19
A2MW09-05I	2019-09-10	13.08	6.83	0.317	NM	0.29	25.1	0.266	0.20
A2MW09-05I	2020-04-08	NM	6.48	0.218	NM	2.60	-19.4	0.192	0.14
A2MW09-05I	2020-08-11	13.45	6.71	0.267	NM	0.45	-59.2	0.222	0.16
A2MW09-05I	2021-03-11	10.66	6.53	0.206	NM	0.49	44.0	0.184	0.14
A2MW09-05I	2021-08-17	12.38	6.44	0.311	NM	0.64	11.6	0.265	0.20
A2MW09-05I	2022-03-03	11.20	6.86	0.208	NM	3.57	-3.4	0.184	0.14
A2MW09-05I	2022-04-07	11.27	6.51	0.192	NM	1.08	-82.4	0.169	0.12
A2MW09-05I	2022-08-10	12.10	6.71	0.262	51.20	1.26	41.0	0.228	0.17
A2MW09-05I	2022-10-19	13.57	6.88	0.337	15.60	2.27	-13.1	0.280	0.21
A2MW09-05I	2023-03-29	11.48	6.56	0.210	65.90	3.19	-133.6	0.184	0.14
A2MW09-05I	2023-03-30	11.33	6.57	0.205	10.70	1.82	6.0	0.180	0.13
A2MW09-05I	2023-08-28	12.00	6.69	0.344	1.27	0.91	39.8	0.343	0.22
A2MW09-06S	2014-04-30	9.34	5.52	0.089	NM	3.63	92.4	0.086	0.06
A2MW09-06S	2017-04-11	9.04	4.39	0.063	NM	5.61	116.7	0.059	0.04
A2MW09-06S	2018-04-26	11.84	6.08	0.077	NM	7.48	288.6	0.066	0.05
A2MW09-06S	2021-03-31	10.02	5.23	0.092	NM	5.70	177.7	0.084	0.06
A2MW09-06S	2022-03-03	9.45	5.46	0.052	NM	6.92	23.7	0.049	0.03
A2MW09-06S	2022-03-21	8.66	5.32	0.044	NM	6.11	285.9	0.041	0.03
A2MW09-06S	2023-04-12	8.50	5.33	0.062	6.84	3.63	212.7	0.059	0.04
A2MW09-06I	2014-04-30	10.15	6.53	0.188	NM	2.10	-123.5	0.170	0.13
A2MW09-06I	2014-08-12	13.67	6.86	0.380	NM	1.71	-100.0	0.315	0.24
A2MW09-06I	2015-05-06	11.51	6.66	0.290	NM	1.82	39.8	0.254	0.19
A2MW09-06I	2015-08-24	12.51	6.86	0.384	NM	1.58	-2.1	0.328	0.25
A2MW09-06I	2016-03-22	11.06	6.44	0.168	NM	0.17	-42.2	0.148	0.11
A2MW09-06I	2016-08-25	13.90	6.87	0.321	NM	0.64	-65.0	0.264	0.20
A2MW09-06I	2017-04-11	10.51	7.12	0.134	NM	0.34	-151.3	0.120	0.09
A2MW09-06I	2017-09-06	12.62	5.86	0.269	NM	3.10	13.6	0.229	0.17
A2MW09-06I	2018-04-26	11.23	6.50	0.161	NM	0.36	-108.0	0.142	0.10
A2MW09-06I	2018-08-21	11.70	5.20	0.277	NM	1.85	71.9	0.242	0.18
A2MW09-06I	2019-03-26	10.42	6.37	0.239	NM	0.41	-55.7	0.215	0.16
A2MW09-06I	2019-09-10	14.62	7.16	0.279	NM	0.46	-105.8	0.226	0.17
A2MW09-06I	2020-03-26	10.43	6.47	0.196	NM	0.77	-71.5	0.177	0.13
A2MW09-06I	2020-08-11	14.18	6.37	0.224	NM	0.70	-20.0	0.183	0.14
A2MW09-06I	2021-03-11	10.25	6.47	0.154	NM	0.19	-60.9	0.139	0.10
A2MW09-06I	2021-08-17	11.06	6.63	0.236	NM	1.68	-14.4	0.205	0.15
A2MW09-06I	2022-03-03	10.86	6.42	0.139	NM	1.82	-14.5	0.123	0.09
A2MW09-06I	2022-08-08	12.80	6.64	NM	NM	2.14	-21.6	0.181	0.13
A2MW09-06I	2023-03-29	10.56	6.46	0.143	9.90	0.50	-10.2	0.129	0.09
A2MW09-06I	2023-08-28	12.80	6.68	0.279	24.80	0.57	-9.0	0.236	0.17
A2MW09-10	2014-04-30	10.32	6.10	0.516	NM	0.42	-33.2	0.467	0.35
A2MW09-10	2016-03-22	10.78	6.68	0.434	NM	1.60	-23.2	0.387	0.29
A2MW09-10	2016-12-21	11.22	6.19	0.428	NM	0.21	-45.1	0.377	0.28
A2MW09-10	2017-04-18	10.57	5.98	0.385	NM	0.31	-79.3	0.345	0.26
A2MW09-10	2021-03-31	10.68	6.26	0.565	NM	1.22	0.1	0.506	0.38
A2MW09-10	2022-03-03	10.21	6.24	0.271	NM	5.86	-49.5	0.246	0.18
A2MW09-10	2023-04-12	9.54	6.07	0.413	30.20	0.99	-77.0	0.381	0.29
A2MW09-11	2014-04-30	9.39	6.33	0.399	NM	1.97	-97.2	0.370	0.28
A2MW09-11	2015-05-06	10.98	6.04	0.466	NM	0.93	-234.4	0.413	0.31
A2MW09-11	2016-03-22	10.46	6.68	0.307	NM	0.09	-417.0	0.276	0.21
A2MW09-11	2016-12-21	10.98	6.34	0.347	NM	0.18	-57.3	0.308	0.23
A2MW09-11	2017-04-18	9.62	6.23	0.188	NM	0.23	-242.8	0.173	0.13
A2MW09-11	2018-04-26	10.07	6.20	0.262	NM	0.20	-38.7	0.238	0.18
A2MW09-11	2019-03-19	9.82	5.83	0.268	NM	0.50	-39.9	0.246	0.18
A2MW09-11	2019-04-17	9.92	5.36	0.189	NM	0.72	50.1	0.172	0.13
A2MW09-11	2020-04-08	9.19	6.25	0.220	NM	5.00	-24.5	0.205	0.15
A2MW09-11	2021-03-10	9.31	6.03	0.115	NM	0.13	-17.8	0.106	0.08
A2MW09-11	2022-03-03	9.19	5.82	0.072	NM	0.18	85.7	0.067	0.05
A2MW09-11	2023-03-29	9.32	6.17	0.222	5.72	0.37	-167.7	0.204	0.15
A2MW09-12	2014-04-30	9.39	5.54	0.074	NM	1.95	111.2	0.068	0.05
A2MW09-12	2015-05-07	11.26	5.55	0.062	NM	5.73	-75.6	0.055	0.04
A2MW09-12	2016-03-22	10.63	5.39	0.066	NM	2.29	201.8	0.059	0.04
A2MW09-12	2017-04-18	9.70	4.99	0.060	NM	1.70	134.2	0.055	0.04
A2MW09-12	2018-04-26	10.70	5.46	0.069	NM	3.42	168.6	0.061	0.04
A2MW09-12	2019-03-21	10.85	4.70	0.043	NM	6.30	2.9	0.038	0.03
A2MW09-12	2020-03-26	9.57	5.63	0.063	NM	9.06	-7.9	0.058	0.04
A2MW09-12	2021-03-10	9.88	5.37	0.048	NM	5.02	229.0	0.044	0.03
A2MW09-12	2022-03-03	9.69	5.49	0.040	NM	6.29	16.2	0.037	0.03
A2MW09-12	2023-03-29	10.10	5.63	0.051	8.99	7.18	191.3	0.046	0.03
A2MW09-13	2014-05-01	8.41	5.13	0.063	NM	2.62	159.1	0.060	0.04
A2MW09-13	2015-05-11	10.58	4.54	0.074	NM	2.52	157.7	0.066	0.05
A2MW09-13	2016-03-22	9.58	5.47	0.049	NM	0.93	166.9	0.045	0.03
A2MW09-13	2017-04-10	8.31	5.12	0.091	NM	1.11	159.1	0.087	0.06
A2MW09-13	2018-04-26	10.43	5.22	0.124	NM	1.33	210.1	0.112	0.08
A2MW09-13	2019-03-19	10.47	4.86	0.039	NM	9.05	9.7	0.035	0.02
A2MW09-13	2021-03-10	8.54	5.87	0.043	NM	0.79	178.1	0.041	0.03
A2MW09-13	2022-03-03	8.29	5.80	0.067	NM	2.37	233.4	0.065	0.05
A2MW09-13	2023-03-29	8.97	5.81	0.104	7.18	2.55	157.8	0.097	0.07
A2MW09-14	2014-05-01	9.90	5.84	0.231	NM	0.20	33.2	0.210	0.16
A2MW09-14	2014-08-07	15.09	6.00	0.250	NM	1.28	-13.5	0.200	0.08
A2MW09-14	2015-05-11	11.04	5.81	0.186	NM	0.57	-14.3	0.165	0.12
A2MW09-14	2016-03-31	10.30	5.79	0.236	NM	0.78	131.7	0.213	0.16
A2MW09-14	2017-04-10	8.61	5.15	0.171	NM	1.00	63.0	0.161	0.12
A2MW09-14	2018-04-26	10.41	5.51	0.361	NM	0.13	87.5	0.320	0.24
A2MW09-14	2021-03-10	9.38	5.39	0.202	NM	1.54	224.7	0.187	0.14
A2MW09-14	2022-03-03	8.71	5.37	0.189	NM	2.50	277.0	0.179	0.13
A2MW09-14	2023-03-28	10.10	6.80	0.245	4.20	1.19	-101.7	0.226	0.17
A2MW09-15	2014-05-01	10.97	7.39	0.578	NM	1.40	-174.6	0.513	0.39
A2MW09-15	2014-08-07	12.33	7.38	0.480	NM	0.58	-144.1	0.412	0.31
A2MW09-15	2015-05-11	12.37	7.21	0.410	NM	0.37	-117.6	0.350	0.26
A2MW09-15	2016-05-10	14.45	7.61	0.419	NM	5.89	26.3	0.341	0.26
A2MW09-15	2016-09-01	13.63	7.32	0.375	NM	0.35	-32.2	0.311	0.23
A2MW09-15	2017-04-10	10.71	5.64	0.201	NM	1.63	99.7	0.180	0.13
A2MW09-15	2018-04-26	13.22	4.39	0.299	NM	3.90	225.8	0.251	0.19
A2MW09-15	2021-03-10	10.60	5.36	0.212	NM	6.04	183.5	0.190	0.14
A2MW09-15	2022-03-03	10.33	6.75	0.443	NM	0.84	11.3	0.401	0.30
A2MW09-15	2023-03-28	12.14	6.73	0.452	53.40	0.71	-20.5	0.390	0.29
MW11-3S	2014-05-07	11.84	5.01	0.375	NM	2.46	-139.0	0.325	0.24
MW11-3S	2014-08-13	12.79	5.38	0.431	NM	0.92	93.2	0.365	0.27
MW11-3S	2015-05-11	12.52	5.28	0.346	NM	1.62	108.1	0.296	0.22
MW11-3S	2015-08-25	13.51	5.31	0.464	NM	1.17	231.6	0.386	0.29
MW11-3S	2015-09-21	12.19	5.18	0.498	NM	2.29	148.4	0.428	0.32
MW11-3S	2016-03-22	11.79	5.66	0.308	NM	2.14	147.3	0.255	0.16
MW11-3S	2016-08-22	13.02	5.34	0.434	NM	0.92	210.7	0.366	0.27
MW11-3S	2017-04-04	11.66	5.93	0.339	NM	8.23	-39.1	0.296	0.22
MW11-3S	2017-08-15	13.66	5.42	0.455	NM	1.76	97.7	0.377	0.28
MW11-3S	2018-04-19	10.65	5.25	0.257	NM	3.25	227.3	0.230	0.17
MW11-3S	2018-08-21	12.45	5.13	0.429	NM	1.92	212.1	0.366	0.27
MW11-3S	2019-03-18	11.58	4.87	0.394	NM	1.34	-36.3	0.345	0.26
MW11-3S	2019-09-09	12.70	5.62	0.612	NM	1.52	81.6	0.520	0.39
MW11-3S	2020-04-01	11.03	5.49	0.668	NM	0.97	78.2	0.592	0.45
MW11-3S	2020-08-17	14.29	5.40	0.729	NM	1.59	155.9	0.596	0.43
MW11-3S	2021-03-09	11.28	5.50	0.430	NM	1.38	34.5	0.379	0.28
MW11-3S	2021-08-16	12.22	5.47	0.510	NM	3.13	108.4	0.437	0.33
MW11-3S	2022-03-16	10.78	6.10	0.294	NM	0.73	28.6	0.262	NM
MW11-3S	2022-08-09	12.50	5.62	0.338	1.71	2.08	124.5	0.288	0.21
MW11-3S	2023-03-27	11.42	5.82	0.272	4.40	2.13	87.7	0.239	0.18

AECOM

TABLE 2-1b
AREA 2 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
MW11-3S	2023-08-24	12.10	5.60	0.340	3.70	2.54	111.1	0.293	0.22
MW11-3I	2014-05-07	12.34	5.43	0.562	NM	0.42	-160.9	0.482	0.36
MW11-3I	2014-08-13	13.35	5.59	0.566	NM	5.19	99.6	0.473	0.36
MW11-3I	2015-05-11	12.64	5.63	0.455	NM	1.12	85.9	0.388	0.29
MW11-3I	2015-08-26	13.80	5.86	0.516	NM	0.33	225.9	0.427	0.32
MW11-3I	2015-09-21	13.01	6.08	0.544	NM	0.23	70.3	0.459	0.35
MW11-3I	2016-03-22	12.29	5.89	0.349	NM	1.90	121.2	0.299	0.22
MW11-3I	2016-08-22	13.10	5.78	0.482	NM	0.68	161.8	0.405	0.31
MW11-3I	2017-04-04	12.54	5.85	0.458	NM	1.67	-51.4	0.391	0.29
MW11-3I	2017-08-15	13.25	5.79	0.473	NM	0.33	69.3	0.396	0.30
MW11-3I	2018-04-19	12.03	5.60	0.536	NM	0.82	230.0	0.463	0.35
MW11-3I	2018-08-21	12.89	5.41	0.506	NM	0.73	222.0	0.428	0.32
MW11-3I	2018-08-21	12.89	5.41	0.506	NM	0.73	222.0	0.428	0.32
MW11-3I	2019-03-18	11.82	5.44	0.373	NM	1.02	-59.5	0.324	0.24
MW11-3I	2019-09-09	12.17	7.04	0.448	NM	0.44	-95.3	0.386	0.29
MW11-3I	2020-04-01	11.54	5.65	0.780	NM	0.78	75.1	0.682	0.52
MW11-3I	2020-08-17	13.97	5.81	0.605	NM	0.38	133.4	0.498	0.38
MW11-3I	2021-03-09	11.80	5.71	0.574	NM	2.36	127.6	0.499	0.38
MW11-3I	2021-08-16	12.58	5.78	0.559	NM	0.62	88.1	0.477	0.36
MW11-3I	2022-03-14	11.40	6.01	0.459	NM	3.58	125.5	0.403	0.30
MW11-3I	2022-08-09	13.40	5.95	0.455	430.00	4.12	133.9	0.380	0.29
MW11-3I	2023-03-28	11.68	6.07	0.441	18.30	6.60	-79.9	0.385	0.29
MW11-3I	2023-08-28	12.70	5.90	0.416	3.20	1.35	129.0	0.354	0.27
MW11-3D	2014-08-13	13.06	6.24	0.834	NM	0.39	37.0	0.702	0.56
MW11-3D	2015-05-12	13.97	6.38	0.806	NM	0.43	37.5	0.665	0.51
MW11-3D	2015-08-26	14.09	6.44	0.862	NM	0.43	85.1	0.708	0.54
MW11-3D	2015-09-21	13.05	6.61	0.845	NM	0.99	21.5	0.711	0.55
MW11-3D	2016-03-22	12.00	6.65	0.784	NM	0.30	2.7	0.678	0.52
MW11-3D	2016-08-22	13.07	6.55	0.802	NM	0.13	3.5	0.691	0.52
MW11-3D	2017-04-04	12.52	6.47	0.792	NM	0.23	-80.0	0.677	0.52
MW11-3D	2017-08-15	14.27	6.41	0.787	NM	1.09	24.5	0.644	0.49
MW11-3D	2018-04-19	12.41	6.36	0.846	NM	0.29	47.0	0.724	0.56
MW11-3D	2018-08-21	12.96	6.34	0.795	NM	2.71	83.8	0.672	0.51
MW11-3D	2019-03-18	12.06	6.18	0.704	NM	1.04	-51.4	0.608	0.46
MW11-3D	2020-04-01	11.48	6.44	1.077	NM	0.24	-3.6	0.943	0.73
MW11-3D	2020-08-13	13.37	6.38	0.825	NM	0.41	26.8	0.690	0.53
MW11-3D	2021-03-09	11.81	6.43	0.813	NM	1.49	23.3	0.706	0.54
MW11-3D	2021-08-30	12.93	6.56	0.825	NM	0.34	33.7	0.698	0.54
MW11-3D	2022-03-14	9.61	6.57	0.742	NM	2.35	19.4	0.683	0.52
MW11-3D	2022-08-09	16.80	NM	NM	10.60	1.66	36.8	0.715	0.55
MW11-3D	2023-03-27	12.37	6.63	0.780	9.16	5.84	-32.4	0.668	0.51
MW11-3D	2023-08-28	13.10	6.39	0.870	0.24	0.19	140.2	0.732	0.56
MW11-4S	2014-05-07	10.57	5.44	0.798	NM	1.68	196.4	0.691	0.53
MW11-4S	2014-08-13	13.48	5.63	0.875	NM	4.35	121.0	0.729	0.56
MW11-4S	2015-05-12	11.26	5.38	0.754	NM	4.92	109.3	0.664	0.51
MW11-4S	2015-08-26	12.16	5.50	0.832	NM	1.76	193.9	0.717	0.55
MW11-4S	2015-09-21	10.91	5.43	0.788	NM	2.30	128.1	0.701	0.54
MW11-4S	2016-03-22	10.84	6.69	0.729	NM	0.18	39.4	0.649	0.50
MW11-4S	2016-08-22	11.69	5.67	0.821	NM	1.95	105.2	0.716	0.55
MW11-4S	2017-04-04	10.59	5.75	0.645	NM	0.42	-89.4	0.624	0.48
MW11-4S	2017-08-15	12.46	5.62	0.864	NM	0.77	38.7	0.740	0.57
MW11-4S	2018-04-19	11.05	5.52	0.966	NM	0.25	151.1	0.856	0.66
MW11-4S	2018-08-20	12.18	5.46	1.035	NM	2.30	135.7	0.891	0.69
MW11-4S	2019-03-18	11.34	5.33	0.815	NM	1.23	-56.3	0.717	0.55
MW11-4S	2019-09-09	11.25	7.04	0.861	NM	4.12	-15.8	0.759	0.58
MW11-4S	2020-04-01	10.28	5.70	1.148	NM	0.91	5.9	1.039	0.81
MW11-4S	2020-08-13	11.27	5.69	0.927	NM	0.19	163.1	0.856	0.66
MW11-4S	2021-03-09	10.73	5.75	0.895	NM	0.19	166.8	0.800	0.62
MW11-4S	2021-08-16	11.66	5.71	0.958	NM	0.32	116.8	0.840	0.65
MW11-4S	2022-03-03	10.28	6.28	0.733	NM	3.90	137.4	0.662	0.51
MW11-4S	2022-08-08	13.40	6.06	0.820	2.76	2.39	65.7	0.689	0.53
MW11-4S	2023-03-27	10.89	5.67	0.719	2.12	0.58	-109.4	0.639	0.49
MW11-4S	2023-08-24	11.80	5.70	0.747	1.73	0.39	169.4	0.650	0.50
MW11-4I	2014-05-07	11.19	5.49	0.948	NM	1.20	138.1	0.837	0.65
MW11-4I	2014-08-13	12.30	5.39	0.948	NM	2.93	107.9	0.813	0.63
MW11-4I	2015-05-12	11.59	5.43	0.789	NM	0.25	110.7	0.690	0.53
MW11-4I	2015-08-26	13.39	5.59	0.899	NM	0.24	153.8	0.751	0.58
MW11-4I	2015-09-21	12.06	5.76	0.856	NM	0.34	168.2	0.739	0.57
MW11-4I	2016-03-22	11.08	6.69	0.793	NM	0.52	38.9	0.702	0.54
MW11-4I	2016-08-22	11.63	5.65	0.837	NM	0.25	41.9	0.731	0.56
MW11-4I	2017-04-04	11.30	5.66	0.767	NM	0.51	-108.5	0.676	0.52
MW11-4I	2017-08-15	12.54	5.55	0.809	NM	0.45	89.7	0.690	0.53
MW11-4I	2018-04-19	11.13	5.09	0.964	NM	1.38	173.4	0.852	0.66
MW11-4I	2018-08-20	12.60	5.63	0.976	NM	3.43	50.0	0.831	0.64
MW11-4I	2019-03-18	11.54	5.29	0.808	NM	0.24	-56.9	0.707	0.54
MW11-4I	2019-09-09	11.74	6.91	0.853	NM	0.81	-34.2	0.742	0.57
MW11-4I	2020-04-01	10.90	5.64	1.185	NM	0.66	-15.4	1.054	0.82
MW11-4I	2020-08-13	12.15	5.74	0.933	NM	0.82	116.9	0.804	0.62
MW11-4I	2021-03-09	11.17	5.58	0.935	NM	0.19	84.5	0.826	0.64
MW11-4I	2021-08-16	12.08	5.68	0.974	NM	0.86	121.4	0.840	0.65
MW11-4I	2022-03-16	10.30	6.31	0.844	NM	1.22	108.6	0.763	0.59
MW11-4I	2022-08-09	14.10	5.78	0.930	327.00	2.00	119.6	0.767	0.59
MW11-4I	2023-03-27	11.39	5.52	0.810	1.37	0.15	-106.5	0.712	0.55
MW11-4I	2023-08-28	12.90	5.83	0.875	0.38	0.37	22.7	0.740	0.57
MW11-4D	2014-05-07	11.82	5.55	1.002	NM	2.21	NM	NM	NM
MW11-4D	2014-08-13	13.01	5.54	0.974	NM	0.48	101.2	0.822	0.64
MW11-4D	2015-05-12	11.93	5.47	0.783	NM	0.38	107.3	0.678	0.52
MW11-4D	2015-08-26	12.56	5.55	0.871	NM	0.14	180.7	0.742	0.57
MW11-4D	2016-03-22	11.13	6.64	0.791	NM	0.24	42.5	0.700	0.54
MW11-4D	2016-08-22	12.15	5.37	0.882	NM	0.32	92.7	0.760	0.59
MW11-4D	2017-04-04	11.63	5.80	0.780	NM	0.35	-83.5	0.681	0.52
MW11-4D	2017-08-15	13.26	5.80	0.897	NM	1.96	68.1	0.752	0.58
MW11-4D	2018-04-19	11.60	5.77	0.913	NM	0.14	118.1	0.798	0.62
MW11-4D	2018-08-20	12.10	5.92	0.986	NM	6.70	92.7	0.850	0.66
MW11-4D	2019-03-18	11.35	5.13	0.784	NM	0.62	-57.4	0.693	0.53
MW11-4D	2019-09-09	11.39	6.98	0.820	NM	1.11	-34.9	0.720	0.55
MW11-4D	2020-04-01	10.76	5.77	1.141	NM	6.81	-11.5	1.019	0.79
MW11-4D	2020-08-13	12.35	5.83	0.907	NM	0.32	97.4	0.778	0.60
MW11-4D	2021-03-09	10.96	5.81	0.896	NM	0.17	82.1	0.796	0.61
MW11-4D	2021-08-16	14.64	5.81	1.019	NM	1.08	59.4	0.830	0.64
MW11-4D	2022-03-14	10.61	5.91	0.844	NM	3.98	102.9	0.757	0.58
MW11-4D	2022-08-09	13.00	5.96	0.900	26.60	7.22	67.1	0.760	0.58
MW11-4D	2023-03-27	11.37	5.69	0.807	8.15	2.80	-85.2	0.710	0.54
MW11-4D	2023-08-28	13.80	5.83	0.925	12.40	3.26	172.9	0.765	0.59
G2-3B	2014-05-27	14.41	6.03	0.568	NM	2.25	-29.0	0.463	0.35
G2-3B	2014-08-26	14.78	6.24	0.502	NM	1.82	-79.1	0.406	0.31
G2-3B	2015-03-03	12.75	6.13	0.406	NM	1.12	-172.0	0.344	0.26
G2-3B	2015-09-16	15.33	6.49	0.542	NM	0.20	3.7	0.433	0.33
G2-3B	2016-03-09	12.42	6.52	0.494	NM	0.37	-142.7	0.423	0.32
G2-3B	2016-08-11	14.35	6.44	0.330	NM	0.48	-46.4	0.272	0.20
G2-3B	2017-03-23	13.64	6.31	0.490	NM	0.57	-82.3	0.410	0.31
G2-3B	2018-08-27	13.47	6.38	0.597	NM	3.39	-20.2	0.497	0.38
G2-3B	2019-03-21	14.12	6.18	0.441	NM	1.97	-26.9	0.361	0.27
G2-3B	2019-09-12	15.13	6.70	0.453	NM	0.35	3.3	0.363	0.27
G2-3B	2020-04-02	13.95	6.60	0.681	NM	4.03	-52.7	0.561	0.43
G2-3B	2020-08-13	15.06	6.38	0.495	NM	0.82	-45.9	0.397	0.30
G2-3B	2021-03-15	13.74	6.39	0.681	NM	0.82	-59.7	0.564	0.43
G2-3B	2021-08-19	15.34	6.44	0.484	NM	1.11	-8.7	0.386	0.29
G2-3B	2022-03-10	12.02	6.62	0.420	NM	6.37	-44.8	0.362	0.27
G2-3B	2022-08-11	14.40	6.47	0.464	22.50	0.92	29.3	0.378	0.28
G2-3B	2023-04-05	13.36	6.52	0.471	46.80	1.96	-70.4	0.394	0.30
G2-3B	2023-08-28	14.50	6.44	0.496	9.03	0.93	43.9	0.404	0.30
G2-3C	2014-05-27	14.13	6.47	0.608	NM	2.03	-60.7	0.498	0.38
G2-3C	2014-08-26	13.09	6.35	0.575	NM	0.36	-20.5	0.484	0.37
G2-3C	2015-03-03	11.35	6.75	0.406	NM	7.61	-60.2	0.357	0.27
G2-3C	2015-09-16	13.24	5.82	0.542	NM	0.82	-20.5	0.454	0.34
G2-3C	2016-03-09	12.00	6.86	0.488	NM	0.81	-133.4	0.422	0.32
G2-3C	2016-08-11	14.10	7.46	0.493	NM	2.59	-50.0	0.404	0.30
G2-3C	2017-03-28	12.06	6.97	0.495	NM	0.26	-151.3	0.397	0.20
G2-3C	2018-08-27	14.79	7.14	0.564	NM	1.65	-52.3	0.455	0.34
G2-3C	2019-03-21	13.99	6.47	0.413	NM	2.05	-35.1	0.339	0.25
G2-3C	2019-09-17	13.52	7.09	0.591	NM	5.99	-15.1	0.492	0.37
G2-3C	2020-04-02	14.00	6.93	0.629	NM	4.66	-41.9	0.518	0.39
G2-3C	2020-08-13	14.12	7.11	0.469	NM	2.86	-52.3	0.385	0.29
G2-3C	2021-03-15	13.58	6.82	0.660	NM	0.99	-62.1	0.549	0.42
G2-3C	2021-08-19	14.33	6.77	0.423	NM	1.52	23.8	0.346	0.26
G2-3C	2022-03-10	12.85	6.95	0.451	NM	2.62	-48.4	0.383	0.29
G2-3C	2022-08-11	15.90	7.15	0.500	12.50	3.83	25.1	0.396	0.30
G2-3C	2023-04-05	13.06	7.30	0.790	13.40	3.17	-95.6	0.404	0.30
G2-3C	2023-08-28	14.80	6.85	0.531	3.67	0.12	19.1	0.427	0.32
G2-9A	2014-05-26	17.23	6.12	0.431	NM	1.32	2.6	0.326	0.24
G2-9A	2014-08-26	15.21	5.87	0.439	NM	4.01	26.9	0.209	0.26
G2-9A	2015-03-03	13.07	5.89	0.344	NM	0.25	64.0	0.290	0.22
G2-9A	2015-09-16	13.86	5.64	0.382	NM	1.75	81.2	0.316	0.24
G2-9A	2016-03-09	12.56	6.04	0.252	NM	0.47	97.9	0.215	0.16
G2-9A	2016-08-11	13.57	6.24	0.403	NM	1.09	10.7	0.335	0.25
G2-9A	2017-03-28	12.66	6.06	0.257	NM	0.60	-157.3	0.219	0.16
G2-9A	2017-08-23	14.90	5.86	0.411	NM	0.48	55.1	0.331	0.25
G2-9A	2018-05-01	13.53	6.06	0.376	NM	1.97	60.2	0.313	0.23
G2-9A	2018-08-27	13.50	6.31	0.475	NM	4.35	116.0	0.395	0.30
G2-9A	2019-03-21	13.24	6.02	0.279	NM	1.05	37.0	0.234	0.17
G2-9A	2019-09-12	13.74	3.46	0.378	NM	0.73	173.0	0.314	0.23
G2-9A	2020-04-02	13.46	5.90	0.400	NM	1.85	52.2	0.334	0.25

AECOM

TABLE 2-1b
AREA 2 SUMMARY OF FIELD PARAMETERS
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Date	Temperature (°C)	pH	Electrical Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP	TDS (g/L)	Salinity (ppt)
G2-9A	2020-08-13	14.59	6.09	0.416	NM	1.57	36.7	0.338	0.25
G2-9A	2021-03-15	13.28	5.99	0.485	NM	0.23	21.8	0.407	0.31
G2-9A	2021-08-19	14.17	6.24	0.425	NM	0.47	22.5	0.348	0.26
G2-9A	2022-03-10	12.98	6.79	0.310	NM	1.71	-65.1	0.262	0.19
G2-9A	2022-08-10	15.00	6.24	0.412	14.30	0.64	16.1	0.332	0.25
G2-9A	2023-04-06	12.01	6.31	0.347	55.50	3.62	-7.6	0.300	0.22
G2-9A	2023-08-29	13.80	6.17	0.434	12.27	0.75	38.8	0.359	0.27
G2-9B	2014-05-26	14.68	6.70	0.411	NM	2.29	-41.4	0.332	0.25
G2-9B	2014-08-26	12.23	6.63	0.398	NM	1.07	2.9	0.345	0.26
G2-9B	2015-03-03	12.74	6.74	0.396	NM	3.63	-88.0	0.335	0.25
G2-9B	2015-09-16	12.72	6.49	0.421	NM	2.26	-28.1	0.357	0.27
G2-9B	2016-03-09	10.21	7.02	0.409	NM	1.57	-5.6	0.370	0.28
G2-9B	2016-08-11	13.10	5.72	0.401	NM	2.54	37.2	0.337	0.25
G2-9B	2017-03-28	11.78	6.99	0.391	NM	0.38	-121.3	0.338	0.25
G2-9B	2017-08-23	14.22	7.00	0.426	NM	2.80	14.4	0.348	0.26
G2-9B	2018-05-02	13.37	6.49	0.479	NM	3.96	41.0	0.400	0.30
G2-9B	2018-08-27	13.61	7.13	0.479	NM	5.05	-3.8	0.398	0.30
G2-9B	2019-03-20	14.19	6.95	0.362	NM	9.33	-22.7	0.296	0.22
G2-9B	2019-09-12	12.54	3.73	0.366	NM	3.00	161.1	0.312	0.23
G2-9B	2020-04-02	12.51	6.93	0.512	NM	5.09	-13.3	0.437	0.33
G2-9B	2020-08-13	14.52	7.24	0.389	NM	2.82	-37.4	0.316	0.24
G2-9B	2021-03-15	12.57	6.95	0.538	NM	4.42	-47.3	0.459	0.35
G2-9B	2021-08-19	13.18	7.03	0.384	NM	1.43	-18.4	0.322	0.24
G2-9B	2022-03-10	12.25	7.57	0.370	NM	4.03	-70.6	0.318	0.24
G2-9B	2022-08-11	16.40	7.17	0.437	12.20	3.75	31.9	0.342	0.26
G2-9B	2023-04-05	12.31	7.17	0.382	16.70	1.72	-81.6	0.328	0.25
G2-9B	2023-08-29	14.00	7.07	0.419	0.10	0.58	-4.1	0.344	0.26
G2-10	2014-05-15	10.66	4.75	0.219	NM	15.72	-281.3	0.196	0.14
G2-10	2014-08-20	13.04	4.84	0.224	NM	1.50	152.7	0.189	0.14
G2-10	2015-03-03	11.09	5.41	0.236	NM	0.27	177.7	0.209	0.15
G2-10	2015-09-16	13.36	5.57	0.290	NM	0.53	138.7	0.242	0.18
G2-10	2016-03-07	10.75	4.27	0.231	NM	1.43	276.4	0.206	0.15
G2-10	2016-08-10	13.90	10.38	0.212	NM	1.96	150.8	0.175	0.13
G2-10	2017-03-28	9.46	5.87	0.228	NM	0.18	-85.9	0.211	0.16
G2-10	2017-08-23	14.22	7.00	0.426	NM	2.80	14.4	0.348	0.26
G2-10	2018-05-01	10.79	5.54	0.391	NM	1.88	107.2	0.349	0.26
G2-10	2018-08-27	13.56	5.79	0.318	NM	3.88	158.2	0.265	0.20
G2-10	2019-03-21	11.02	5.28	0.335	NM	0.25	-33.8	0.297	0.22
G2-10	2019-09-17	12.09	6.70	0.380	NM	2.01	5.6	0.328	0.25
G2-10	2020-04-02	9.66	5.52	0.564	NM	1.25	-4.5	0.519	0.39
G2-10	2020-08-12	11.94	5.28	0.344	NM	0.77	185.9	0.298	0.22
G2-10	2021-03-15	10.43	5.68	0.469	NM	0.21	144.7	0.423	0.32
G2-10	2021-08-24	12.76	5.37	0.319	NM	0.97	148.5	0.271	0.20
G2-10	2022-03-10	10.07	5.77	0.275	NM	1.05	100.5	0.250	0.19
G2-10	2022-08-11	14.50	5.60	0.242	23.90	0.81	53.6	0.205	0.15
G2-10	2023-04-11	9.78	5.48	0.393	75.50	0.36	-75.1	0.360	0.27
G2-10	2023-08-28	13.10	5.44	0.241	43.40	0.91	131.5	0.203	0.15
WS2-D	2014-05-22	10.21	6.04	0.110	NM	0.94	54.1	0.100	0.07
WS2-D	2014-08-22	12.09	5.73	0.134	NM	1.02	103.7	0.116	0.08
WS2-D	2015-03-05	11.27	6.22	0.105	NM	6.61	126.3	0.093	0.07
WS2-D	2015-08-18	12.85	6.29	0.111	NM	0.25	265.7	0.094	0.07
WS2-D	2016-03-08	10.72	6.56	0.147	NM	1.34	212.2	0.131	0.10
WS2-D	2016-08-08	12.27	5.85	0.118	NM	0.72	138.2	0.101	0.07
WS2-D	2016-09-12	12.87	6.55	0.131	NM	4.76	71.0	0.111	0.08
WS2-D	2017-03-08	10.05	6.18	0.098	NM	6.59	-149.6	0.089	0.07
WS2-D	2017-08-23	12.17	6.06	0.095	NM	1.07	95.6	0.082	0.06
WS2-D	2018-05-02	10.51	5.31	0.083	NM	2.51	204.6	0.075	0.05
WS2-D	2018-08-27	11.75	5.13	0.092	NM	1.79	236.4	0.080	0.06
WS2-D	2019-03-25	10.85	5.03	0.082	NM	5.00	250.9	0.074	0.05
WS2-D	2019-09-12	11.44	6.85	0.078	NM	4.69	18.3	0.068	0.05
WS2-D	2020-04-02	10.12	5.40	0.085	NM	2.10	76.8	0.077	0.06
WS2-D	2020-08-12	11.89	5.77	0.062	NM	0.28	55.1	0.053	0.04
WS2-D	2021-03-08	10.77	5.69	0.061	NM	3.80	162.0	0.054	0.04
WS2-D	2021-08-19	12.41	5.74	0.066	NM	0.69	110.3	0.057	0.04
WS2-D	2022-03-16	10.83	6.42	0.050	NM	3.16	152.5	0.044	0.03
WS2-D	2022-08-22	14.10	5.06	0.067	3.51	1.58	124.3	0.055	0.04
WS2-D	2023-04-05	10.26	5.61	0.045	3.11	1.22	-65.6	0.041	0.03
WS2-D	2023-08-24	12.60	5.28	0.063	3.06	1.24	218.2	0.054	0.04
WS2-D2	2014-05-22	10.86	6.79	0.189	NM	0.73	51.3	0.168	0.12
WS2-D2	2014-08-22	12.89	7.23	0.229	NM	0.61	-54.7	0.194	0.14
WS2-D2	2015-03-05	12.36	7.07	0.198	NM	8.44	50.0	0.170	0.12
WS2-D2	2015-08-17	13.41	7.20	0.201	NM	0.15	68.7	0.168	0.12
WS2-D2	2016-03-10	10.11	7.01	0.140	NM	1.16	-111.3	0.128	0.09
WS2-D2	2016-08-08	13.15	6.85	0.200	NM	0.51	76.3	0.168	0.12
WS2-D2	2017-03-08	10.86	7.02	0.158	NM	1.00	-226.7	0.141	0.10
WS2-D2	2017-08-23	12.11	7.10	0.203	NM	0.45	90.7	0.175	0.13
WS2-D2	2018-05-02	11.32	7.19	0.213	NM	4.90	141.0	0.188	0.14
WS2-D2	2018-08-27	12.40	7.01	0.231	NM	0.42	222.4	0.197	0.15
WS2-D2	2019-03-25	11.33	7.05	0.210	NM	1.09	115.6	0.185	0.14
WS2-D2	2019-09-12	12.05	7.02	0.160	NM	0.73	66.1	0.139	0.10
WS2-D2	2020-04-02	10.75	6.94	0.229	NM	0.50	73.9	0.205	0.15
WS2-D2	2020-08-12	13.35	7.13	0.176	NM	0.55	62.0	0.147	0.11
WS2-D2	2021-03-08	11.11	7.05	0.165	NM	0.97	25.0	0.146	0.11
WS2-D2	2021-08-19	12.43	6.85	0.176	NM	0.83	65.7	0.154	0.11
WS2-D2	2022-03-16	11.62	7.62	0.203	NM	2.53	33.0	0.177	0.13
WS2-D2	2022-08-22	13.30	6.62	0.194	121.00	NM	70.8	0.162	0.12
WS2-D2	2023-04-06	10.33	7.50	0.181	65.40	3.03	-13.9	0.164	0.12
WS2-D2	2023-08-28	11.80	7.22	0.205	6.26	0.27	79.9	0.179	0.13
MW3	2021-03-15	9.68	6.23	0.964	NM	0.90	3.1	0.885	0.69
MW3	2021-08-18	11.24	6.24	0.844	NM	1.75	32.6	0.744	0.57
MW3	2022-08-11	12.10	6.16	0.950	10.40	2.20	35.5	0.819	0.63
MW3	2023-04-11	9.20	6.24	1.217	17.40	2.11	24.1	1.133	0.89
MW3	2023-08-24	11.00	6.08	0.947	8.10	0.55	52.4	0.841	0.65
MW5	2021-03-15	8.77	4.80	0.282	NM	0.54	194.8	0.265	0.20
MW5	2021-08-18	12.67	4.78	0.319	NM	0.48	194.8	0.272	0.20
MW5	2022-08-11	13.90	5.30	0.318	1.34	1.15	64.9	0.263	0.20
MW5	2023-04-06	8.44	6.28	0.239	2.50	4.05	147.5	0.227	0.17
MW5	2023-08-24	11.60	5.63	0.311	2.13	2.26	191.9	0.272	0.20
U4-1	2021-03-15	10.44	5.59	0.104	NM	9.53	193.5	0.093	0.07
U4-1	2021-08-18	14.36	6.80	0.130	NM	8.99	70.7	0.106	0.08
U4-1	2022-08-25	12.50	6.29	0.138	13.40	6.91	66.2	0.118	0.09
U4-1	2023-04-06	9.49	6.00	0.067	7.37	8.15	170.6	0.057	0.04
U4-1	2023-08-24	12.60	5.82	0.103	22.80	8.86	195.2	0.087	0.06
U4-3	2021-03-15	9.92	6.32	0.332	NM	3.45	175.7	0.303	0.23
U4-3	2021-08-18	10.62	6.61	0.258	NM	4.39	53.1	0.232	0.17
U4-3	2022-08-24	11.30	6.54	0.351	10.10	3.40	61.8	0.299	0.22
U4-3	2023-04-11	10.00	6.18	0.358	36.90	6.07	-63.9	0.326	0.24
U4-3	2023-08-28	13.00	6.39	0.313	11.34	4.84	126.2	0.265	0.20

Abbreviations:

°C	degrees Celsius
g/L	grams per litre
L	Litres
m	metres
mASL	metres above sea level
mg/L	milligrams per litre
mV	millivolts
mS/cm	millisiemens per centimetre
NA	Not applicable/available
ND	Not detected
NM	Not monitored
NS	Not sampled
NTU	Nephelometric Turbidity unit
ORP	Oxidation Reduction Potential
ppt	parts per thousand
TDS	Total Dissolved Solids
TOC	Top of Casing

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type												
PW03-1A	PW03-1A-20140429	PW03-1A-20140429	2014-04-29	2.40 - 4.00	N	420	340	420	340	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-1A	PW03-1A-20160309	PW03-1A-20160309	2016-03-09	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-1A	PW03-1A-20170403	PW03-1A-20170403	2017-04-03	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	PW03-1A-20180430	PW03-1A-20180430	2018-04-30	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	PW03-1A-REG-GW_20180430		2018-04-30	2.40 - 4.00	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	PW03-1A-20190326	PW03-1A-20190326	2019-03-26	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	PW03-1A-REG-GW_20190326		2019-03-26	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	PW03-1A-20200408	PW03-1A-20200408	2020-04-08	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1A	VA20A4587-005		2020-04-08	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-1A	PW03-1A-20210311	PW03-1A-20210311	2021-03-11	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-1A	PW03-1A-REG-GW_20210311		2021-03-11	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-1A	PW03-1A-REG-GW_20220302		2022-03-02	2.40 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-1A	PW03-1A_20230330		2023-03-30	2.40 - 4.00	N	< 250	300	< 250	300	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-1B	PW03-1B-20140429	PW03-1B-20140429	2014-04-29	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-1B	PW03-1B-20160309	PW03-1B-20160309	2016-03-09	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-1B	PW03-1B-20170403	PW03-1B-20170403	2017-04-03	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	PW03-1B-20180430	PW03-1B-20180430	2018-04-30	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	PW03-1B-REG-GW_20180430		2018-04-30	1.10 - 3.70	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	PW03-1B-20190416	PW03-1B-20190416	2019-04-16	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	PW03-1B-REG-GW_20190416		2019-04-16	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	PW03-1B-20200408	PW03-1B-20200408	2020-04-08	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	VA20A4587-006		2020-04-08	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-1B	PW03-1B_DUP-12-20200408	PW03-1B-20200408	2020-04-08	1.10 - 3.70	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-1B	VA20A4586-002	VA20A4587-006	2020-04-08	1.10 - 3.70	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-1B	PW03-1B-20210311	PW03-1B-20210311	2021-03-11	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-1B	PW03-1B-REG-GW_20210311		2021-03-11	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-1B	PW03-1B-REG-GW_20220302		2022-03-02	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-1B	PW03-1B_20230412		2023-04-12	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2A	PW03-2A-20140429	PW03-2A-20140429	2014-04-29	1.80 - 4.60	N	< 250	400	< 250	400	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-2A	PW03-2A-20160309	PW03-2A-20160309	2016-03-09	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-2A	PW03-2A-20170403	PW03-2A-20170403	2017-04-03	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2A	PW03-2A-20190416	PW03-2A-20190416	2019-04-16	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2A	PW03-2A-REG-GW_20190416		2019-04-16	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2A	PW03-2A-20200408	PW03-2A-20200408	2020-04-08	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2A	VA20A4586-001		2020-04-08	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-2A	PW03-2A-20210311	PW03-2A-20210311	2021-03-11	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-2A	PW03-2A-REG-GW_20210311		2021-03-11	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2A	PW03-2A-REG-GW_20220302		2022-03-02	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2A	PW03-2A_20230330		2023-03-30	1.80 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2B	PW03-2B-20140429	PW03-2B-20140429	2014-04-29	1.10 - 3.70	N	< 250	300	< 250	300	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-2B	PW03-2B-20160309	PW03-2B-20160309	2016-03-09	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-2B	PW03-2B-20170403	PW03-2B-20170403	2017-04-03	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
PW03-2B	PW03-2B-20190326	PW03-2B-20190326	2019-03-26	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2B	PW03-2B-REG-GW_20190326		2019-03-26	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2B	PW03-2B-20200408	PW03-2B-20200408	2020-04-08	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-2B	VA20A4587-003		2020-04-08	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-2B	PW03-2B-20210311	PW03-2B-20210311	2021-03-11	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-2B	PW03-2B-REG-GW_20210311		2021-03-11	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2B	PW03-2B-REG-GW_20220302		2022-03-02	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-2B	PW03-2B_20230330		2023-03-30	1.10 - 3.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-3	PW03-3-20140429	PW03-3-20140429	2014-04-29	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-3	PW03-3-20160309	PW03-3-20160309	2016-03-09	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-3	PW03-3-20170331	PW03-3-20170331	2017-03-31	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	PW03-3-20180430	PW03-3-20180430	2018-04-30	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	PW03-3-REG-GW_20180430		2018-04-30	1.20 - 4.10	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	PW03-3-20190326	PW03-3-20190326	2019-03-26	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	PW03-3-REG-GW_20190326		2019-03-26	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	PW03-3-20200409	PW03-3-20200409	2020-04-09	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-3	VA20A4665-002		2020-04-09	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-3	PW03-3-20210311	PW03-3-20210311	2021-03-11	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-3	PW03-3-REG-GW_20210311		2021-03-11	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-3	PW03-3-REG-GW_20220321		2022-03-21	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-3	PW03-3_20230330		2023-03-30	1.20 - 4.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-4	PW03-4-20140429	PW03-4-20140429	2014-04-29	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-4	PW03-4-20160309	PW03-4-20160309	2016-03-09	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-4	PW03-4-20170403	PW03-4-20170403	2017-04-03	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
PW03-4	PW03-4-20190416	PW03-4-20190416	2019-04-16	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-4	PW03-4-REG-GW_20190416		2019-04-16	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-4	PW03-4-20200409	PW03-4-20200409	2020-04-09	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-4	VA20A4665-001		2020-04-09	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-4	PW03-4-20210311	PW03-4-20210311	2021-03-11	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
PW03-4	PW03-4-REG-GW_20210311		2021-03-11	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-4	PW03-4-REG-GW_20220302		2022-03-02	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-4	PW03-4_20230330		2023-03-30	1.80 - 4.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-5	PW03-5-20140429	PW03-5-20140429	2014-04-29	7.60 - 8.50	N	< 250	290	< 250	290	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-5	PW03-5-20150506	PW03-5-20150506	2015-05-06	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-5	PW03-5-20160309	PW03-5-20160309	2016-03-09	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-5	PW03-5_DUP-3-20160309	PW03-5-20160309	2016-03-09	7.60 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-5	PW03-5-20170403	PW03-5-20170403	2017-04-03	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5-20180430	PW03-5-20180430	2018-04-30	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5-REG-GW_20180430		2018-04-30	7.60 - 8.50	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5_DUP-11-20180430	PW03-5-20180430	2018-04-30	7.60 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5-20190326	PW03-5-20190326	2019-03-26	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5-REG-GW_20190326		2019-03-26	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	DUP-05-FD-GW_20190326	PW03-5-REG-GW_20190326	2019-03-26	7.60 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5_DUP-05-20190326	PW03-5-20190326	2019-03-26	7.60 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	PW03-5-20200326	PW03-5-20200326	2020-03-26	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-5	VA20A3974-001		2020-03-26	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
PW03-5	PW03-5-20210311	PW03-5-20210311	2021-03-11	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.76
PW03-5	PW03-5-REG-GW_20210311		2021-03-11	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.76
PW03-5	PW03-5-REG-GW_20220302		2022-03-02	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.89
PW03-5	PW03-5-20220810		2022-08-10	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.81
PW03-5	PW03-5_20230330		2023-03-30	7.60 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.44
PW03-6	PW03-6-20140429	PW03-6-20140429	2014-04-29	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-6	PW03-6-20160309	PW03-6-20160309	2016-03-09	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
PW03-6	PW03-6-20170331	PW03-6-20170331	2017-03-31	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-6	PW03-6_DUP-5-20170331	PW03-6-20170331	2017-03-31	1.10 - 3.15	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-6	PW03-06-REG-GW_20190416		2019-04-16	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-6	PW03-6-20190416	PW03-6-20190416	2019-04-16	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
PW03-6	PW03-6-REG-GW_20220321		2022-03-21	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
PW03-6	PW03-6_20230412		2023-04-12	1.10 - 3.15	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U8	U8-20140429	U8-20140429	2014-04-29	3.22 - 6.22	N	< 250	370	< 250	370	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U8	U8-20160322	U8-20160322	2016-03-22	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U8	U8-20161202	U8-20161202	2016-12-02	3.22 - 6.22	N	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
U8	U8-20161221	U8-20161221	2016-12-21	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U8	U8-20170411	U8-20170411	2017-04-11	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	U8-20180430	U8-20180430	2018-04-30	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	U8-REG-GW_20180430		2018-04-30	3.22 - 6.22	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	U8-20190321	U8-20190321	2019-03-21	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	U8-REG-GW_20190321		2019-03-21	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	U8-20200325	U8-20200325	2020-03-25	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U8	VA20A3942-004		2020-03-25	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
U8	U8-20210311	U8-20210311	2021-03-11	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U8	U-8-REG-GW_20210311		2021-03-11	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U8	U8-REG-GW_20220302		2022-03-02	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U8	U8_20230329		2023-03-29	3.22 - 6.22	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U9	U9-20140429	U9-20140429	2014-04-29	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	0.81	< 0.75	-	-
U9	U9-20160322	U9-20160322	2016-03-22	3.30 - 6.30	N	< 250	< 250	< 250	< 250	110	110	< 0.5	< 0.5	0.98	1.34	-	-
U9	U9-20161202	U9-20161202	2016-12-02	3.30 - 6.30	N	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
U9	U9-20161221	U9-20161221	2016-12-21	3.30 - 6.30	N	330	< 250	340	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U9	U9-20170411	U9-20170411	2017-04-11	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U9	U9-20180430	U9-20180430	2018-04-30	3.30 - 6.30	N	**560**	480	560	480	< 100	< 100	2.28	< 0.5	< 0.5	< 0.75	< 0.5	-
U9	U9-REG-GW_20180430		2018-04-30	3.30 - 6.30	N	**560**	480	-	-	< 100	< 100	2.28	< 0.5	< 0.5	< 0.75	< 0.5	-
U9	U9-20190321	U9-20190321	2019-03-21	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	9.14	< 0.5	0.78	< 0.75	< 0.5	-
U9	U9-REG-GW_20190321		2019-03-21	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	9.14	< 0.5	0.78	< 0.75	< 0.5	-
U9	U9-20200407	U9-20200407	2020-04-07	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U9	VA20A4496-001		2020-04-07	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
U9	U9_DUP-09-20200407	U9-20200407	2020-04-07	3.30 - 6.30	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
U9	VA20A4496-002	VA20A4496-001	2020-04-07	3.30 - 6.30	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
U9	U9-20210311	U9-20210311	2021-03-11	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U9	U-9-REG-GW_20210311		2021-03-11	3.30 - 6.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type												
G2-11A	G2-11A-20170412	G2-11A-20170412	2017-04-12	4.60 - 6.10	N	340	< 250	350	< 250	< 100	< 100	2.16	< 0.5	0.55	1.1	< 0.5	-
G2-11A	G2-11A_DUP-9-20170412	G2-11A-20170412	2017-04-12	4.60 - 6.10	FD	270	< 250	280	< 250	< 100	< 100	2.33	< 0.5	0.63	1.23	< 0.5	-
G2-11A	G2-11A-20170828	G2-11A-20170828	2017-08-28	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.98	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.23	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-REG-GW_20180430		2018-04-30	4.60 - 6.10	N	< 250	< 250	-	-	< 100	< 100	1.23	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A_DUP-12-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	1.25	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-20180828	G2-11A-20180828	2018-08-28	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.6	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-REG-GW_20180828		2018-08-28	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.60	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-20190326	G2-11A-20190326	2019-03-26	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	0.99	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-REG-GW_20190326		2019-03-26	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	0.99	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	DUP-06-FD-GW_20190326	G2-11A-REG-GW_20190326	2019-03-26	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	0.95	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A_DUP-06-20190326	G2-11A-20190326	2019-03-26	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	0.95	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-20190917	G2-11A-20190917	2019-09-17	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.74	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	L2349075-3		2019-09-17	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.74	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	G2-11A-20200406	G2-11A-20200406	2020-04-06	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.16	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	VA20A4448-003		2020-04-06	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.16	< 0.50	< 0.50	< 0.75	< 0.50	-
G2-11A	G2-11A_DUP-11-20200406	G2-11A-20200406	2020-04-06	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	1.15	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	VA20A4448-006	VA20A4448-003	2020-04-06	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	1.15	< 0.50	< 0.50	< 0.75	< 0.50	-
G2-11A	G2-11A-20200817	G2-11A-20200817	2020-08-17	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.12	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11A	VA20B2849-AA-003		2020-08-17	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.12	< 0.50	< 0.50	< 0.75	< 0.50	-
G2-11A	G2-11A-20210309	G2-11A-20210309	2021-03-09	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.85	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G2-11A	G2-11A-REG-GW_20210309		2021-03-09	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.85	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	G2-11A-REG-GW_20220316		2022-03-16	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.17	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	DUP-04/FD-GW_20220316	G2-11A-REG-GW_20220316	2022-03-16	4.60 - 6.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	1.14	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	G2-11A-20220810		2022-08-10	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.18	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	DUP-1-20220810	G2-11A-20220810	2022-08-10	4.60 - 6.10	FD	< 250	830	< 250	830	< 100	< 100	1.21	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	G2-11A_20230328		2023-03-28	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	0.89	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11A	G2-11A-20230824		2023-08-24	4.60 - 6.10	N	< 250	< 250	< 250	< 250	< 100	< 100	1.27	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B-20140512	G2-11B-20140512	2014-05-12	7.00 - 8.50	N	-	-	< 250	< 250	< 100	< 100	1.01	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B_DUP-19-20140512	G2-11B-20140512	2014-05-12	7.00 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	1	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B-20140818	G2-11B-20140818	2014-08-18	7.00 - 8.50	N	-	-	< 250	< 250	< 100	< 100	1	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B-20150511	G2-11B-20150511	2015-05-11	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.11	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B-20150916	G2-11B-20150916	2015-09-16	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.03	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B-20160404	G2-11B-20160404	2016-04-04	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.01	< 0.5	< 0.5	< 0.75	-	-
G2-11B	G2-11B-20160901	G2-11B-20160901	2016-09-01	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.06	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-11B	G2-11B-20170412	G2-11B-20170412	2017-04-12	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.05	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20170828	G2-11B-20170828	2017-08-28	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.06	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20180430	G2-11B-20180430	2018-04-30	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.99	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-REG-GW_20180430		2018-04-30	7.00 - 8.50	N	< 250	< 250	-	-	< 100	< 100	0.99	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20180828	G2-11B-20180828	2018-08-28	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.03	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-REG-GW_20180828		2018-08-28	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	1.03	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20190326	G2-11B-20190326	2019-03-26	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.93	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-REG-GW_20190326		2019-03-26	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.93	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20190917	G2-11B-20190917	2019-09-17	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.86	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	L2349075-4		2019-09-17	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.86	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B_DUP-04-20190917	G2-11B-20190917	2019-09-17	7.00 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	0.92	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	L2349075-5	L2349075-4	2019-09-17	7.00 - 8.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	0.92	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	G2-11B-20200406	G2-11B-20200406	2020-04-06	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.84	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	VA20A4448-004		2020-04-06	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.84	< 0.50	< 0.50	< 0.75	< 0.50	-
G2-11B	G2-11B-20200817	G2-11B-20200817	2020-08-17	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.96	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-11B	VA20B2849-AA-004		2020-08-17	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.96	< 0.50	< 0.50	< 0.75	< 0.50	-
G2-11B	G2-11B-20210309	G2-11B-20210309	2021-03-09	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.86	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G2-11B	G2-11B-REG-GW_20210309		2021-03-09	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.86	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B-20210901	G2-11B-20210901	2021-09-01	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.82	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G2-11B	G2-11B-REG-GW_20210901		2021-09-01	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.82	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B-REG-GW_20220316		2022-03-16	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.56	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B-20220810		2022-08-10	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.76	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B_20230328		2023-03-28	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.54	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-11B	G2-11B-20230824		2023-08-24	7.00 - 8.50	N	< 250	< 250	< 250	< 250	< 100	< 100	0.55	< 0.50	< 0.50	0.84	< 0.50	< 0.50
MW02-02	MW02-02-20140501	MW02-02-20140501	2014-05-01	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-02	MW02-02-20150511	MW02-02-20150511	2015-05-11	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-02	MW02-02-20160331	MW02-02-20160331	2016-03-31	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-02	MW02-02-20170405	MW02-02-20170405	2017-04-05	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-02	MW02-02-20190319	MW02-02-20190319	2019-03-19	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-02	MW02-02-REG-GW_20190319		2019-03-19	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-02	MW02-02-20200406	MW02-02-20200406	2020-04-06	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-02	VA20A4448-001		2020-04-06	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW02-02	MW02-02-20210310	MW02-02-20210310	2021-03-10	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW02-02	MW02-02-REG-GW_20210310		2021-03-10	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-02	MW02-02-REG-GW_20220314		2022-03-14	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-02	MW02-02_20230328		2023-03-28	1.20 - 4.30	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	MW02-03-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03_DUP-13-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	N	340	< 250	340	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03_DUP-4-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	FD	310	< 250	310	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03-20150511	MW02-03-20150511	2015-05-11	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03_DUP-13-20150511	MW02-03-20150511	2015-05-11	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03-20160331	MW02-03-20160331	2016-03-31	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-03	MW02-03-20170405	MW02-03-20170405	2017-04-05	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	MW02-03-20170410	MW02-03-20170410	2017-04-10	1.50 - 4.60	N	-	-	-	-	-	-	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
MW02-03	MW02-03_DUP-8-20170410	MW02-03-20170410	2017-04-10	1.50 - 4.60	FD	-	-	-	-	-	-	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
MW02-03	MW02-03-20180426	MW02-03-20180426	2018-04-26	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	MW02-03-REG-GW_20180426		2018-04-26	1.50 - 4.60	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	MW02-03-20190319	MW02-03-20190319	2019-03-19	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	MW02-03-REG-GW_20190319		2019-03-19	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	MW02-03-20200406	MW02-03-20200406	2020-04-06	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	VA20A4448-002		2020-04-06	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW02-03	MW02-03_DUP-7-20200406	MW02-03-20200406	2020-04-06	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-03	VA20A4448-005	VA20A4448-002	2020-04-06	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW02-03	MW02-03-20210310	MW02-03-20210310	2021-03-10	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW02-03	MW02-03-REG-GW_20210310		2021-03-10	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	A1MW02-03-REG-GW_20210324		2021-03-24	1.50 - 4.60	N	**2960**	690	2960	690	2650	**2560**	77.6	5.75	5.38	6.31	< 0.50	59.2
MW02-03	DUP-06-FD-GW_20210324	A1MW02-03-REG-GW_20210324	2021-03-24	1.50 - 4.60	fd	3670	910	3670	910	2480	**2390**	73.9	5.68	5.54	6.16	< 0.50	56.0
MW02-03	MW02-03-REG-GW_20220314		2022-03-14	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	DUP-03-FD-GW_20220314	MW02-03-REG-GW_20220314	2022-03-14	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	MW02-03-20220809		2022-08-09	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	MW02-03_20230321		2023-03-21	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-03	DUP-07_20230321	MW02-03_20230321	2023-03-21	1.50 - 4.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-04	MW02-04-20140501	MW02-04-20140501	2014-05-01	1.50 - 4.60	N	340	< 250	340	< 250	150	150	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-04	MW02-04-20140807	MW02-04-20140807	2014-08-07	1.50 - 4.60	N	**650**	< 250	650	< 250	170	170	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-04	MW02-04-20160331	MW02-04-20160331	2016-03-31	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW02-04	MW02-04-20170405	MW02-04-20170405	2017-04-05	1.50 - 4.60	N	310	< 250	310	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-04	MW02-04-20180419	MW02-04-20180419	2018-04-19	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-04	W02-04-REG-GW_20180419144700		2018-04-19	1.50 - 4.60	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-04	MW02-04-20200407	MW02-04-20200407	2020-04-07	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW02-04	VA20A4503-001		2020-04-07	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW02-04	MW02-04-20210309	MW02-04-20210309	2021-03-09	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW02-04	MW02-04-REG-GW_20210309		2021-03-09	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW02-04	MW02-04_20230321		2023-03-21	1.50 - 4.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW03-02	MW03-02-20140430	MW03-02-20140430	2014-04-30	3.70 - 7.60	N	-	-	< 250	< 250	< 100	< 100	< 0.5	0.61	< 0.5	< 0.75	-	-
MW03-02	MW03-02-20140812	MW03-02-20140812	2014-08-12	3.70 - 7.60	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-02	MW03-02-20150507	MW03-02-20150507	2015-05-07	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-02	MW03-02-20150825	MW03-02-20150825	2015-08-25	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-02	MW03-02_DUP-5-20150825	MW03-02-20150825	2015-08-25	3.70 - 7.60	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-02	MW03-02-20160322	MW03-02-20160322	2016-03-22	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW03-02	MW03-02-20161202	MW03-02-20161202	2016-12-02	3.70 - 7.60	N	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
MW03-02	MW03-02-20170410	MW03-02-20170410	2017-04-10	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-02	MW03-02-20180426	MW03-02-20180426	2018-04-26	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-02	MW03-02-20190320	MW03-02-20190320	2019-03-20	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-02	MW03-02-REG-GW_20190320		2019-03-20	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-02	MW03-02-20200326	MW03-02-20200326	2020-03-26	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW03-02	VA20A3974-002		2020-03-26	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW03-02	MW03-02-20210310	MW03-02-20210310	2021-03-10	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW03-02	MW03-02-REG-GW_20210310		2021-03-10	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW03-02	MW03-02-REG-GW_20220316		2022-03-16	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW03-02	MW03-02_20230329		2023-03-29	3.70 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW03-03	MW03-03-20140506	MW03-03-20140506	2014-05-06	6.10 - 13.70	N	**980**	< 250	1010	< 250	2140	**2090**	< 6	1.02	50	4.76	-	-
MW03-03	MW03-03-20140813	MW03-03-20140813	2014-08-13	6.10 - 13.70	N	450	< 250	450	< 250	1230	1230	< 3	< 0.5	3.58	< 0.75	-	-
MW03-03	MW03-03-20160331	MW03-03-20160331	2016-03-31	6.10 - 13.70	N	370	< 250	370	< 250	1020	1020	1.66	< 0.5	0.7	< 0.75	-	-
MW03-03	MW03-03-20170405	MW03-03-20170405	2017-04-05	6.10 - 13.70	N	**950**	< 250	970	< 250	1950	**1880**	< 2.5	< 2.3	61	4.6	< 2.5	-
MW03-03	MW03-03-20170410	MW03-03-20170410	2017-04-10

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
A2MW09-05I	A2MW09-05I-20170906	A2MW09-05I-20170906	2017-09-06	9.18 - 10.68	N	**1130**	460	1140	460	2200	1470	658	5.58	11.3	54.5	< 0.5	-
A2MW09-05I	A2MW09-05I_DUP-6-20170906	A2MW09-05I-20170906	2017-09-06	9.18 - 10.68	FD	**1140**	480	1140	480	2120	1360	681	6.25	11.6	55.3	< 0.5	-
A2MW09-05I	A2MW09-05I_MW09-05I-20180426		2018-04-26	9.18 - 10.68	N	**920**	330	920	330	380	380	3.69	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	MW09-05I-REG-GW_20180426		2018-04-26	9.18 - 10.68	N	**920**	330	-	-	380	380	3.69	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	A2MW09-05I_DUP-10-20180426	A2MW09-05I_MW09-05I-2018042(	2018-04-26	9.18 - 10.68	FD	4000	2490	4000	2490	510	510	3.59	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	A2MW09-05I_MW09-05I-20180530		2018-05-30	9.18 - 10.68	N	360	< 250	360	< 250	140	140	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	MW09-05I-REG-GW_20180530		2018-05-30	9.18 - 10.68	N	360	< 250	360	< 250	140	140	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	A2MW09-05I_DUP-14-20180530	A2MW09-05I_MW09-05I-2018053(	2018-05-30	9.18 - 10.68	FD	350	< 250	360	< 250	160	160	< 1	-	-	-	-	-
A2MW09-05I	DUP-14-FD-GW_20180530	MW09-05I-REG-GW_20180530	2018-05-30	9.18 - 10.68	FD	350	< 250	360	< 250	160	160	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	A2MW09-05I-20180822		2018-08-22	9.18 - 10.68	N	420	< 250	430	< 250	540	490	48.8	0.58	< 0.5	0.99	< 0.5	-
A2MW09-05I	MW09-5I-REG-GW_20180822		2018-08-22	9.18 - 10.68	N	420	< 250	430	< 250	540	490	48.8	0.58	< 0.5	0.99	< 0.5	-
A2MW09-05I	A2MW09-05I-20190326		2019-03-26	9.18 - 10.68	N	< 250	< 250	< 250	< 250	170	170	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	MW09-05I-REG-GW_20190326_3		2019-03-26	9.18 - 10.68	N	< 250	< 250	< 250	< 250	170	170	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	DUP-04-FD-GW_20190326	MW09-05I-REG-GW_20190326	2019-03-26	9.18 - 10.68	FD	< 250	< 250	< 250	< 250	160	160	< 1	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	A2MW09-05I-20190910		2019-09-10	9.18 - 10.68	N	350	< 250	350	< 250	780	590	181	2.14	5.03	10.3	< 0.5	-
A2MW09-05I	L2344655-1		2019-09-10	9.18 - 10.68	N	350	< 250	350	< 250	780	590	181	2.14	5.03	10.3	< 0.5	-
A2MW09-05I	L2344655-3	L2344655-1	2019-09-10	9.18 - 10.68	FD	320	< 250	320	< 250	630	430	183	2.10	4.91	10.3	< 0.5	-
A2MW09-05I	A2MW09-05I_MW09-05I-20200408		2020-04-08	9.18 - 10.68	N	310	< 250	310	< 250	260	260	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	VA20A4587-001		2020-04-08	9.18 - 10.68	N	310	< 250	310	< 250	260	260	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-05I	A2MW09-05I_MW09-05I-20200811		2020-08-11	9.18 - 10.68	N	< 250	< 250	< 250	< 250	230	220	6.14	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-05I	VA20B2369-001		2020-08-11	9.18 - 10.68	N	< 250	< 250	< 250	< 250	230	220	6.14	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-05I	VA20B2369-003	VA20B2369-001	2020-08-11	9.18 - 10.68	FD	< 250	< 250	< 250	< 250	190	180	6.34	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-05I	A2MW09-05I_MW09-05I-20210311		2021-03-11	9.18 - 10.68	N	390	< 250	390	< 250	150	150	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-05I	MW09-05I-REG-GW_20210311		2021-03-11	9.18 - 10.68	N	390	< 250	390	< 250	150	150	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-05I	MW09-05I-20210817	MW09-05I-20210817	2021-08-17	9.18 - 10.68	N	360	< 250	360	< 250	420	300	108	1.49	1.63	3.66	< 0.5	< 0.5
A2MW09-05I	MW09-05I-REG-GW_20210817		2021-08-17	9.18 - 10.68	N	360	< 250	360	< 250	420	300	108	1.49	1.63	3.66	< 0.50	< 0.50
A2MW09-05I	A2MW09-05I_DUP-01-20210817	MW09-05I-20210817	2021-08-17	9.18 - 10.68	FD	310	< 250	310	< 250	380	270	106	1.46	1.55	3.33	< 0.5	< 0.5
A2MW09-05I	DUP-01-FD-GW_20210817	A2MW09-05I-20210817	2021-08-17	9.18 - 10.68	FD	310	< 250	310	< 250	380	270	106	1.46	1.55	3.33	< 0.50	< 0.50
A2MW09-05I	MW09-05I-REG-GW_20220303		2022-03-03	9.18 - 10.68	N	**830**	370	830	370	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-05I	A2MW09-05I-20220407		2022-04-07	9.18 - 10.68	N	320	< 250	320	< 250	110	110	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-05I	MW09-05I-20220810		2022-08-10	9.18 - 10.68	N	**2100**	1230	2100	1230	320	300	16.9	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-05I	A2MW09-05I_20230330		2023-03-30	9.18 - 10.68	N	270	< 250	270	< 250	230	230	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-05I	A2MW09-05I-20230824		2023-08-28	9.18 - 10.68	N	270	< 250	270	< 250	710	590	117	1.35	1.23	2.56	< 0.50	< 0.50
A2MW09-06S	2MW09-06S_MW09-06S-20140430		2014-04-30	2.44 - 5.44	N	**590**	< 250	600	< 250	470	300	2.7	1.85	24.6	142	-	-
A2MW09-06S	2MW09-06S_MW09-06S-20170411		2017-04-11	2.44 - 5.44	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
A2MW09-06S	W09-06S_MW09-06S-20170411-	2MW09-06S_MW09-06S-2017041	2017-04-11	2.44 - 5.44	FD	-	-	-	-	-	-	-	< 0.45	1.78	0.87	-	-
A2MW09-06S	W09-06S_MW09-06S-DUP1_2017	2MW09-06S_MW09-06S-2017041	2017-04-11	2.44 - 5.44	FD	-	-	-	-	-	-	< 0.5	< 0.45	1.78	0.87	< 0.5	-
A2MW09-06S	2MW09-06S_MW09-06S-20210331		2021-03-31	2.44 - 5.44	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-06S	MW09-6S-REG-GW_20210331		2021-03-31	2.44 - 5.44	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06S	MW09-06S-REG-GW_20220321		2022-03-21	2.44 - 5.44	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06S	A2MW09-06S_20230412		2023-04-12	2.44 - 5.44	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	A2MW09-06I_MW09-6I-20140430		2014-04-30	9.33 - 10.83	N	**1010**	< 250	1050	< 250	1880	1350	-	14	187	230	-	-
A2MW09-06I	A2MW09-06I_DUP-12-20140430	A2MW09-06I_MW09-06I-2014043(	2014-04-30	9.33 - 10.83	FD	**1060**	< 250	1100	< 250	1770	1240	-	12.9	191	234	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20140812		2014-08-12	9.33 - 10.83	N	**690**	960	700	960	1560	800	-	3	57.8	103	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20150506		2015-05-06	9.33 - 10.83	N	500	< 250	500	< 250	370	300	-	0.64	17.1	15.4	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20150825		2015-08-25	9.33 - 10.83	N	350	< 250	350	< 250	800	470	-	1.4	4.6	10	-	-
A2MW09-06I	A2MW09-06I_DUP-4-20150825	A2MW09-06I_MW09-6I-20150825	2015-08-25	9.33 - 10.83	FD	490	< 250	490	< 250	880	580	-	1.2	4.2	9.1	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20160322		2016-03-22	9.33 - 10.83	N	**570**	< 250	570	< 250	660	570	-	0.64	54.7	15.9	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20160825		2016-08-25	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	-	< 0.5	2.24	< 0.75	-	2.71
A2MW09-06I	A2MW09-06I_MW09-6I-20170412		2017-04-12	9.33 - 10.83	N	**540**	< 250	540	< 250	560	520	-	< 0.5	27.6	4.08	< 0.5	-
A2MW09-06I	A2MW09-06I_MW09-6I-20170906		2017-09-06	9.33 - 10.83	N	350	< 250	350	< 250	350	240	-	0.53	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	A2MW09-06I_MW09-06I-20180426		2018-04-26	9.33 - 10.83	N	**2230**	1410	2230	1410	450	440	-	< 0.5	6.26	< 0.75	< 0.5	-
A2MW09-06I	MW09-06I-REG-GW_20180426		2018-04-26	9.33 - 10.83	N	**2230**	1410	-	-	450	440	3.27	< 0.5	6.26	< 0.75	< 0.5	-
A2MW09-06I	A2MW09-06I-20180822		2018-08-22	9.33 - 10.83	N	< 250	< 250	< 250	< 250	310	300	-	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	MW09-61-REG-GW_20180822		2018-08-22	9.33 - 10.83	N	< 250	< 250	< 250	< 250	310	300	13.4	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	A2MW09-06I_MW09-06I-20190326		2019-03-26	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	MW09-06I-REG-GW_20190326		2019-03-26	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	A2MW09-06I_MW09-06I-20190910		2019-09-10	9.33 - 10.83	N	**1720**	1340	1720	1340	< 100	< 100	57.2	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	L2344655-2		2019-09-10	9.33 - 10.83	N	**1720**	1340	1720	1340	< 100	< 100	57.2	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	A2MW09-06I_MW09-06I-20200326		2020-03-26	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	VA20A3974-003		2020-03-26	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-06I	A2MW09-06I_MW09-06I-20200811		2020-08-11	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-06I	VA20B2369-002		2020-08-11	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-06I	VA20B2369-004	VA20B2369-002	2020-08-11	9.33 - 10.83	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-06I	A2MW09-06I_MW09-06I-20210311		2021-03-11	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-06I	MW09-06I-REG-GW_20210311		2021-03-11	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	DUP-02-FD-GW_20210311	MW09-06I-REG-GW_20210311	2021-03-11	9.33 - 10.83	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	MW09-06I-20210817	MW09-06I-20210817	2021-08-17	9.33 - 10.83	N	310	< 250	310	< 250	110	< 100	47.1	< 0.5	< 0.5	< 0.5	< 0.5	0.67
A2MW09-06I	MW09-06I-REG-GW_20210817		2021-08-17	9.33 - 10.83	N	310	< 250	310	< 250	110	< 100	47.1	< 0.50	< 0.50	< 0.50	< 0.50	0.67
A2MW09-06I	MW09-06I-REG-GW_20220303		2022-03-03	9.33 - 10.83	N	300	< 250	300	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	MW09-06I-20220810		2022-08-10	9.33 - 10.83	N	280	< 250	280	< 250	< 100	< 100	0.78	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	A2MW09-06I_20230329		2023-03-29	9.33 - 10.83	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	DUP-09_20230329	A2MW09-06I_20230329	2023-03-29	9.33 - 10.83	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-06I	A2MW09-06I-20230824		2023-08-28	9.33 - 10.83	N	< 250	< 250	< 250	< 250	110	110	< 0.50	< 0.50	< 0.50	0.88	< 0.50	0.74
A2MW09-10	A2MW09-10_MW09-10-20140430		2014-04-30	2.22 - 5.22	N	**2520**	480	2620	480	8700	**< 5000**	**5250**	113	672	**968**	-	-
A2MW09-10	A2MW09-10_MW09-10-20160322		2016-03-22	2.22 - 5.22	N	**1090**	300	1140	300	5800	**2500**	**2520**	66.8	417	291	-	-
A2MW09-10	A2MW09-10_MW09-10-20161221		2016-12-21	2.22 - 5.22	N	**1210**	< 250	1280	< 250	5000	**1800**	**2370**	62.5	480	256	-	-
A2MW09-10	A2MW09-10_MW09-10-20170418		2017-04-18	2.22 - 5.22	N	**1420**	370	1490	370	4100	1500	**1840**	50.1	387	262	< 0.5	-
A2MW09-10	A2MW09-10_MW09-10-20210331		2021-03-31	2.22 - 5.22	N	**1100**	< 250	1150	< 250	2410	**1720**	492	28.9	115	49.3	< 0.5	< 0.5
A2MW09-10	MW09-10-REG-GW_20210331		2021-03-31	2.22 - 5.22	N	**1100**	< 250	1150	< 250	2410	**1720**	492	28.9	115	49.3	< 0.50	< 0.50
A2MW09-10	MW09-10-REG-GW_20220303		2022-03-03	2.22 - 5.22	N	**1090**	800	1140	800	690	< 280	312	14.4	109	31.9	< 0.50	< 0.50
A2MW09-10	A2MW09-10_20230412		2023-04-12	2.22 - 5.22	N	**810**	< 250	860	< 250	1940	1480	269	20.4	151	18.0	< 0.50	< 0.50
A2MW09-11	A2MW09-11-20140430	A2MW09-11-20140430	2014-04-30	2.05 - 5.05	N	3090	490	3240	490	26400	**< 5000**	**1950**	7790	1940	10200	-	-
A2MW09-11	A2MW09-11-20150507	A2MW09-11-20150507	2015-05-07	2.05 - 5.05	N	**1920**	< 250	2010	< 250	17000	**5600**	**1840**	773	1410	7370	-	-
A2MW09-11	A2MW09-11-20160322	A2MW09-11-20160322	2016-03-22	2.05 - 5.05	N	**2150**	270	2250	270	14100	**6000**	648	139	1330	5960	-	-
A2MW09-11	A2MW09-11_DUP-11-20160322	A2MW09-11-20160322	2016-03-22	2.05 - 5.05	FD	**1980**	< 250	2070	< 250	13800	**5600**	624	138	1330	6070	-	-
A2MW09-11	A2MW09-11-20161221	A2MW09-11-20161221	2016-12-21	2.05 - 5.05	N	**2590**	< 250	2720	< 250	14000	**5500**	330	22.5	1700	6450	-	-
A2MW09-11	MW09-11_A2MW09-11-20170418		2017-04-18	2.05 - 5.05	N	**2140**	430	2220	430	5600	**3000**	91.7	9.15	504	**2030**	< 0.5	-
A2MW09-11	MW09-11_DUP-11-20170418	MW09-11_A2MW09-11-20170418	2017-04-18	2.05 - 5.05	FD	**2340**	480	2420	490	6900	**3700**	103	9.82	648	**2400**	< 0.5	-
A2MW09-11	MW09-11_A2MW09-11-20180214		2018-02-14	2.05 - 5.05	N	**1780**	310	1830	310	5250	**3130**	105	7.03	402	**1610**	< 0.5	-
A2MW09-11	MW09-11-20180426	MW09-11-20180426	2018-04-26	2.05 - 5.05	N	**1810**	300	1910	300	9300	**3600**	167	19.1	1180	4350	< 0.5	-
A2MW09-11	MW09-11-REG-GW_20180426		2018-04-26	2.05 - 5.05	N	**1810**	300	-	-	9300	**3600**	167	19.1	1180	4350	< 0.5	-
A2MW09-11	MW09-11_A2MW09-11-20190319		2019-03-19	2.05 - 5.05	N	**1880**	< 250	2000	< 250	13300	**6000**	118	9.73	1580	5540	< 0.5	-
A2MW09-11	MW09-11-REG-GW_20190319		2019-03-19	2.05 - 5.05	N	**1880**	< 250	2000	< 250	13300	**6000**	118	9.73	1580	5540	< 0.5	-
A2MW09-11	DUP-02-FD-GW_20190319	MW09-11-REG-GW_20190319	2019-03-19	2.05 - 5.05	FD	**1940**	< 250	2060	< 250	14100	**6300**	147	9.84	1720	5960	< 0.5	-
A2MW09-11	MW09-11_DUP-02-20190319	MW09-11_A2MW09-11-20190319	2019-03-19	2.05 - 5.05	FD	**1940**	< 250	2060	< 250	14100	**6300**	147	9.84	1720	5960	< 0.5	-
A2MW09-11	MW09-11-20190417	MW09-11-20190417	2019-04-17	2.05 - 5.05	N	**2270**	560	2330	560	8560	**5800**	37.8	2.6	565	**2190**	< 2.5	-
A2MW09-11	MW09-11-REG-GW_20190417		2019-04-17	2.05 - 5.05	N	**2270**	560	2330	560	8560	**5800**	37.8	2.6	565	**2190**	< 2.5	-
A2MW09-11	A2MW09-11-20200408	A2MW09-11-20200408	2020-04-08	2.05 - 5.05	N	**1960**	390	2050	390	12300	**7820**	66.7	6.12	1060	3360	< 0.5	-
A2MW09-11	VA20A4587-002		2020-04-08	2.05 - 5.05	N	**1960**	390	2050	390	12300	**7820**	66.7	6.12	1060	3360	< 0.50	-
A2MW09-11	A2MW09-11_DUP-10-20200408	A2MW09-11-20200408	2020-04-08	2.05 - 5.05	FD	**1560**	260	1650	260	10100	**5480**	62	6.48	1100	3440	< 0.5	-
A2MW09-11	VA20A4587-004	VA20A4587-002	2020-04-08	2.05 - 5.05	FD	**1560**	260	1650	260	10100	**5480**	62.0	6.48	1100	3440	< 0.50	-
A2MW09-11	A2MW09-11-20210310	A2MW09-11-20210310	2021-03-10	2.05 - 5.05	N	**1270**	< 250	1330	< 250	5520	**3580**	23.9	2.17	453	**1460**	< 0.5	< 0.5
A2MW09-11	MW09-11-REG-GW_20210310		2021-03-10	2.05 - 5.05	N	**1270**	< 250	1330	< 250	5520	**3580**	23.9	2.17	453	**1460**	< 0.50	< 0.50
A2MW09-11	A2MW09-11_DUP-01-20210310	A2MW09-11-20210310	2021-03-10	2.05 - 5.05	FD	**1320**	< 250	1380	< 250	4100	**2050**	24.9	2.18	494	**1530**	< 0.5	< 0.5
A2MW09-11	DUP-01-FD-GW_20210310	MW09-11-REG-GW_20210310	2021-03-10	2.05 - 5.05	FD	**1320**	< 250	1380	< 250	4100	**2050**	24.9	2.18	494	**1530**	< 0.50	< 0.50
A2MW09-11	MW09-11-REG-GW_20220303		2022-03-03	2.05 - 5.05	N	**1140**	< 250	1240	< 250	6170	**3750**	4.96	1.16	574	**1840**	< 1.00	< 1.00
A2MW09-11	DUP02-FD-GW_20220303	MW09-11-REG-GW_20220303	2022-03-03	2.05 - 5.05	FD	**1170**	360	1270	360	6180	**3720**	5.20	1.18	592	**1860**	< 1.00	< 1.00
A2MW09-11	A2MW09-11_20230329		2023-03-29	2.05 - 5.05	N	**2000**	< 250	2130	< 250	9990	**4840**	42.1	7.67	1590	3510	< 0.50	< 0.50
A2MW09-12	A2MW09-12_MW09-12-20140430		2014-04-30	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-12	A2MW09-12_MW09-12-20150507		2015-05-07	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-12	A2MW09-12_MW09-12-20160322		2016-03-22	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-12	A2MW09-12_MW09-12-20170418		2017-04-18	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	A2MW09-12_MW09-12-20180214		2018-02-14	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	A2MW09-12_MW09-12-20180426		2018-04-26	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	MW09-12-REG-GW_20180426		2018-04-26	2.14 - 5.14	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	A2MW09-12_MW09-12-20190319		2019-03-19	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	MW09-12-REG-GW_20190319		2019-03-19	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	A2MW09-12_MW09-12-20200326		2020-03-26	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-12	VA20A3974-004		2020-03-26	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
A2MW09-12	A2MW09-12_MW09-12-20210310		2021-03-10	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-12	MW09-12-REG-GW_20210310		2021-03-10	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-12	MW09-12-REG-GW_20220303		2022-03-03	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-12	A2MW09-12_20230329		2023-03-29	2.14 - 5.14	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-13	A2MW09-13_MW09-13-20140501		2014-05-01	2.02 - 5.02	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-13	A2MW09-13_MW09-13-20150511		2015-05-11	2.02 - 5.02	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-13	A2MW09-13_MW09-13-20160322		2016-03-22	2.02 - 5.02	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
A2MW09-13	A2MW09-13_MW09-13-20170410		2017-04-10	2.02 - 5.02	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-13	A2MW09-13_MW09-13-20180426		2018-04-26	2.02 - 5.02	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-13	MW09-13-REG-GW_20180426		2018-04-26	2.02 - 5.02	N	< 250	< 250	-	-	< 100	< 100

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	$LEPH_w$	$HEPH_w$	EPH_w (C10-C19)	EPH_w (C19-C32)	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Parameter																	
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
A2MW09-14	A2MW09-14_MW09-14-20210310		2021-03-10	2.03 - 5.03	N	< 250	< 250	250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
A2MW09-14	MW09-14-REG-GW_20210310		2021-03-10	2.03 - 5.03	N	< 250	< 250	250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-14	MW09-14-REG-GW_20220317		2022-03-17	2.03 - 5.03	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-14	A2MW09-14_20230328		2023-03-28	2.03 - 5.03	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
A2MW09-15	A2MW09-15_MW09-15-20140501		2014-05-01	1.35 - 4.35	N	**770**	< 250	770	< 250	220	220	2.44	< 0.5	< 0.5	< 0.75	-	-
A2MW09-15	A2MW09-15_MW09-15-20140807		2014-08-07	1.35 - 4.35	N	**760**	< 250	760	< 250	430	430	< 1.5	< 0.5	< 0.5	< 0.75	-	12.4
A2MW09-15	A2MW09-15_MW09-15-20150511		2015-05-11	1.35 - 4.35	N	400	< 250	400	< 250	180	180	< 0.6	< 0.5	< 0.5	< 0.75	-	-
A2MW09-15	A2MW09-15_MW09-15-20160510		2016-05-10	1.35 - 4.35	N	**540**	< 250	540	< 250	300	300	< 0.7	< 0.5	< 0.5	< 0.75	-	-
A2MW09-15	A2MW09-15_MW09-15-20160901		2016-09-01	1.35 - 4.35	N	**600**	< 250	600	< 250	600	600	< 1	< 0.5	< 0.5	< 0.75	-	-
A2MW09-15	A2MW09-15_MW09-15-20170410		2017-04-10	1.35 - 4.35	N	**520**	< 250	520	< 250	400	400	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-15	A2MW09-15_MW09-15-20180426		2018-04-26	1.35 - 4.35	N	**530**	< 250	530	< 250	260	260	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-15	MW09-15-REG-GW_20180426		2018-04-26	1.35 - 4.35	N	**530**	< 250	-	-	260	260	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
A2MW09-15	A2MW09-15_MW09-15-20210311		2021-03-11	1.35 - 4.35	N	290	< 250	290	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.64
A2MW09-15	MW09-15-REG-GW_20210311		2021-03-11	1.35 - 4.35	N	290	< 250	290	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.64
A2MW09-15	MW09-15-REG-GW_20220303		2022-03-03	1.35 - 4.35	N	**510**	< 250	510	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.37
A2MW09-15	A2MW09-15_20230328		2023-03-28	1.35 - 4.35	N	300	< 250	300	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.36
MW11-3S	MW11-3S-20140507	MW11-3S-20140507	2014-05-07	5.00 - 8.00	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3S	MW11-3S-20140813	MW11-3S-20140813	2014-08-13	5.00 - 8.00	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3S	MW11-3S-20150511	MW11-3S-20150511	2015-05-11	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3S	MW11-3S-20150826	MW11-3S-20150826	2015-08-26	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3S	MW11-3S-20160322	MW11-3S-20160322	2016-03-22	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3S	MW11-3S-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S_DUP-5-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S_DUP-6-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20170815	MW11-3S-20170815	2017-08-15	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20180419	MW11-3S-20180419	2018-04-19	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-REG-GW_20180821		2018-08-21	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	DUP-1-GW_20180821	MW11-3S-REG-GW_20180821	2018-08-21	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S_DUP-1-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20190318	MW11-3S-20190318	2019-03-18	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-REG-GW_20190318		2019-03-18	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	L2343824-1		2019-09-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20190909	MW11-3S-20190909	2019-09-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	MW11-3S-20200401	MW11-3S-20200401	2020-04-01	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	VA20A4276-001		2020-04-01	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3S	MW11-3S-20200817	MW11-3S-20200817	2020-08-17	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3S	VA20B2849-AA-001		2020-08-17	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3S	MW11-3S-20210309	MW11-3S-20210309	2021-03-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-3S	MW11-3S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3S	MW11-3S-20210816	MW11-3S-20210816	2021-08-16	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-3S	MW11-3S-REG-GW_20210816		2021-08-16	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3S	MW11-3S-REG-GW_20220316		2022-03-16	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3S	MW11-3S-20220809		2022-08-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3S	MW11-3S_20230327		2023-03-27	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3S	MW11-3S-20230824		2023-08-24	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I-20140507	MW11-3I-20140507	2014-05-07	11.00 - 12.50	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3I	MW11-3I-20140813	MW11-3I-20140813	2014-08-13	11.00 - 12.50	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3I	MW11-3I-20150511	MW11-3I-20150511	2015-05-11	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3I	MW11-3I-20150826	MW11-3I-20150826	2015-08-26	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3I	MW11-3I-20160322	MW11-3I-20160322	2016-03-22	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3I	MW11-3I-20160822	MW11-3I-20160822	2016-08-22	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
MW11-3I	MW11-3I-20170404	MW11-3I-20170404	2017-04-04	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20170815	MW11-3I-20170815	2017-08-15	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20180419	MW11-3I-20180419	2018-04-19	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20180821	MW11-3I-20180821	2018-08-21	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-REG-GW_20180821		2018-08-21	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20190318	MW11-3I-20190318	2019-03-18	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-REG-GW_20190318		2019-03-18	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	L2343824-2		2019-09-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20190909	MW11-3I-20190909	2019-09-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	MW11-3I-20200401	MW11-3I-20200401	2020-04-01	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	VA20A4276-002		2020-04-01	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3I	MW11-3I-20200817	MW11-3I-20200817	2020-08-17	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3I	VA20B2849-AA-002		2020-08-17	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3I	MW11-3I-20210309	MW11-3I-20210309	2021-03-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-3I	MW11-3I-REG-GW_20210309		2021-03-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I-20210816	MW11-3I-20210816	2021-08-16	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-3I	MW11-3I-REG-GW_20210816		2021-08-16	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I-REG-GW_20220314		2022-03-14	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I-20220809		2022-08-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I_20230328		2023-03-28	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	DUP-08_20230328	MW11-3I_20230328	2023-03-28	11.00 - 12.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3I	MW11-3I-20230828		2023-08-28	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW11-3D	MW11-3D-20140507	MW11-3D-20140507	2014-05-07	18.50 - 20.00	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3D	MW11-3D-20140813	MW11-3D-20140813	2014-08-13	18.50 - 20.00	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3D	MW11-3D-20150512	MW11-3D-20150512	2015-05-12	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3D	MW11-3D-20150826	MW11-3D-20150826	2015-08-26	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3D	MW11-3D-20160322	MW11-3D-20160322	2016-03-22	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-3D	MW11-3D-20160822	MW11-3D-20160822	2016-08-22	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	4.96
MW11-3D	MW11-3D-20170404	MW11-3D-20170404	2017-04-04	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20170815	MW11-3D-20170815	2017-08-15	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20180419	MW11-3D-20180419	2018-04-19	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20180821	MW11-3D-20180821	2018-08-21	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-REG-GW_20180821		2018-08-21	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20190318	MW11-3D-20190318	2019-03-18	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-REG-GW_20190318		2019-03-18	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	L2343824-3		2019-09-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20190909	MW11-3D-20190909	2019-09-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	MW11-3D-20200401	MW11-3D-20200401	2020-04-01	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	VA20A4276-003		2020-04-01	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3D	MW11-3D-20200813	MW11-3D-20200813	2020-08-13	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-3D	VA20B2619-AA-001		2020-08-13	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-3D	MW11-3D-20210309	MW11-3D-20210309	2021-03-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3.32
MW11-3D	MW11-3D-REG-GW_20210309		2021-03-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.32
MW11-3D	MW11-3D-20210816	MW11-3D-20210816	2021-08-16	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3.61
MW11-3D	MW11-3D-REG-GW_20210816		2021-08-16	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.61
MW11-3D	MW11-3D-REG-GW_20220314		2022-03-14	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.33
MW11-3D	MW11-3D-20220809		2022-08-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.75
MW11-3D	MW11-3D_20230327		2023-03-27	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.80
MW11-3D	MW11-3D-20230828		2023-08-28	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.60	< 0.50	2.77
MW11-4S	MW11-4S-20140507	MW11-4S-20140507	2014-05-07	5.00 - 8.00	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4S	MW11-4S-20140813	MW11-4S-20140813	2014-08-13	5.00 - 8.00	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4S	MW11-4S-20150512	MW11-4S-20150512	2015-05-12	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4S	MW11-4S-20150826	MW11-4S-20150826	2015-08-26	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4S	MW11-4S-20160322	MW11-4S-20160322	2016-03-22	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4S	MW11-4S-20160822	MW11-4S-20160822	2016-08-22	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-20170404	MW11-4S-20170404	2017-04-04	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-20170815	MW11-4S-20170815	2017-08-15	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-20180419	MW11-4S-20180419	2018-04-19	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S_20180820		2018-08-20	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	0.54	< 0.45	< 0.5	< 0.75	< 0.5	0.51
MW11-4S	MW11-4S-20180820	MW11-4S-20180820	2018-08-20	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	0.54	< 0.45	< 0.5	< 0.75	< 0.5	0.51
MW11-4S	MW11-4S-20190318	MW11-4S-20190318	2019-03-18	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-REG-GW_20190318		2019-03-18	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	L2343824-4		2019-09-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-20190909	MW11-4S-20190909	2019-09-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	MW11-4S-20200401	MW11-4S-20200401	2020-04-01	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	VA20A4276-004		2020-04-01	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4S	MW11-4S_DUP-8-20200401	MW11-4S-20200401	2020-04-01	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	VA20A4276-007	VA20A4276-004	2020-04-01	5.00 - 8.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4S	MW11-4S-20200813	MW11-4S-20200813	2020-08-13	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4S	VA20B2619-AA-002		2020-08-13	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4S	MW11-4S-20210309	MW11-4S-20210309	2021-03-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4S	MW11-4S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N	< 250	< 250	< 250	< 250

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Parameter																	
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
MW11-4I	MW11-4I-20150826	MW11-4I-20150826	2015-08-26	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4I	MW11-4I_DUP-6-20150826	MW11-4I-20150826	2015-08-26	11.00 - 12.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4I	MW11-4I-20160322	MW11-4I-20160322	2016-03-22	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4I	MW11-4I-20160822	MW11-4I-20160822	2016-08-22	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	0.56
MW11-4I	MW11-4I-20170404	MW11-4I-20170404	2017-04-04	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-20170815	MW11-4I-20170815	2017-08-15	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-20180419	MW11-4I-20180419	2018-04-19	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I_20180820		2018-08-20	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
MW11-4I	MW11-4I-20180820	MW11-4I-20180820	2018-08-20	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
MW11-4I	MW11-4I-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-REG-GW_20190318		2019-03-18	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	DUP-01-FD-GW_20190318	MW11-4I-REG-GW_20190318	2019-03-18	11.00 - 12.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I_DUP-01-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	L2343824-5		2019-09-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-20190909	MW11-4I-20190909	2019-09-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	MW11-4I-20200401	MW11-4I-20200401	2020-04-01	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	VA20A4276-005		2020-04-01	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4I	MW11-4I-20200813	MW11-4I-20200813	2020-08-13	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4I	VA20B2619-AA-003		2020-08-13	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4I	MW11-4I-20210309	MW11-4I-20210309	2021-03-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I-REG-GW_20210309	MW11-4I-20210309	2021-03-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I-REG-GW_20210816	MW11-4I-20210816	2021-08-16	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I-REG-GW_20220314		2022-03-14	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I-20220809		2022-08-09	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I_20230327		2023-03-27	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4I	MW11-4I-20230828		2023-08-28	11.00 - 12.50	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW11-4D	MW11-4D-20140507	MW11-4D-20140507	2014-05-07	18.50 - 20.00	N	-	-	280	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D-20140813	MW11-4D-20140813	2014-08-13	18.50 - 20.00	N	-	-	310	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D-20150512	MW11-4D-20150512	2015-05-12	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D-20150826	MW11-4D-20150826	2015-08-26	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D_DUP-12-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW11-4D	MW11-4D-20160822	MW11-4D-20160822	2016-08-22	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	5.27
MW11-4D	MW11-4D-20170404	MW11-4D-20170404	2017-04-04	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D_DUP-1-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	DUP-9-FD-GW_20180419	MW11-4D-REG-GW_20180419	2018-04-19	18.50 - 20.00	FD	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D_DUP-9-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D_20180820		2018-08-20	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 7
MW11-4D	MW11-4D-20180820	MW11-4D-20180820	2018-08-20	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 7
MW11-4D	MW11-4D-20190318	MW11-4D-20190318	2019-03-18	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-REG-GW_20190318		2019-03-18	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	L2343824-6		2019-09-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	L2343824-7	L2343824-6	2019-09-09	18.50 - 20.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D_DUP-1-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	MW11-4D-20200401	MW11-4D-20200401	2020-04-01	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	VA20A4276-006		2020-04-01	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4D	MW11-4D-20200813	MW11-4D-20200813	2020-08-13	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
MW11-4D	VA20B2619-AA-004		2020-08-13	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	-
MW11-4D	MW11-4D-20210309	MW11-4D-20210309	2021-03-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.63
MW11-4D	MW11-4D-REG-GW_20210309		2021-03-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.63
MW11-4D	MW11-4D-20210816	MW11-4D-20210816	2021-08-16	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	0.76	< 0.5	1.08
MW11-4D	MW11-4D-REG-GW_20210816		2021-08-16	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.76	< 0.50	1.08
MW11-4D	MW11-4D-REG-GW_20220314		2022-03-14	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.03
MW11-4D	MW11-4D-20220809		2022-08-09	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.83
MW11-4D	MW11-4D_20230327		2023-03-27	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.07
MW11-4D	MW11-4D-20230828		2023-08-28	18.50 - 20.00	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.97
G2-3B	G2-3B-20140527	G2-3B-20140527	2014-05-27	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3B	G2-3B-20140826	G2-3B-20140826	2014-08-26	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3B	G2-3B-20150303	G2-3B-20150303	2015-03-03	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	11.7
G2-3B	G2-3B-20150916	G2-3B-20150916	2015-09-16	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3B	G2-3B-20160309	G2-3B-20160309	2016-03-09	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	15.8
G2-3B	G2-3B-20160811	G2-3B-20160811	2016-08-11	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	19
G2-3B	G2-3B-20170323	G2-3B-20170323	2017-03-23	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	16.6
G2-3B	G2-3B_20180827		2018-08-27	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	41.5
G2-3B	G2-3B-20180827	G2-3B-20180827	2018-08-27	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	41.5
G2-3B	G2-3B-20190321	G2-3B-20190321	2019-03-21	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	30.3
G2-3B	G2-3B-REG-GW_20190321		2019-03-21	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	30.3
G2-3B	G2-3B-20190912	G2-3B-20190912	2019-09-12	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	26.8
G2-3B	L2346508-3		2019-09-12	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	26.8
G2-3B	G2-3B-20200402	G2-3B-20200402	2020-04-02	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	22.4
G2-3B	VA20A4358-006		2020-04-02	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	22.4
G2-3B	G2-3B-20200813	G2-3B-20200813	2020-08-13	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	27.7
G2-3B	VA20B2619-AA-005		2020-08-13	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	27.7
G2-3B	G2-3B-20201209	G2-3B-20201209	2020-12-09	10.10 - 13.10	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-3B	G2-3B_DUP-1-20201209	G2-3B-20201209	2020-12-09	10.10 - 13.10	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-3B	G2-3B-20210315	G2-3B-20210315	2021-03-15	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	17.2
G2-3B	G2-3B-REG-GW_20210315		2021-03-15	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	17.2
G2-3B	DUP-04-FD-GW_20210315	G2-3B-REG-GW_20210315	2021-03-15	10.10 - 13.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	17.1
G2-3B	G2-3B_DUP-04-20210315	G2-3B-20210315	2021-03-15	10.10 - 13.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	17.1
G2-3B	G2-3B-20210819	G2-3B-20210819	2021-08-19	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	30.9
G2-3B	G2-3B-REG-GW_20210819		2021-08-19	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	30.9
G2-3B	G2-3B-REG-GW_20220310		2022-03-10	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	17.8
G2-3B	G2-3B-20220811		2022-08-11	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	34.8
G2-3B	DUP--20220811	G2-3B-20220811	2022-08-11	10.10 - 13.10	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	34.7
G2-3B	G2-3B_20230405		2023-04-05	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	40.4
G2-3B	G2-3B-20230828		2023-08-28	10.10 - 13.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.56	< 0.50	40.7
G2-3C	G2-3C-20140527	G2-3C-20140527	2014-05-27	18.30 - 22.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3C	G2-3C-20140826	G2-3C-20140826	2014-08-26	18.30 - 22.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3C	G2-3C_DUP-17-20140826	G2-3C-20140826	2014-08-26	18.30 - 22.90	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3C	G2-3C-20150303	G2-3C-20150303	2015-03-03	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	0.69	< 0.5	< 0.5	< 0.75	-	22.2
G2-3C	G2-3C-20150917	G2-3C-20150917	2015-09-17	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-3C	G2-3C-20160309	G2-3C-20160309	2016-03-09	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	21.4
G2-3C	G2-3C-20160811	G2-3C-20160811	2016-08-11	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	19.7
G2-3C	G2-3C-20170323	G2-3C-20170323	2017-03-23	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	11.2
G2-3C	G2-3C-20170328	G2-3C-20170328	2017-03-28	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	13.7
G2-3C	G2-3C_20180827		2018-08-27	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	13.7
G2-3C	G2-3C-20180827	G2-3C-20180827	2018-08-27	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	13.7
G2-3C	DUP-2_20180827	G2-3C_20180827	2018-08-27	18.30 - 22.90	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	13.8
G2-3C	G2-3C_DUP-2-20180827	G2-3C-20180827	2018-08-27	18.30 - 22.90	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	13.8
G2-3C	G2-3C-20190321	G2-3C-20190321	2019-03-21	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	12.2
G2-3C	G2-3C-REG-GW_20190321		2019-03-21	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	12.2
G2-3C	G2-3C-20190917	G2-3C-20190917	2019-09-17	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	11.3
G2-3C	L2349075-1		2019-09-17	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	11.3
G2-3C	G2-3C-20200402	G2-3C-20200402	2020-04-02	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	9.44
G2-3C	VA20A4358-007		2020-04-02	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	9.44
G2-3C	G2-3C-20200813	G2-3C-20200813	2020-08-13	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	9.46
G2-3C	VA20B2619-AA-006		2020-08-13	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	9.46
G2-3C	G2-3C-20201209	G2-3C-20201209	2020-12-09	18.30 - 22.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-3C	G2-3C-20210315	G2-3C-20210315	2021-03-15	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	8.41
G2-3C	G2-3C-REG-GW_20210315		2021-03-15	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.41
G2-3C	G2-3C-20210819	G2-3C-20210819	2021-08-19	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	8.75
G2-3C	G2-3C-REG-GW_20210819		2021-08-19	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.75
G2-3C	G2-3C-REG-GW_20220310		2022-03-10	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	9.30
G2-3C	G2-3C-20220811		2022-08-11	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	8.81
G2-3C	G2-3C_20230405		2023-04-05	18.30 - 22.90	N	< 250	570	< 250	570	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	9.69
G2-3C	G2-3C-20230828		2023-08-28	18.30 - 22.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	1.30	< 0.50	2.16	< 0.50	9.17
G2-3C	DUP-7-20230828	G2-3C-20230828	2023-08-28	18.30 - 22.90	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	1.16	< 0.50	1.98	< 0.50	8.94
G2-9A	G2-9A-20140526	G2-9A-20140526	2014-05-26	6.10 - 9.10	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9A	G2-9A-20140527	G2-9A-20140527	2014-05-27	6.10 - 9.10	N	-	-	< 250	< 250	-	-	-	-	-	-	-	-
G2-9A	G2-9A-20140826	G2-9A-20140826	2014-08-26	6.10 - 9.10	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9A	G2-9A-20150303	G2-9A-20150303	2015-03-03	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	3.43
G2-9A	G2-9A-20150916	G2-9A-20150916	2015-09-16	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9A	G2-9A-20160309	G2-9A-20160309	2016-03-09	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	1.31
G2-9A	G2-9A-20160811	G2-9A-20160811	2016-08-11	6.10 -

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19	EPH_w (C19-C32	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type												
G2-9A	VA20B2619-AA-007		2020-08-13	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.85
G2-9A	G2-9A-20201209	G2-9A-20201209	2020-12-09	6.10 - 9.10	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-9A	G2-9A-20210315	G2-9A-20210315	2021-03-15	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.66
G2-9A	G2-9A-REG-GW_20210315		2021-03-15	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.66
G2-9A	G2-9A-20210819	G2-9A-20210819	2021-08-19	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.53
G2-9A	G2-9A-REG-GW_20210819		2021-08-19	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.53
G2-9A	G2-9A-REG-GW_20220310		2022-03-10	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.46
G2-9A	G2-9A-20220810		2022-08-10	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.39
G2-9A	G2-9A_20230406		2023-04-06	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.43
G2-9A	G2-9A-20230828		2023-08-29	6.10 - 9.10	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.68	< 0.50	1.90
G2-9B	G2-9B-20140526	G2-9B-20140526	2014-05-26	18.90 - 21.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9B	G2-9B_DUP-25-20140526	G2-9B-20140526	2014-05-26	18.90 - 21.90	FD	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9B	G2-9B-20140826	G2-9B-20140826	2014-08-26	18.90 - 21.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9B	G2-9B-20150303	G2-9B-20150303	2015-03-03	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	0.68
G2-9B	G2-9B_DUP-1-20150303	G2-9B-20150303	2015-03-03	18.90 - 21.90	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	0.64
G2-9B	G2-9B-20150917	G2-9B-20150917	2015-09-17	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-9B	G2-9B-20160310	G2-9B-20160310	2016-03-10	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	1.03
G2-9B	G2-9B-20160811	G2-9B-20160811	2016-08-11	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-9B	G2-9B-20170328	G2-9B-20170328	2017-03-28	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	0.83
G2-9B	G2-9B-20170823	G2-9B-20170823	2017-08-23	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	0.58
G2-9B	G2-9B-20180502	G2-9B-20180502	2018-05-02	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	0.88
G2-9B	G2-9B-REG-GW_20180502		2018-05-02	18.90 - 21.90	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	0.88
G2-9B	G2-9B_20180827		2018-08-27	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.31
G2-9B	G2-9B-20180827	G2-9B-20180827	2018-08-27	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.31
G2-9B	G2-9B-20190320	G2-9B-20190320	2019-03-20	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	-
G2-9B	G2-9B-REG-GW_20190320		2019-03-20	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.26
G2-9B	G2-9B-20190912	G2-9B-20190912	2019-09-12	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.62
G2-9B	L2346508-5		2019-09-12	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.62
G2-9B	G2-9B-20200402	G2-9B-20200402	2020-04-02	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	1.92
G2-9B	VA20A4358-005		2020-04-02	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	1.92
G2-9B	G2-9B-20200813	G2-9B-20200813	2020-08-13	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	2.64
G2-9B	VA20B2619-AA-008		2020-08-13	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	2.64
G2-9B	G2-9B-20201209	G2-9B-20201209	2020-12-09	18.90 - 21.90	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	-
G2-9B	G2-9B-20210315	G2-9B-20210315	2021-03-15	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	2.54
G2-9B	G2-9B-REG-GW_20210315		2021-03-15	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.54
G2-9B	G2-9B-20210819	G2-9B-20210819	2021-08-19	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	3.12
G2-9B	G2-9B-REG-GW_20210819		2021-08-19	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.12
G2-9B	G2-9B-REG-GW_20220310		2022-03-10	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.58
G2-9B	G2-9B-20220811		2022-08-11	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	3.76
G2-9B	G2-9B_20230405		2023-04-05	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.56
G2-9B	DUP-10_20230405	G2-9B_20230405	2023-04-05	18.90 - 21.90	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.56
G2-9B	G2-9B-20230828		2023-08-29	18.90 - 21.90	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	6.60
G2-10	G2-10-20140515	G2-10-20140515	2014-05-15	4.90 - 6.40	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-10	G2-10-20140820	G2-10-20140820	2014-08-20	4.90 - 6.40	N	-	-	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-10	G2-10-20150303	G2-10-20150303	2015-03-03	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-10	G2-10-20150916	G2-10-20150916	2015-09-16	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
G2-10	G2-10-20160307	G2-10-20160307	2016-03-07	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-10	G2-10-20160810	G2-10-20160810	2016-08-10	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
G2-10	G2-10-20170328	G2-10-20170328	2017-03-28	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20170823	G2-10-20170823	2017-08-23	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20180501	G2-10-20180501	2018-05-01	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-REG-GW_20180501		2018-05-01	4.90 - 6.40	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10_20180827		2018-08-27	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20180827	G2-10-20180827	2018-08-27	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20190321	G2-10-20190321	2019-03-21	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-REG-GW_20190321		2019-03-21	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20190917	G2-10-20190917	2019-09-17	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	L2349075-2		2019-09-17	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-20200402	G2-10-20200402	2020-04-02	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	VA20A4358-003		2020-04-02	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
G2-10	G2-10-20200812	G2-10-20200812	2020-08-12	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	< 0.5
G2-10	VA20B2611-003		2020-08-12	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	< 0.50
G2-10	G2-10-20210315	G2-10-20210315	2021-03-15	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
G2-10	G2-10-REG-GW_20210315		2021-03-15	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-10	G2-10_20210824		2021-08-24	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
G2-10	G2-10-20210824	G2-10-20210824	2021-08-24	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
G2-10	G2-10-REG-GW_20220310		2022-03-10	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-10	G2-10-20220811		2022-08-11	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-10	G2-10_20230411		2023-04-11	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
G2-10	G2-10-20230828		2023-08-28	4.90 - 6.40	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.63	< 0.50	< 0.50
WS2-D	WS2-D-20140522	WS2-D-20140522	2014-05-22	4.60 - 7.60	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	2.72
WS2-D	WS2-D-20140822	WS2-D-20140822	2014-08-22	4.60 - 7.60	N	-	-	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	83.9
WS2-D	WS2-D-20150305	WS2-D-20150305	2015-03-05	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	1.65
WS2-D	WS2-D-20150818	WS2-D-20150818	2015-08-18	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	24.9
WS2-D	WS2-D-20160308	WS2-D-20160308	2016-03-08	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	< 0.5
WS2-D	WS2-D-20160808	WS2-D-20160808	2016-08-08	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	5.92
WS2-D	WS2-D-20160912	WS2-D-20160912	2016-09-12	4.60 - 7.60	N	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.75	-	29.1
WS2-D	WS2-D-20170308	WS2-D-20170308	2017-03-08	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	< 0.5
WS2-D	WS2-D-20170823	WS2-D-20170823	2017-08-23	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	2.27
WS2-D	WS2-D-20180502	WS2-D-20180502	2018-05-02	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	< 0.5
WS2-D	WS2-D-REG-GW_20180502		2018-05-02	4.60 - 7.60	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	< 0.5
WS2-D	WS2-D_20180827		2018-08-27	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	2.91
WS2-D	WS2-D-20180827	WS2-D-20180827	2018-08-27	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	2.91
WS2-D	WS2-D-20190325	WS2-D-20190325	2019-03-25	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
WS2-D	WS2-D-REG-GW_20190325		2019-03-25	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
WS2-D	L2346508-1		2019-09-12	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.96
WS2-D	WS2-D-20190912	WS2-D-20190912	2019-09-12	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	1.96
WS2-D	VA20A4358-001		2020-04-02	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	< 0.50
WS2-D	WS2-D-20200402	WS2-D-20200402	2020-04-02	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5
WS2-D	VA20B2611-001		2020-08-12	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	2.23
WS2-D	WS2-D-20200812	WS2-D-20200812	2020-08-12	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	2.23
WS2-D	WS2-D-20210308	WS2-D-20210308	2021-03-08	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
WS2-D	WS2-D-REG-GW_20210308		2021-03-08	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
WS2-D	WS2-D-20210819	WS2-D-20210819	2021-08-19	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	4.15
WS2-D	WS2-D-REG-GW_20210819		2021-08-19	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.15
WS2-D	WS2-D-REG-GW_20220316		2022-03-16	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
WS2-D	WS2-D-20220822		2022-08-22	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.95
WS2-D	WS2-D_20230405		2023-04-05	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
WS2-D	WS2-D-20230824		2023-08-24	4.60 - 7.60	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.86
WS2-D2	WS2-D2-20140522	WS2-D2-20140522	2014-05-22	10.70 - 12.20	N	-	-	-	-	< 100	< 100	< 1	< 1	< 1	< 1.4	-	616
WS2-D2	WS2-D2-20140822	WS2-D2-20140822	2014-08-22	10.70 - 12.20	N	-	-	-	-	< 100	< 100	< 2.5	< 2.5	< 2.5	< 3.5	-	881
WS2-D2	WS2-D2-20150305	WS2-D2-20150305	2015-03-05	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	402
WS2-D2	WS2-D2-20150817	WS2-D2-20150817	2015-08-17	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	327
WS2-D2	WS2-D2-20160310	WS2-D2-20160310	2016-03-10	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	146
WS2-D2	WS2-D2-20160808	WS2-D2-20160808	2016-08-08	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	315
WS2-D2	WS2-D2-20170308	WS2-D2-20170308	2017-03-08	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	150
WS2-D2	WS2-D2-20170823	WS2-D2-20170823	2017-08-23	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	229
WS2-D2	WS2-D2_DUP-2-20170823	WS2-D2-20170823	2017-08-23	10.70 - 12.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	221
WS2-D2	WS2-D2-20180502	WS2-D2-20180502	2018-05-02	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	163
WS2-D2	WS2-D2-REG-GW_20180502		2018-05-02	10.70 - 12.20	N	< 250	< 250	-	-	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	163
WS2-D2	WS2-D2_DUP-13-20180502	WS2-D2-20180502	2018-05-02	10.70 - 12.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	166
WS2-D2	WS2-D2_20180827		2018-08-27	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	227
WS2-D2	WS2-D2-20180827	WS2-D2-20180827	2018-08-27	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	227
WS2-D2	WS2-D2-20190325	WS2-D2-20190325	2019-03-25	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	113
WS2-D2	WS2-D2-DUP1-20190325	WS2-D2-20190325	2019-03-25	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	119
WS2-D2	WS2-D2-REG-GW_20190325		2019-03-25	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	113
WS2-D2	DUP-03-FD-GW_20190325	WS2-D2-REG-GW_20190325	2019-03-25	10.70 - 12.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	119
WS2-D2	L2346508-2		2019-09-12	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	155
WS2-D2	WS2-D2-20190912	WS2-D2-20190912	2019-09-12	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	155
WS2-D2	L2346508-6	L2346508-2	2019-09-12	10.70 - 12.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	161
WS2-D2	WS2-D2_DUP-03-20190912	WS2-D2-20190912	2019-09-12	10.70 - 12.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	161
WS2-D2	VA20A4358-002		2020-04-02	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.75	< 0.50	104
WS2-D2	WS2-D2-20200402	WS2-D2-20200402	2020-04-02	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.45	< 0.5	< 0.75	< 0.5	104
WS2-D2	VA20B2611-002		2020-08-12	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	122
WS2-D2	WS2-D2-20200812	WS2-D2-20200812	2020-08-12	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 70	< 0.5	< 0.5	< 0.5	< 0.71	< 0.5	122
WS2-D2	WS2-D2-20210308	WS2-D2-20210308	2021-03-08	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	87.4
WS2-D2	WS2-D2-REG-GW_20210308		2021-03-08	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	87.4
WS2-D2	WS2-D2-20210819	WS2-D2-20210819	2021-08-19	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	97.7
WS2-D2	WS2-D2-REG-GW_20210819		2021-08-19	10.70 - 12.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	<

AECOM

TABLE 2-2
AREA 2 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						$LEPH_w$	$HEPH_w$	EPH_w (C10-C19)	EPH_w (C19-C32)	VH_w (C6-C10)	VPH_w (C6-C10)	Benzene	Toluene	Ethylbenzene	Xylene	Styrene	MTBE
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						500	--	5000	--	15000	1500	1000	2000	2500	300	720	4400
SSSLs Parkland Refinery						3000	--	5000	--	15000	15000	21000	7700	3200	3300	--	--
Minimum RDL						250	250	250	250	100	70	0.5	0.45	0.5	0.5	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type												
MW3	MW3-20190812	MW3-20190812	2019-08-12	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	0.85	< 0.5	< 0.75	-	-
MW3	MW3-20191116	MW3-20191116	2019-11-16	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.45	< 0.5	< 0.75	-	-
MW3	MW3-20200302	MW3-20200302	2020-03-02	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW3	MW3-20200512	MW3-20200512	2020-05-12	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW3	MW3-20200817	MW3-20200817	2020-08-17	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	0.72	< 0.75	-	-
MW3	MW3-20201202	MW3-20201202	2020-12-02	4.70 - 6.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW3	MW3-20210315	MW3-20210315	2021-03-15	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW3	MW3-REG-GW_20210315		2021-03-15	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW3	MW3-20210819	MW3-20210819	2021-08-19	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW3	MW3-REG-GW_20210819		2021-08-19	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW3	MW3-REG-GW_20220317		2022-03-17	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW3	MW3-20220811		2022-08-11	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW3	MW3_20230411		2023-04-11	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW3	MW3-20230824		2023-08-24	4.70 - 6.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5-20170202	MW5-20170202	2017-02-02	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20180220	MW5-20180220	2018-02-20	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20180509	MW5-20180509	2018-05-09	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20180813	MW5-20180813	2018-08-13	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20181119	MW5-20181119	2018-11-19	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20190304	MW5-20190304	2019-03-04	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20190507	MW5-20190507	2019-05-07	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20190812	MW5-20190812	2019-08-12	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20191116	MW5-20191116	2019-11-16	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.45	< 0.5	< 0.75	-	-
MW5	MW5-20200302	MW5-20200302	2020-03-02	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20200512	MW5-20200512	2020-05-12	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20200817	MW5-20200817	2020-08-17	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20201202	MW5-20201202	2020-12-02	3.70 - 5.20	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
MW5	MW5-20210315	MW5-20210315	2021-03-15	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW5	MW5-REG-GW_20210315		2021-03-15	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5_20210818		2021-08-18	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW5	DUP-02_20210818	MW5_20210818	2021-08-18	3.70 - 5.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5_DUP-02-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW5	MW5-REG-GW_20220317		2022-03-17	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	DUP-05-FD-GW_20220317	MW5-REG-GW_20220317	2022-03-17	3.70 - 5.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5-20220811		2022-08-11	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5_20230406		2023-04-06	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	DUP-06_20230406	MW5_20230406	2023-04-06	3.70 - 5.20	FD	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
MW5	MW5-20230824		2023-08-24	3.70 - 5.20	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1-20170202	U4-1-20170202	2017-02-02	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20180220	U4-1-20180220	2018-02-20	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20180509	U4-1-20180509	2018-05-09	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20180814	U4-1-20180814	2018-08-14	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20181120	U4-1-20181120	2018-11-20	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20190305	U4-1-20190305	2019-03-05	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20190508	U4-1-20190508	2019-05-08	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20190813	U4-1-20190813	2019-08-13	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20191127	U4-1-20191127	2019-11-27	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20200303	U4-1-20200303	2020-03-03	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20200513	U4-1-20200513	2020-05-13	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20200818	U4-1-20200818	2020-08-18	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20201203	U4-1-20201203	2020-12-03	6.40 - 9.45	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-1	U4-1-20210315	U4-1-20210315	2021-03-15	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U4-1	U4-1-REG-GW_20210315		2021-03-15	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1-20210819	U4-1-20210819	2021-08-19	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U4-1	U4-1-REG-GW_20210819		2021-08-19	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1-REG-GW_20220317		2022-03-17	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1-20220825		2022-08-25	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1_20230406		2023-04-06	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-1	U4-1-20230824		2023-08-24	6.40 - 9.45	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	0.81	< 0.50	< 0.50
U4-3	U4-3-20170202	U4-3-20170202	2017-02-02	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20180220	U4-3-20180220	2018-02-20	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20180509	U4-3-20180509	2018-05-09	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20180813	U4-3-20180813	2018-08-13	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20181120	U4-3-20181120	2018-11-20	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20190305	U4-3-20190305	2019-03-05	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20190508	U4-3-20190508	2019-05-08	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20190813	U4-3-20190813	2019-08-13	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20191127	U4-3-20191127	2019-11-27	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20200303	U4-3-20200303	2020-03-03	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20200513	U4-3-20200513	2020-05-13	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20200818	U4-3-20200818	2020-08-18	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20201203	U4-3-20201203	2020-12-03	8.70 - 11.70	N	-	-	< 250	< 250	-	< 100	< 0.5	< 0.5	< 0.5	< 0.75	-	-
U4-3	U4-3-20210315	U4-3-20210315	2021-03-15	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U4-3	U4-3-REG-GW_20210315		2021-03-15	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-3	U4-3_20210818		2021-08-18	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-3	U4-3-20210818	U4-3-20210818	2021-08-18	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
U4-3	U4-3-REG-GW_20220317		2022-03-17	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-3	U4-3-20220824		2022-08-24	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-3	U4-3_20230411		2023-04-11	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
U4-3	U4-3-20230828		2023-08-28	8.70 - 11.70	N	< 250	< 250	< 250	< 250	< 100	< 100	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 14 Amendments, July 2022)
EPHw	Extractable petroleum hydrocarbons in water
FD	Field duplicate sample
LEPHw	Light extractable petroleum hydrocarbons in water
N	Normal environmental sample
HEPHw	Heavy extractable petroleum hydrocarbons in water
VHw	Volatile hydrocarbons in water
VPHw	Volatile petroleum hydrocarbons in water
MTBE	Methyl tert-butyl ether
mbgs	Metres below ground surface
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
-	Sample not analyzed for indicated parameter
--	No standard/guideline

Notes:
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Marine Water
Exceeds Parkland Refinery Site Specific Screening Levels (SSSLs)
Detection Limit Exceeds Applicable Standard/Guideline

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridin	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
PW03-1A	PW03-1A-20140429	PW03-1A-20140429	2014-04-29	2.40 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1A	PW03-1A-20160309	PW03-1A-20160309	2016-03-09	2.40 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1A	PW03-1A-20170403	PW03-1A-20170403	2017-04-03	2.40 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1A	PW03-1A-20180430	PW03-1A-20180430	2018-04-30	2.40 - 4.00	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1A	PW03-1A-REG-GW_20180430		2018-04-30	2.40 - 4.00	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-1A	PW03-1A-20190326	PW03-1A-20190326	2019-03-26	2.40 - 4.00	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1A	PW03-1A-REG-GW_20190326		2019-03-26	2.40 - 4.00	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-1A	PW03-1A-20200408	PW03-1A-20200408	2020-04-08	2.40 - 4.00	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1A	VA20A4587-005		2020-04-08	2.40 - 4.00	N	< 0.010	< 0.020	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-1A	PW03-1A-20210311	PW03-1A-20210311	2021-03-11	2.40 - 4.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1A	PW03-1A-REG-GW_20210311		2021-03-11	2.40 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-1A	PW03-1A-REG-GW_20220302		2022-03-02	2.40 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-1A	PW03-1A_20230330		2023-03-30	2.40 - 4.00	N	< 0.010	< 0.022	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-1B	PW03-1B-20140429	PW03-1B-20140429	2014-04-29	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1B	PW03-1B-20160309	PW03-1B-20160309	2016-03-09	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1B	PW03-1B-20170403	PW03-1B-20170403	2017-04-03	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-1B	PW03-1B-20180430	PW03-1B-20180430	2018-04-30	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1B	PW03-1B-REG-GW_20180430		2018-04-30	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	0.010	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-1B	PW03-1B-20190416	PW03-1B-20190416	2019-04-16	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.07	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	0.05	0.05	< 0.05	-
PW03-1B	PW03-1B-REG-GW_20190416		2019-04-16	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	0.014	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.068	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	0.045	0.051	< 0.05	0.18
PW03-1B	PW03-1B-20200408	PW03-1B-20200408	2020-04-08	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.0069	-	< 0.000015	< 0.01	< 0.01	< 0.0069	< 0.01	< 0.01	< 0.01	0.01	< 0.03	0.06	< 0.02	< 0.01	< 0.05	-
PW03-1B	VA20A4587-006		2020-04-08	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0069	-	< 0.000015	< 0.010	< 0.010	< 0.0069	< 0.010	< 0.010	< 0.010	0.011	< 0.030	0.060	< 0.020	< 0.010	< 0.050	-
PW03-1B	PW03-1B_DUP-12-20200408	PW03-1B-20200408	2020-04-08	1.10 - 3.70	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW03-1B	VA20A4586-002	VA20A4587-006	2020-04-08	1.10 - 3.70	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-1B	PW03-1B-20210311	PW03-1B-20210311	2021-03-11	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-1B	PW03-1B-REG-GW_20210311		2021-03-11	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-1B	PW03-1B-REG-GW_20220302		2022-03-02	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-1B	PW03-1B_20230412		2023-04-12	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2A	PW03-2A-20140429	PW03-2A-20140429	2014-04-29	1.80 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2A	PW03-2A-20160309	PW03-2A-20160309	2016-03-09	1.80 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2A	PW03-2A-20170403	PW03-2A-20170403	2017-04-03	1.80 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2A	PW03-2A-20190416	PW03-2A-20190416	2019-04-16	1.80 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2A	PW03-2A-REG-GW_20190416		2019-04-16	1.80 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-2A	PW03-2A-20200408	PW03-2A-20200408	2020-04-08	1.80 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2A	VA20A4586-001		2020-04-08	1.80 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-2A	PW03-2A-20210311	PW03-2A-20210311	2021-03-11	1.80 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2A	PW03-2A-REG-GW_20210311		2021-03-11	1.80 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2A	PW03-2A-REG-GW_20220302		2022-03-02	1.80 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2A	PW03-2A_20230330		2023-03-30	1.80 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2B	PW03-2B-20140429	PW03-2B-20140429	2014-04-29	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2B	PW03-2B-20160309	PW03-2B-20160309	2016-03-09	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2B	PW03-2B-20170403	PW03-2B-20170403	2017-04-03	1.10 - 3.70	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-2B	PW03-2B-20190326	PW03-2B-20190326	2019-03-26	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2B	PW03-2B-REG-GW_20190326		2019-03-26	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-2B	PW03-2B-20200408	PW03-2B-20200408	2020-04-08	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2B	VA20A4587-003		2020-04-08	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-2B	PW03-2B-20210311	PW03-2B-20210311	2021-03-11	1.10 - 3.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-2B	PW03-2B-REG-GW_20210311		2021-03-11	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2B	PW03-2B-REG-GW_20220302		2022-03-02	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-2B	PW03-2B_20230330		2023-03-30	1.10 - 3.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-3	PW03-3-20140429	PW03-3-20140429	2014-04-29	1.20 - 4.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-3	PW03-3-20160309	PW03-3-20160309	2016-03-09	1.20 - 4.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-3	PW03-3-20170331	PW03-3-20170331	2017-03-31	1.20 - 4.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-3	PW03-3-20180430	PW03-3-20180430	2018-04-30	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-3	PW03-3-REG-GW_20180430		2018-04-30	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-3	PW03-3-20190326	PW03-3-20190326	2019-03-26	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-3	PW03-3-REG-GW_20190326		2019-03-26	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-3	PW03-3-20200409	PW03-3-20200409	2020-04-09	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-3	VA20A4665-002		2020-04-09	1.20 - 4.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-3	PW03-3-20210311	PW03-3-20210311	2021-03-11	1.20 - 4.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-3	PW03-3-REG-GW_20210311		2021-03-11	1.20 - 4.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-3	PW03-3-REG-GW_20220321		2022-03-21	1.20 - 4.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-3	PW03-3_20230330		2023-03-30	1.20 - 4.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-4	PW03-4-20140429	PW03-4-20140429	2014-04-29	1.80 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-4	PW03-4-20160309	PW03-4-20160309	2016-03-09	1.80 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-4	PW03-4-20170403	PW03-4-20170403	2017-04-03	1.80 - 4.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-4	PW03-4-20190416	PW03-4-20190416	2019-04-16	1.80 - 4.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-4	PW03-4-REG-GW_20190416		2019-04-16	1.80 - 4.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.020	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	0.031	< 0.01	< 0.05	< 0.11
PW03-4	PW03-4-20200409	PW03-4-20200409	2020-04-09	1.80 - 4.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-4	VA20A4665-001		2020-04-09	1.80 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
PW03-4	PW03-4-20210311	PW03-4-20210311	2021-03-11	1.80 - 4.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-4	PW03-4-REG-GW_20210311		2021-03-11	1.80 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-4	PW03-4-REG-GW_20220302		2022-03-02	1.80 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-4	PW03-4_20230330		2023-03-30	1.80 - 4.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-5	PW03-5-20140429	PW03-5-20140429	2014-04-29	7.60 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-5	PW03-5-20150506	PW03-5-20150506	2015-05-06	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-5	PW03-5-20160309	PW03-5-20160309	2016-03-09	7.60 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
					Parameter																				
					Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
					CSR-SCH-3.2C3-GENWAT-MW	60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
					SSSLs Parkland Refinery	60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
					Minimum RDL	0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
PW03-5	PW03-5_DUP-3-20160309	PW03-5-20160309	2016-03-09	7.60 - 8.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW03-5	PW03-5-20170403	PW03-5-20170403	2017-04-03	7.60 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-5	PW03-5-20180430	PW03-5-20180430	2018-04-30	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-5	PW03-5-REG-GW_20180430		2018-04-30	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-5	PW03-5_DUP-11-20180430	PW03-5-20180430	2018-04-30	7.60 - 8.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW03-5	PW03-5-20190326	PW03-5-20190326	2019-03-26	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-5	PW03-5-REG-GW_20190326		2019-03-26	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-5	DUP-05-FD-GW_20190326	PW03-5-REG-GW_20190326	2019-03-26	7.60 - 8.50	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
PW03-5	PW03-5_DUP-05-20190326	PW03-5-20190326	2019-03-26	7.60 - 8.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW03-5	PW03-5-20200326	PW03-5-20200326	2020-03-26	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	0.05	< 0.02	< 0.01	< 0.05	-
PW03-5	VA20A3974-001		2020-03-26	7.60 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.019	0.050	< 0.020	< 0.010	< 0.050	-
PW03-5	PW03-5-20210311	PW03-5-20210311	2021-03-11	7.60 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
PW03-5	PW03-5-REG-GW_20210311		2021-03-11	7.60 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-5	PW03-5-REG-GW_20220302		2022-03-02	7.60 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-5	PW03-5-20220810		2022-08-10	7.60 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.019	0.038	0.081	< 0.020	< 0.010	< 0.050	0.081
PW03-5	PW03-5_20230330		2023-03-30	7.60 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-6	PW03-6-20140429	PW03-6-20140429	2014-04-29	1.10 - 3.15	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-6	PW03-6-20160309	PW03-6-20160309	2016-03-09	1.10 - 3.15	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-6	PW03-6-20170331	PW03-6-20170331	2017-03-31	1.10 - 3.15	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
PW03-6	PW03-6_DUP-5-20170331	PW03-6-20170331	2017-03-31	1.10 - 3.15	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PW03-6	PW03-06-REG-GW_20190416		2019-04-16	1.10 - 3.15	N	0.013	< 0.01	< 0.06	0.101	0.0215	-	0.000053	< 0.01	0.064	< 0.005	0.445	0.147	< 0.01	< 0.05	< 0.05	< 0.05	0.897	**0.280**	< 0.05	2.02
PW03-6	PW03-6-20190416	PW03-6-20190416	2019-04-16	1.10 - 3.15	N	0.01	< 0.01	< 0.06	0.10	0.02	-	0.00005	0.02	0.06	< 0.005	0.45	0.15	< 0.01	< 0.05	< 0.05	< 0.05	0.90	**0.28**	< 0.05	-
PW03-6	PW03-6-REG-GW_20220321		2022-03-21	1.10 - 3.15	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
PW03-6	PW03-6_20230412		2023-04-12	1.10 - 3.15	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U8	U8-20140429	U8-20140429	2014-04-29	3.22 - 6.22	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U8	U8-20160322	U8-20160322	2016-03-22	3.22 - 6.22	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U8	U8-20161221	U8-20161221	2016-12-21	3.22 - 6.22	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U8	U8-20170411	U8-20170411	2017-04-11	3.22 - 6.22	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
U8	U8-20180430	U8-20180430	2018-04-30	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U8	U8-REG-GW_20180430		2018-04-30	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U8	U8-20190321	U8-20190321	2019-03-21	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
U8	U8-REG-GW_20190321		2019-03-21	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
U8	U8-20200325	U8-20200325	2020-03-25	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U8	VA20A3942-004		2020-03-25	3.22 - 6.22	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	-
U8	U8-20210311	U8-20210311	2021-03-11	3.22 - 6.22	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U8	U-8-REG-GW_20210311		2021-03-11	3.22 - 6.22	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U8	U8-REG-GW_20220302		2022-03-02	3.22 - 6.22	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U8	U8_20230329		2023-03-29	3.22 - 6.22	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U9	U9-20140429	U9-20140429	2014-04-29	3.30 - 6.30	N	0.07	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	-	-	0.93	< 0.05	< 0.05	< 0.07	-
U9	U9-20160322	U9-20160322	2016-03-22	3.30 - 6.30	N	0.08	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	-	-	0.61	< 0.05	< 0.05	< 0.3	-
U9	U9-20161221	U9-20161221	2016-12-21	3.30 - 6.30	N	0.30	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.39	< 0.05	-	-	1.16	0.16	< 0.05	< 0.2	-
U9	U9-20170411	U9-20170411	2017-04-11	3.30 - 6.30	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.08	-
U9	U9-20180430	U9-20180430	2018-04-30	3.30 - 6.30	N	< 0.01	< 0.07	< 0.02	< 0.01	< 0.006	< 0.015	-	< 0.01	< 0.03	< 0.005	< 0.01	0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.04	< 0.05	-
U9	U9-REG-GW_20180430		2018-04-30	3.30 - 6.30	N	< 0.01	< 0.07	< 0.02	< 0.01	< 0.006	-	< 0.000015	< 0.01	< 0.03	< 0.005	< 0.01	0.011	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.036	< 0.05	< 0.13
U9	U9-20190321	U9-20190321	2019-03-21	3.30 - 6.30	N	0.03	< 0.05	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.04	< 0.005	< 0.01	0.03	< 0.01	1.20	0.74	2.30	< 0.02	0.04	< 0.07	-
U9	U9-REG-GW_20190321		2019-03-21	3.30 - 6.30	N	0.027	< 0.05	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.04	< 0.005	< 0.01	0.027	< 0.01	1.20	0.744	2.30	< 0.02	0.038	< 0.07	4.34
U9	U9-20200407	U9-20200407	2020-04-07	3.30 - 6.30	N	0.09	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.11	< 0.01	1.71	0.99	< 0.5	0.07	< 0.01	< 0.3	-
U9	VA20A4496-001		2020-04-07	3.30 - 6.30	N	0.088	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.108	< 0.010	1.71	0.990	< 0.500	0.068	< 0.010	< 0.300	-
U9	U9_DUP-09-20200407	U9-20200407	2020-04-07	3.30 - 6.30	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U9	VA20A4496-002	VA20A4496-001	2020-04-07	3.30 - 6.30	FD	0.087	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.111	< 0.010	1.71	0.984	< 0.500	0.069	< 0.010	< 0.300	-
U9	U9-20210311	U9-20210311	2021-03-11	3.30 - 6.30	N	0.04	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.07	< 0.01	0.21	0.09	< 0.11	0.03	< 0.01	< 0.13	-
U9	U-9-REG-GW_20210311		2021-03-11	3.30 - 6.30	N	0.035	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.071	< 0.010	0.211	0.089	< 0.110	0.029	< 0.010	< 0.130	0.135
U9	DUP-03-FD-GW_20210311	U-9-REG-GW_20210311	2021-03-11	3.30 - 6.30	FD	0.031	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.070	< 0.010	0.202	0.084	< 0.100	0.027	< 0.010	< 0.150	0.128
U9	U9_DUP-03-20210311	U9-20210311	2021-03-11	3.30 - 6.30	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U9	U9_DUP-09-20210311	U9-20210311	2021-03-11	3.30 - 6.30	FD	0.03	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.07	< 0.01	0.20	0.08	< 0.1	0.03	< 0.01	< 0.15	-
U9	U9-REG-GW_20220302		2022-03-02	3.30 - 6.30	N	0.040	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.065	< 0.010	0.722	0.186	< 0.114	0.046	< 0.010	< 0.127	0.151
U9	DUP01-FD-GW_20220302	U9-REG-GW_20220302	2022-03-02	3.30 - 6.30	FD	0.039	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.064	< 0.010	0.721	0.189	< 0.109	0.044	< 0.010	< 0.131	0.147
U9	U9_20230330		2023-03-30	3.30 - 6.30	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.110	0.106	0.186	< 0.020	< 0.010	< 0.050	0.186
G2-11A	G2-11A-20140512	G2-11A-20140512	2014-05-12	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	-	-	< 0.08	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A-20140818	G2-11A-20140818	2014-08-18	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	-	-	< 0.07	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A-20150511	G2-11A-20150511	2015-05-11	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.08	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A-20150916	G2-11A-20150916	2015-09-16	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.08	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A_DUP-16-20150916	G2-11A-20150916	2015-09-16	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-20160404	G2-11A-20160404	2016-04-04	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A-20160901	G2-11A-20160901	2016-09-01	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.07	< 0.05	< 0.05	< 0.07	-
G2-11A	G2-11A-20170412	G2-11A-20170412	2017-04-12	4.60 - 6.10	N	< 0.2	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.66	< 0.05	-	-	8.48	0.08	< 0.05	< 0.6	-
G2-11A	G2-11A_DUP-9-20170412	G2-11A-20170412	2017-04-12	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-20170828	G2-11A-20170828	2017-08-28	4.60 - 6.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.11	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11A	G2-11A-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	N	0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	0.02	0.02	< 0.01	0.09	< 0.05	< 0.05	< 0.02	0.02	< 0.05	-
G2-11A	G2-11A-REG-GW_20180430		2018-04-30	4.60 - 6.10	N	0.012	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.024	0.020	< 0.01	0.087	< 0.05	< 0.05	< 0.02	0.017	< 0.05	0.16
G2-11A	G2-11A_DUP-12-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-20180828	G2-11A-20180828	2018-08-28	4.60 - 6.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	0.02	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11A	G2-11A-REG-GW_20180828		2018-08-28	4.60 - 6.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.018	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11A	G2-11A-20190326	G2-11A-20190326	2019-03-26	4.60 - 6.10	N	< 0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.03	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11A	G2-11A-REG-GW_20190326		2019-03-26	4.60 - 6.10	N	< 0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.030	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11A	DUP-06-FD-GW_20190326	G2-11A-REG-GW_20190326	2019-03-26	4.60 - 6.10	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11A	G2-11A_DUP-06-20190326	G2-11A-20190326	2019-03-26	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
G2-11A	G2-11A-20190917	G2-11A-20190917	2019-09-17	4.60 - 6.10	N	0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.03	< 0.01	0.07	< 0.05	< 0.1	< 0.02	< 0.01	< 0.05	-
G2-11A	L2349075-3		2019-09-17	4.60 - 6.10	N	0.019	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.025	< 0.01	0.066	< 0.05	< 0.1	< 0.02	< 0.01	< 0.05	< 0.14
G2-11A	G2-11A-20200406	G2-11A-20200406	2020-04-06	4.60 - 6.10	N	0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.04	< 0.01	0.06	0.03	< 0.2	< 0.02	< 0.01	< 0.05	-
G2-11A	VA20A4448-003		2020-04-06	4.60 - 6.10	N	0.021	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.039	< 0.010	0.061	0.031	< 0.200	< 0.020	< 0.010	< 0.050	-
G2-11A	G2-11A_DUP-11-20200406	G2-11A-20200406	2020-04-06	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	VA20A4448-006	VA20A4448-003	2020-04-06	4.60 - 6.10	FD	0.022	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.032	< 0.010	0.252	0.149	< 0.200	< 0.020	< 0.010	< 0.050	-
G2-11A	G2-11A-20200817	G2-11A-20200817	2020-08-17	4.60 - 6.10	N	0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.01	< 0.01	< 0.02	0.02	< 0.07	< 0.02	< 0.01	< 0.05	-
G2-11A	VA20B2849-AA-003		2020-08-17	4.60 - 6.10	N	0.015	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.012	< 0.010	< 0.020	0.015	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
G2-11A	G2-11A-20210309	G2-11A-20210309	2021-03-09	4.60 - 6.10	N	0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.06	< 0.01	0.56	0.03	< 0.15	< 0.02	< 0.01	< 0.05	-
G2-11A	G2-11A-REG-GW_20210309		2021-03-09	4.60 - 6.10	N	0.023	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.057	< 0.010	0.556	0.031	< 0.150	< 0.020	< 0.010	< 0.050	< 0.155
G2-11A	G2-11A-REG-GW_20220316		2022-03-16	4.60 - 6.10	N	0.011	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.018	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11A	DUP-04/FD-GW_20220316	G2-11A-REG-GW_20220316	2022-03-16	4.60 - 6.10	FD	0.015	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.016	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11A	G2-11A-20220810		2022-08-10	4.60 - 6.10	N	< 0.020	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.012	< 0.010	0.018	0.034	< 0.090	< 0.020	< 0.010	< 0.050	< 0.100
G2-11A	DUP-1-20220810	G2-11A-20220810	2022-08-10	4.60 - 6.10	FD	< 0.020	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.014	< 0.010	0.021	0.031	< 0.090	< 0.020	< 0.010	< 0.050	< 0.100
G2-11A	G2-11A_20230328		2023-03-28	4.60 - 6.10	N	0.012	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.023	0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11A	G2-11A-20230824		2023-08-24	4.60 - 6.10	N	0.015	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.013	0.016	< 0.065	< 0.020	< 0.010	< 0.050	< 0.077
G2-11B	G2-11B-20140512	G2-11B-20140512	2014-05-12	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B_DUP-19-20140512	G2-11B-20140512	2014-05-12	7.00 - 8.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-20140818	G2-11B-20140818	2014-08-18	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-20150511	G2-11B-20150511	2015-05-11	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20150916	G2-11B-20150916	2015-09-16	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20160404	G2-11B-20160404	2016-04-04	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20160901	G2-11B-20160901	2016-09-01	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20170412	G2-11B-20170412	2017-04-12	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20170828	G2-11B-20170828	2017-08-28	7.00 - 8.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-11B	G2-11B-20180430	G2-11B-20180430	2018-04-30	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	G2-11B-REG-GW_20180430		2018-04-30	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11B	G2-11B-20180828	G2-11B-20180828	2018-08-28	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	G2-11B-REG-GW_20180828		2018-08-28	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11B	G2-11B-20190326	G2-11B-20190326	2019-03-26	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	G2-11B-REG-GW_20190326		2019-03-26	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11B	G2-11B-20190917	G2-11B-20190917	2019-09-17	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.06	< 0.02	< 0.01	< 0.05	-
G2-11B	L2349075-4		2019-09-17	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.06	< 0.02	< 0.01	< 0.05	< 0.11
G2-11B	G2-11B_DUP-04-20190917	G2-11B-20190917	2019-09-17	7.00 - 8.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B_DUP-4-20190917	G2-11B-20190917	2019-09-17	7.00 - 8.50	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	L2349075-5	L2349075-4	2019-09-17	7.00 - 8.50	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-11B	G2-11B-20200406	G2-11B-20200406	2020-04-06	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.1	< 0.02	< 0.01	< 0.05	-
G2-11B	VA20A4448-004		2020-04-06	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.017	< 0.100	< 0.020	< 0.010	< 0.050	-
G2-11B	G2-11B-20200817	G2-11B-20200817	2020-08-17	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	VA20B2849-AA-004		2020-08-17	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11B	G2-11B-20210309	G2-11B-20210309	2021-03-09	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-11B	G2-11B-REG-GW_20210309		2021-03-09	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11B	G2-11B-20210901	G2-11B-20210901	2021-09-01	7.00 - 8.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.017	0.026	< 0.06	< 0.02	< 0.01	< 0.05	-
G2-11B	G2-11B-REG-GW_20210901		2021-09-01	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.017	0.026	< 0.060	< 0.020	< 0.010	< 0.050	< 0.072
G2-11B	G2-11B-REG-GW_20220316		2022-03-16	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11B	G2-11B-20220810		2022-08-10	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.015	0.026	< 0.063	< 0.020	< 0.010	< 0.050	< 0.075
G2-11B	G2-11B_20230328		2023-03-28	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-11B	G2-11B-20230824		2023-08-24	7.00 - 8.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.026	< 0.065	< 0.020	< 0.010	< 0.050	< 0.077
MW02-02	MW02-02-20140501	MW02-02-20140501	2014-05-01	1.20 - 4.30	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	-	-	< 0.1	< 0.05	< 0.05	< 0.05	-
MW02-02	MW02-02-20150511	MW02-02-20150511	2015-05-11	1.20 - 4.30	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.1	< 0.05	< 0.05	< 0.05	-
MW02-02	MW02-02-20160331	MW02-02-20160331	2016-03-31	1.20 - 4.30	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-02	MW02-02-20170405	MW02-02-20170405	2017-04-05	1.20 - 4.30	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-02	MW02-02-20190319	MW02-02-20190319	2019-03-19	1.20 - 4.30	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-02	MW02-02-REG-GW_20190319		2019-03-19	1.20 - 4.30	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW02-02	MW02-02-20200406	MW02-02-20200406	2020-04-06	1.20 - 4.30	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-02	VA20A4448-001		2020-04-06	1.20 - 4.30	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	-
MW02-02	MW02-02-20210310	MW02-02-20210310	2021-03-10	1.20 - 4.30	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-02	MW02-02-REG-GW_20210310		2021-03-10	1.20 - 4.30	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-02	MW02-02-REG-GW_20220314		2022-03-14	1.20 - 4.30	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-02	MW02-02_20230328		2023-03-28	1.20 - 4.30	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-03	MW02-03-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	N	< 0.05	< 0.05	< 0.06	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.1	-
MW02-03	MW02-03_DUP-13-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	MW02-03-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	-	-	< 0.3	< 0.05	< 0.05	< 0.05	-
MW02-03	MW02-03_DUP-4-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	MW02-03-20150511	MW02-03-20150511	2015-05-11	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.09	-
MW02-03	MW02-03_DUP-13-20150511	MW02-03-20150511	2015-05-11	1.50 - 4.60	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	MW02-03-20160331	MW02-03-20160331	2016-03-31	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-03	MW02-03-20170405	MW02-03-20170405	2017-04-05	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-03	MW02-03-20180426	MW02-03-20180426	2018-04-26	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-03	MW02-03-REG-GW_20180426		2018-04-26	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW02-03	MW02-03-20190319	MW02-03-20190319	2019-03-19	1.50 - 4.60	N	0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.02	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-03	MW02-03-REG-GW_20190319		2019-03-19	1.50 - 4.60	N	0.019	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.017	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW02-03	MW02-03-20200406	MW02-03-20200406	2020-04-06	1.50 - 4.60	N	0.04	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.02	< 0.01	0.05	0.03	< 0.1	< 0.02	< 0.01	< 0.05	-
MW02-03	VA20A4448-002		2020-04-06	1.50 - 4.60	N	0.036	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.015	< 0.010	0.050	0.026	< 0.100	< 0.020	< 0.010	< 0.050	-
MW02-03	MW02-03_DUP-7-20200406	MW02-03-20200406	2020-04-06	1.50 - 4.60	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	VA20A4448-005	VA20A4448-002	2020-04-06	1.50 - 4.60	FD	0.029	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.014	< 0.010	0.050	0.026	< 0.100	< 0.020	< 0.010	< 0.050	-
MW02-03	MW02-03-20210310	MW02-03-20210310	2021-03-10	1.50 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.06	< 0.02	< 0.01	< 0.05	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
					Parameter																				
					Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
					CSR-SCH-3.2C3-GENWAT-MW	60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
					SSSLs Parkland Refinery	60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
					Minimum RDL	0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
MW02-03	MW02-03-REG-GW_20210310		2021-03-10	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.016	< 0.060	< 0.020	< 0.010	< 0.050	< 0.072
MW02-03	A1MW02-03-REG-GW_20210324		2021-03-24	1.50 - 4.60	N	1.09	< 0.200	< 0.150	< 0.040	0.0220	-	0.000044	0.044	< 0.080	< 0.0060	0.163	0.582	0.028	5.39	< 0.170	< 1.50	< 0.080	**0.294**	< 2.90	2.27
MW02-03	DUP-06-FD-GW_20210324	A1MW02-03-REG-GW_20210324	2021-03-24	1.50 - 4.60	fd	1.17	< 0.210	< 0.190	< 0.040	0.0240	-	0.000049	0.053	< 0.080	< 0.0080	0.170	0.891	0.035	15.4	1.40	< 1.50	0.445	**0.314**	< 3.50	3.15
MW02-03	MW02-03-REG-GW_20220314		2022-03-14	1.50 - 4.60	N	0.047	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.024	< 0.010	0.033	< 0.010	< 0.050	< 0.020	< 0.010	< 0.110	0.071
MW02-03	DUP-03-FD-GW_20220314	MW02-03-REG-GW_20220314	2022-03-14	1.50 - 4.60	FD	0.050	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.026	< 0.010	0.038	< 0.010	< 0.050	< 0.020	< 0.010	< 0.140	0.076
MW02-03	MW02-03-20220809		2022-08-09	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.021	0.036	0.105	< 0.020	< 0.010	< 0.050	0.105
MW02-03	MW02-03_20230321		2023-03-21	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-03	DUP-07_20230321	MW02-03_20230321	2023-03-21	1.50 - 4.60	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-04	MW02-04-20140501	MW02-04-20140501	2014-05-01	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.3	< 0.05	< 0.05	< 0.08	-
MW02-04	MW02-04-20140807	MW02-04-20140807	2014-08-07	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.6	< 0.05	< 0.05	< 0.05	-
MW02-04	MW02-04-20160331	MW02-04-20160331	2016-03-31	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-04	MW02-04-20170405	MW02-04-20170405	2017-04-05	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.2	-
MW02-04	MW02-04-20180419	MW02-04-20180419	2018-04-19	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW02-04	MW02-04-REG-GW_20180419144700		2018-04-19	1.50 - 4.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW02-04	MW02-04-20200407	MW02-04-20200407	2020-04-07	1.50 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-04	VA20A4503-001		2020-04-07	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
MW02-04	MW02-04-20210309	MW02-04-20210309	2021-03-09	1.50 - 4.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW02-04	MW02-04-REG-GW_20210309		2021-03-09	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW02-04	MW02-04_20230321		2023-03-21	1.50 - 4.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-02	MW03-02-20140430	MW03-02-20140430	2014-04-30	3.70 - 7.60	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-02	MW03-02-20140812	MW03-02-20140812	2014-08-12	3.70 - 7.60	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-02	MW03-02-20150507	MW03-02-20150507	2015-05-07	3.70 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-02	MW03-02-20150825	MW03-02-20150825	2015-08-25	3.70 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-02	MW03-02_DUP-5-20150825	MW03-02-20150825	2015-08-25	3.70 - 7.60	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-02	MW03-02-20160322	MW03-02-20160322	2016-03-22	3.70 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-02	MW03-02-20170410	MW03-02-20170410	2017-04-10	3.70 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-02	MW03-02-20180426	MW03-02-20180426	2018-04-26	3.70 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW03-02	MW03-02-20190320	MW03-02-20190320	2019-03-20	3.70 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-02	MW03-02-REG-GW_20190320		2019-03-20	3.70 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW03-02	MW03-02-20200326	MW03-02-20200326	2020-03-26	3.70 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-02	VA20A3974-002		2020-03-26	3.70 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.024	< 0.050	< 0.020	< 0.010	< 0.050	-
MW03-02	MW03-02-20210310	MW03-02-20210310	2021-03-10	3.70 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW03-02	MW03-02-REG-GW_20210310		2021-03-10	3.70 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-02	MW03-02-REG-GW_20220316		2022-03-16	3.70 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-02	MW03-02_20230329		2023-03-29	3.70 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW03-03	MW03-03-20140506	MW03-03-20140506	2014-05-06	6.10 - 13.70	N	0.79	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.48	< 0.05	-	-	**28.00**	0.45	< 0.05	< 0.7	-
MW03-03	MW03-03-20140813	MW03-03-20140813	2014-08-13	6.10 - 13.70	N	0.47	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.30	< 0.05	-	-	< 0.5	0.50	< 0.05	< 0.2	-
MW03-03	MW03-03-20160331	MW03-03-20160331	2016-03-31	6.10 - 13.70	N	0.40	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.30	< 0.05	-	-	< 0.8	0.36	< 0.05	< 2	-
MW03-03	MW03-03-20170405	MW03-03-20170405	2017-04-05	6.10 - 13.70	N	0.94	< 0.05	0.06	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.71	< 0.05	-	-	**18.90**	0.69	< 0.05	< 0.3	-
MW03-03	MW03-03-20180419	MW03-03-20180419	2018-04-19	6.10 - 13.70	N	0.54	< 0.08	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.52	< 0.05	14.50	0.08	< 0.8	0.59	< 0.05	< 2	-
MW03-03	MW03-03-REG-GW_20180419144500		2018-04-19	6.10 - 13.70	N	0.540	< 0.08	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	0.524	< 0.05	14.5	0.078	< 0.8	0.591	< 0.05	< 2	16.2
A2MW09-05I	A2MW09-05I_MW09-05I-20140430		2014-04-30	9.18 - 10.68	N	0.43	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.50	< 0.05	-	-	5.62	0.46	< 0.05	< 0.05	-
A2MW09-05I	A2MW09-05I_MW09-05I-20140812		2014-08-12	9.18 - 10.68	N	0.53	< 0.05	< 0.08	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.80	< 0.05	-	-	**20.80**	1.13	0.07	< 0.4	-
A2MW09-05I	A2MW09-05I_DUP-6-20140812	A2MW09-05I_MW09-05I-20140812	2014-08-12	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20150507		2015-05-07	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I-20150507		2015-05-07	9.18 - 10.68	N	0.48	< 0.05	< 0.06	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.76	< 0.05	-	-	5.61	0.70	< 0.05	< 2	-
A2MW09-05I	A2MW09-05I_DUP-12-20150507	A2MW09-05I_MW09-05I-20150507	2015-05-07	9.18 - 10.68	FD	0.41	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.68	< 0.05	-	-	5.83	0.63	< 0.05	< 4	-
A2MW09-05I	A2MW09-05I-20150825	A2MW09-05I-20150825	2015-08-25	9.18 - 10.68	N	0.48	< 0.2	< 0.06	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.75	< 0.05	-	-	**14.30**	0.81	< 0.05	< 2	-
A2MW09-05I	A2MW09-05I-20160322	A2MW09-05I-20160322	2016-03-22	9.18 - 10.68	N	0.43	< 0.05	< 0.06	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.52	< 0.05	-	-	< 1	0.29	< 0.05	< 0.3	-
A2MW09-05I	A2MW09-05I_MW09-05I-20160825		2016-08-25	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I-20160825		2016-08-25	9.18 - 10.68	N	0.42	< 0.1	< 0.07	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.74	< 0.05	-	-	**24.40**	0.70	< 0.05	< 3	-
A2MW09-05I	A2MW09-05I-20161221	A2MW09-05I-20161221	2016-12-21	9.18 - 10.68	N	0.68	< 0.05	< 0.07	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.91	< 0.05	-	-	< 2	0.47	< 0.05	< 0.7	-
A2MW09-05I	A2MW09-05I_MW09-05I-20170412		2017-04-12	9.18 - 10.68	N	0.39	< 0.05	< 0.06	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.53	< 0.05	-	-	< 2	0.15	< 0.05	< 2	-
A2MW09-05I	A2MW09-05I-20170412	A2MW09-05I-20170412	2017-04-12	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20170906		2017-09-06	9.18 - 10.68	N	0.41	< 0.05	< 0.08	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.68	< 0.05	-	-	< 6	0.54	< 0.05	< 2	-
A2MW09-05I	A2MW09-05I-20170906	A2MW09-05I-20170906	2017-09-06	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_DUP-6-20170906	A2MW09-05I-20170906	2017-09-06	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20180426		2018-04-26	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-05I-REG-GW_20180426		2018-04-26	9.18 - 10.68	N	0.454	< 0.2	< 0.08	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	0.690	< 0.05	3.69	< 0.05	< 2	< 0.06	0.058	< 2	4.9
A2MW09-05I	A2MW09-05I_DUP-10-20180426	A2MW09-05I_MW09-05I-20180426	2018-04-26	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20180530		2018-05-30	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-05I-REG-GW_20180530		2018-05-30	9.18 - 10.68	N	0.288	< 0.01	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.428	< 0.01	0.091	< 0.05	< 0.8	< 0.02	0.016	< 0.6	< 1.0
A2MW09-05I	A2MW09-05I_DUP-14-20180530	A2MW09-05I_MW09-05I-20180530	2018-05-30	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	DUP-14-FD-GW_20180530	MW09-05I-REG-GW_20180530	2018-05-30	9.18 - 10.68	FD	0.314	0.081	0.040	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.482	< 0.01	0.105	< 0.05	< 0.9	< 0.02	0.018	< 0.6	< 1.1
A2MW09-05I	A2MW09-05I-20180822		2018-08-22	9.18 - 10.68	N	0.426	< 0.2	< 0.08	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	0.681	< 0.01	2.71	0.141	< 2	0.096	0.030	< 1	-
A2MW09-05I	MW09-5I-REG-GW_20180822		2018-08-22	9.18 - 10.68	N	0.426	< 0.2	< 0.08	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.681	< 0.01	2.71	0.141	< 2	0.096	0.030	< 1	4.1
A2MW09-05I	A2MW09-05I-20190326		2019-03-26	9.18 - 10.68	N	< 0.3	< 0.01	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.46	< 0.01	0.20	< 0.05	< 0.8	< 0.02	0.02	< 0.8	-
A2MW09-05I	MW09-05I-REG-GW_20190326_3		2019-03-26	9.18 - 10.68	N	< 0.3	< 0.01	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.459	< 0.01	0.201	< 0.05	< 0.8	< 0.02	0.019	< 0.8	< 1.2
A2MW09-05I	DUP-04-FD-GW_20190326	MW09-05I-REG-GW_20190326	2019-03-26	9.18 - 10.68	FD	< 0.3	< 0.01	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.453	< 0.01	0.232	< 0.05	< 0.8	< 0.02	0.019	< 0.9	< 1.2
A2MW09-05I	A2MW09-05I-20190910		2019-09-10	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	L2344655-1		2019-09-10	9.18 - 10.68	N	0.373	< 0.09	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.392	< 0.01	4.45	1.21	< 2	0.108	0.020	< 0.8	6.6
A2MW09-05I	L2344655-3	L2344655-1	2019-09-10	9.18 - 10.68	FD	0.347	< 0.07	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.404	< 0.01	4.13	1.12	< 2	0.099	0.018	< 0.7	6.1
A2MW09-05I	A2MW09-05I_MW09-05I-20200408		2020-04-08	9.18 - 10.68	N	0.32	< 0.1	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.55	< 0.01	0.27	< 0.04	< 0.9	< 0.02	0.02	< 0.8	-
A2MW09-05I	VA20A4587-001		2020-04-08	9.18 - 10.68	N	0.324	< 0.100	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.553	< 0.010	0.274	< 0.040	< 0.900	< 0.020	0.018	< 0.800	-
A2MW09-05I	A2MW09-05I_MW09-05I-20200811		2020-08-11	9.18 - 10.68	N	0.23	< 0.01	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.33	< 0.01	0.17	0.04	< 0.6	< 0.02	0.02	< 0.5	-
A2MW09-05I	VA20B2369-001		2020-08-11	9.18 - 10.68	N	0.233	< 0.010	< 0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.332	< 0.010	0.167	0.036	< 0.600	< 0.020	0.015	< 0.500	< 0.605
A2MW09-05I	VA20B2369-003	VA20B2369-001	2020-08-11	9.18 - 10.68	FD	0.281	< 0.010	< 0.030	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.364	< 0.010	0.183	0.040	< 0.700	< 0.020	0.017	< 0.500	< 0.704

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
A2MW09-05I	A2MW09-05I_MW09-05I-20210311		2021-03-11	9.18 - 10.68	N	0.32	< 0.12	< 0.054	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.60	< 0.01	0.82	< 0.029	< 0.87	< 0.027	0.02	< 0.9	-
A2MW09-05I	MW09-05I-REG-GW_20210311		2021-03-11	9.18 - 10.68	N	0.324	< 0.120	< 0.054	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.604	< 0.010	0.822	< 0.029	< 0.870	< 0.027	0.023	< 0.900	0.951
A2MW09-05I	MW09-05I-20210817	MW09-05I-20210817	2021-08-17	9.18 - 10.68	N	0.35	< 0.12	< 0.059	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.40	< 0.01	2.94	1.25	< 0.99	< 0.041	0.03	< 0.66	-
A2MW09-05I	MW09-05I-REG-GW_20210817		2021-08-17	9.18 - 10.68	N	0.350	< 0.120	< 0.059	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.400	< 0.010	2.94	1.25	< 0.990	< 0.041	0.025	< 0.660	< 0.995
A2MW09-05I	A2MW09-05I_DUP-01-20210817	MW09-05I-20210817	2021-08-17	9.18 - 10.68	FD	0.33	< 0.12	< 0.052	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.43	< 0.01	2.74	1.16	< 0.92	< 0.042	0.02	< 0.61	-
A2MW09-05I	DUP-01-FD-GW_20210817	A2MW09-05I-20210817	2021-08-17	9.18 - 10.68	FD	0.326	< 0.120	< 0.052	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.425	< 0.010	2.74	1.16	< 0.920	< 0.042	0.024	< 0.610	< 0.925
A2MW09-05I	MW09-05I-REG-GW_20220303		2022-03-03	9.18 - 10.68	N	0.251	< 0.220	< 0.070	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.517	< 0.010	< 0.080	< 0.020	< 0.100	< 0.020	< 0.060	< 1.05	0.768
A2MW09-05I	A2MW09-05I-20220407		2022-04-07	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-05I-20220407-1		2022-04-07	9.18 - 10.68	N	0.33	< 0.14	< 0.06	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.64	< 0.01	0.367	< 0.01	< 0.25	< 0.02	0.04	0.991	-
A2MW09-05I	MW09-05I-20220810		2022-08-10	9.18 - 10.68	N	0.343	< 0.420	< 0.120	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.020	< 0.0050	< 0.030	0.529	< 0.010	0.874	0.212	< 1.10	< 0.030	0.109	< 1.10	< 1.11
A2MW09-05I	A2MW09-05I_20230330		2023-03-30	9.18 - 10.68	N	0.258	< 0.155	< 0.061	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.513	< 0.010	< 0.027	< 0.010	< 0.810	< 0.020	0.032	< 0.770	< 0.816
A2MW09-05I	A2MW09-05I-20230824		2023-08-28	9.18 - 10.68	N	0.311	< 0.125	< 0.065	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.352	< 0.010	2.59	1.05	< 0.960	0.059	0.028	< 0.890	< 0.965
A2MW09-06S	A2MW09-06S_MW09-06S-20140430		2014-04-30	2.44 - 5.44	N	0.24	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.47	< 0.05	-	-	9.61	0.34	< 0.05	< 0.05	-
A2MW09-06S	A2MW09-06S_MW09-06S-20170411		2017-04-11	2.44 - 5.44	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.3	< 0.05	< 0.05	< 0.05	-
A2MW09-06S	A2MW09-06S_MW09-06S-20210331		2021-03-31	2.44 - 5.44	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-06S	MW09-6S-REG-GW_20210331		2021-03-31	2.44 - 5.44	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-06S	MW09-06S-REG-GW_20220321		2022-03-21	2.44 - 5.44	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-06S	A2MW09-06S_20230412		2023-04-12	2.44 - 5.44	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.022	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-06I	A2MW09-06I_MW09-6I-20140430		2014-04-30	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_DUP-12-20140430	A2MW09-06I_MW09-06I-20140430	2014-04-30	9.33 - 10.83	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-6I-20140812		2014-08-12	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20150506		2015-05-06	9.33 - 10.83	N	0.25	< 0.01	< 0.05	< 0.01	< 0.01	< 0.02	-	< 0.01	< 0.02	< 0.01	< 0.02	0.44	< 0.01	-	-	< 2	0.49	0.08	< 0.8	-
A2MW09-06I	A2MW09-06I_MW09-6I-20150506		2015-05-06	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20150825		2015-08-25	9.33 - 10.83	N	0.12	< 0.08	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.17	< 0.05	-	-	< 1	0.11	0.07	< 2	-
A2MW09-06I	A2MW09-06I_MW09-6I-20150825		2015-08-25	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_DUP-4-20150825	A2MW09-06I_MW09-6I-20150825	2015-08-25	9.33 - 10.83	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-06I_DUP-4-20150825	A2MW09-06I_MW09-6I-20150825	2015-08-25	9.33 - 10.83	FD	0.13	< 0.2	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.21	< 0.05	-	-	< 0.8	0.13	0.11	< 0.3	-
A2MW09-06I	A2MW09-06I_MW09-06I-20160322		2016-03-22	9.33 - 10.83	N	0.41	< 0.05	< 0.07	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.65	< 0.05	-	-	4.45	0.61	< 0.05	< 2	-
A2MW09-06I	A2MW09-06I_MW09-6I-20160322		2016-03-22	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20160825		2016-08-25	9.33 - 10.83	N	< 0.05	< 0.2	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.09	< 0.05	-	-	< 0.2	0.20	0.09	< 0.4	-
A2MW09-06I	A2MW09-06I_MW09-6I-20160825		2016-08-25	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20170412		2017-04-12	9.33 - 10.83	N	0.50	< 0.05	< 0.07	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.88	< 0.05	-	-	< 5	0.68	0.06	< 2	-
A2MW09-06I	A2MW09-06I_MW09-6I-20170412		2017-04-12	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20170906		2017-09-06	9.33 - 10.83	N	0.11	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.21	< 0.05	-	-	< 0.4	< 0.05	0.06	< 0.6	-
A2MW09-06I	A2MW09-06I_MW09-6I-20170906		2017-09-06	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	A2MW09-06I_MW09-06I-20180426		2018-04-26	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-06I-REG-GW_20180426		2018-04-26	9.33 - 10.83	N	0.371	< 0.6	< 0.2	< 0.05	< 0.005	-	-	< 0.05	< 0.06	< 0.005	0.097	0.720	< 0.05	5.04	< 0.07	< 2	0.391	**0.644**	< 2	7.3
A2MW09-06I	A2MW09-06I-20180822		2018-08-22	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-61-REG-GW_20180822		2018-08-22	9.33 - 10.83	N	0.133	< 0.01	< 0.06	< 0.01	< 0.005	-	0.000025	< 0.01	< 0.03	< 0.005	0.015	0.218	0.011	< 0.05	< 0.05	< 0.5	< 0.02	0.084	< 0.5	< 0.72
A2MW09-06I	A2MW09-06I_MW09-06I-20190326		2019-03-26	9.33 - 10.83	N	< 0.08	< 0.06	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.17	< 0.01	0.09	< 0.05	< 0.3	< 0.02	0.03	< 0.3	-
A2MW09-06I	MW09-06I-REG-GW_20190326		2019-03-26	9.33 - 10.83	N	< 0.08	< 0.06	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.172	< 0.01	0.091	< 0.05	< 0.3	< 0.02	0.028	< 0.3	< 0.45
A2MW09-06I	A2MW09-06I_MW09-06I-20190910		2019-09-10	9.33 - 10.83	N	0.12	< 0.4	< 0.07	< 0.02	< 0.005	-	< 0.000015	< 0.01	< 0.05	< 0.005	0.09	0.16	< 0.01	0.15	0.06	< 0.4	< 0.07	**0.59**	< 0.3	-
A2MW09-06I	L2344655-2		2019-09-10	9.33 - 10.83	N	0.116	< 0.4	< 0.07	< 0.02	< 0.005	-	< 0.000015	< 0.01	< 0.05	< 0.005	0.086	0.164	< 0.01	0.154	0.059	< 0.4	< 0.07	**0.592**	< 0.3	1.17
A2MW09-06I	A2MW09-06I_MW09-06I-20200326		2020-03-26	9.33 - 10.83	N	0.18	< 0.2	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.3	0.39	< 0.01	0.13	< 0.02	< 2.5	< 0.04	0.05	< 0.6	-
A2MW09-06I	VA20A3974-003		2020-03-26	9.33 - 10.83	N	0.184	< 0.200	< 0.050	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.300	0.392	< 0.010	0.133	< 0.020	< 2.50	< 0.040	0.047	< 0.600	-
A2MW09-06I	A2MW09-06I_MW09-06I-20200811		2020-08-11	9.33 - 10.83	N	0.05	< 0.03	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.07	< 0.01	0.03	0.03	< 0.3	< 0.02	0.02	< 0.2	-
A2MW09-06I	VA20B2369-002		2020-08-11	9.33 - 10.83	N	0.048	< 0.030	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.072	< 0.010	0.028	0.034	< 0.300	< 0.020	0.015	< 0.200	< 0.303
A2MW09-06I	VA20B2369-004	VA20B2369-002	2020-08-11	9.33 - 10.83	FD	0.053	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.076	< 0.010	0.030	0.036	< 0.300	< 0.020	0.016	< 0.200	< 0.303
A2MW09-06I	A2MW09-06I_MW09-06I-20210311		2021-03-11	9.33 - 10.83	N	0.18	< 0.11	< 0.037	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.38	< 0.01	0.28	< 0.031	< 0.56	< 0.04	0.04	< 0.64	-
A2MW09-06I	MW09-06I-REG-GW_20210311		2021-03-11	9.33 - 10.83	N	0.176	< 0.110	< 0.037	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.375	< 0.010	0.279	< 0.031	< 0.560	< 0.040	0.042	< 0.640	0.593
A2MW09-06I	DUP-02-FD-GW_20210311	MW09-06I-REG-GW_20210311	2021-03-11	9.33 - 10.83	FD	0.168	< 0.100	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.383	< 0.010	0.274	< 0.023	< 0.570	< 0.040	0.041	< 0.600	0.592
A2MW09-06I	A2MW09-06I_MW09-06I-20210817		2021-08-17	9.33 - 10.83	N	0.12	< 0.18	< 0.042	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.019	0.192	< 0.01	0.183	0.060	< 0.35	< 0.048	0.076	< 0.34	-
A2MW09-06I	MW09-06I-20210817	MW09-06I-20210817	2021-08-17	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-06I-REG-GW_20210817		2021-08-17	9.33 - 10.83	N	0.115	< 0.180	< 0.042	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.019	0.192	< 0.010	0.183	0.060	< 0.350	< 0.048	0.076	< 0.340	0.402
A2MW09-06I	MW09-06I-REG-GW_20220303		2022-03-03	9.33 - 10.83	N	0.125	0.157	< 0.050	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.285	< 0.010	0.168	0.013	< 0.500	< 0.020	0.053	< 0.600	< 0.505
A2MW09-06I	MW09-06I-20220810		2022-08-10	9.33 - 10.83	N	0.080	< 0.147	< 0.047	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.017	0.182	< 0.010	< 0.032	< 0.020	< 0.279	< 0.020	0.082	< 0.229	0.361
A2MW09-06I	A2MW09-06I_20230329		2023-03-29	9.33 - 10.83	N	0.092	< 0.010	< 0.028	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.192	< 0.010	< 0.019	< 0.020	< 0.286	< 0.020	0.033	< 0.231	0.317
A2MW09-06I	DUP-09_20230329	A2MW09-06I_20230329	2023-03-29	9.33 - 10.83	FD	0.090	< 0.095	< 0.028	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.195	< 0.010	< 0.021	< 0.019	< 0.298	< 0.020	0.036	< 0.265	0.321
A2MW09-06I	A2MW09-06I-20230824		2023-08-28	9.33 - 10.83	N	0.050	< 0.051	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.088	< 0.010	0.035	0.046	< 0.240	< 0.020	0.021	< 0.300	< 0.244
A2MW09-10	A2MW09-10_MW09-10-20140430		2014-04-30	2.22 - 5.22	N	0.51	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.78	< 0.05	-	-	**100.00**	0.33	< 0.05	< 0.2	-
A2MW09-10	A2MW09-10_MW09-10-20160322		2016-03-22	2.22 - 5.22	N	0.22	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05	-	-	**50.80**	0.13	< 0.05	< 0.9	-
A2MW09-10	A2MW09-10_MW09-10-20161221		2016-12-21	2.22 - 5.22	N	0.57	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.76	< 0.05	-	-	**64.90**	0.17	< 0.05	< 0.09	-
A2MW09-10	A2MW09-10_MW09-10-20170418		2017-04-18	2.22 - 5.22	N	0.52	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.89	< 0.05	-	-	**71.10**	0.21	< 0.05	< 2	-
A2MW09-10	A2MW09-10_MW09-10-20210331		2021-03-31	2.22 - 5.22	N	0.42	< 0.029	< 0.014	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.60	< 0.01	21.00	17.70	**45.30**	0.22	0.03	< 1.2	-
A2MW09-10	MW09-10-REG-GW_20210331		2021-03-31	2.22 - 5.22	N	0.421	< 0.029	< 0.014	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.598	< 0.010	21.0	17.7	**45.3**	0.215	0.025	< 1.20	46.6
A2MW09-10	MW09-10-REG-GW_20220303		2022-03-03	2.22 - 5.22	N	0.430	< 0.050	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	0.017	< 0.0050	< 0.010	0.742	< 0.010	20.4	17.8	**47.0**	0.313	0.071	1.86	48.7
A2MW09-10	A2MW09-10_20230412		2023-04-12	2.22 - 5.22	N	0.199	< 0.023	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.197	< 0.010	13.2	5.99	**48.5**	0.036	0.034	< 0.290	49.0
A2MW09-11	A2MW09-11-20140430	A2MW09-11-20140430	2014-04-30	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_MW09-11-20150507		2015-05-07	2.05 - 5.05	N	0.50	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.64	< 0.05	-	-	**91.60**	0.44	0.12	< 3	-
A2MW09-11	A2MW09-11-20150507	A2MW09-11-20150507	2015-05-07	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_MW09-11-20160322		2016-03-22	2.05 - 5.05	N	0.52	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.63	< 0.05	-	-	**98.60**	0.41	0.18	< 4	-
A2MW09-11	A2MW09-11-20160322	A2MW09-11-20160322	2016-03-22	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_DUP-11-20160322	A2MW09-11-20160322	2016-03-22	2.05 - 5.05	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_MW09-11-20161221		2016-12-21	2.05 - 5.05	N	0.72	< 0.05	0.06	< 0.05	0.01	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.76	< 0.05	-	-	**130.00**	0.50	**0.21**	< 0.2	-
A2MW09-11	A2MW09-11-20161221	A2MW09-11-20161221	2016-12-21	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_MW09-11-20170418		2017-04-18	2.05 - 5.05	N	0.63	< 0.05	< 0.08	< 0.05	0.01	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.80	< 0.05	-	-	**83.60**	0.57	0.20	< 4	-
A2MW09-11	MW09-11_A2MW09-11-20170418		2017-04-18	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
A2MW09-11	A2MW09-11_DUP-11-20170418	MW09-11_A2MW09-11-20170418	2017-04-18	2.05 - 5.05	FD	0.62	< 0.05	< 0.09	< 0.05	0.01	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.86	< 0.05	-	-	**84.30**	0.62	**0.21**	< 5	-
A2MW09-11	MW09-11_DUP-11-20170418	MW09-11_A2MW09-11-20170418	2017-04-18	2.05 - 5.05	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11_A2MW09-11-20180214		2018-02-14	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-20180426	MW09-11-20180426	2018-04-26	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-REG-GW_20180426		2018-04-26	2.05 - 5.05	N	0.413	< 0.3	< 0.05	< 0.05	< 0.02	-	-	< 0.05	< 0.05	< 0.005	< 0.05	0.666	< 0.05	27.0	42.7	**99.4**	0.451	0.196	< 4	171
A2MW09-11	A2MW09-11_MW09-11-20190319		2019-03-19	2.05 - 5.05	N	0.40	< 0.1	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.03	< 0.005	< 0.02	0.51	< 0.01	29.50	46.10	**119.00**	0.28	0.10	< 3	-
A2MW09-11	MW09-11_A2MW09-11-20190319		2019-03-19	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-REG-GW_20190319		2019-03-19	2.05 - 5.05	N	0.397	< 0.1	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.03	< 0.005	< 0.02	0.514	< 0.01	29.5	46.1	**119**	0.281	0.100	< 3	196
A2MW09-11	A2MW09-11_DUP-02-20190319	MW09-11_A2MW09-11-20190319	2019-03-19	2.05 - 5.05	FD	0.41	< 0.2	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.04	< 0.005	< 0.02	0.53	< 0.01	31.60	47.30	**117.00**	0.30	0.11	< 2	-
A2MW09-11	DUP-02-FD-GW_20190319	MW09-11-REG-GW_20190319	2019-03-19	2.05 - 5.05	FD	0.413	< 0.2	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.04	< 0.005	< 0.02	0.532	< 0.01	31.6	47.3	**117**	0.297	0.113	< 2	197
A2MW09-11	MW09-11_DUP-02-20190319	MW09-11_A2MW09-11-20190319	2019-03-19	2.05 - 5.05	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-20190417	MW09-11-20190417	2019-04-17	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-REG-GW_20190417		2019-04-17	2.05 - 5.05	N	0.563	< 0.03	< 0.06	< 0.02	< 0.008	-	< 0.000015	0.011	< 0.03	< 0.005	< 0.03	0.724	< 0.01	25.4	40.9	**60.3**	0.445	0.192	< 4	129
A2MW09-11	A2MW09-11-20200408	A2MW09-11-20200408	2020-04-08	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	VA20A4587-002		2020-04-08	2.05 - 5.05	N	0.467	< 0.100	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.030	< 0.0050	< 0.010	0.578	< 0.010	30.3	45.1	**89.1**	0.278	0.112	< 3.00	-
A2MW09-11	A2MW09-11_DUP-10-20200408	A2MW09-11-20200408	2020-04-08	2.05 - 5.05	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	VA20A4587-004	VA20A4587-002	2020-04-08	2.05 - 5.05	FD	0.447	< 0.090	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.030	< 0.0050	0.011	0.570	< 0.010	27.3	42.1	**85.5**	0.286	0.104	< 3.00	-
A2MW09-11	A2MW09-11_MW09-11-20210310		2021-03-10	2.05 - 5.05	N	0.40	< 0.13	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.03	< 0.005	< 0.01	0.58	< 0.01	21.70	33.70	**58.30**	0.28	0.09	< 2.3	-
A2MW09-11	A2MW09-11-20210310	A2MW09-11-20210310	2021-03-10	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-REG-GW_20210310		2021-03-10	2.05 - 5.05	N	0.396	< 0.130	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.030	< 0.0050	< 0.010	0.583	< 0.010	21.7	33.7	**58.3**	0.279	0.090	< 2.30	59.6
A2MW09-11	A2MW09-11_DUP-01-20210310	A2MW09-11-20210310	2021-03-10	2.05 - 5.05	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	DUP-01-FD-GW_20210310	MW09-11-REG-GW_20210310	2021-03-10	2.05 - 5.05	FD	0.414	< 0.130	< 0.040	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.030	< 0.0050	< 0.010	0.555	< 0.010	20.8	32.4	**56.5**	0.293	0.095	< 2.90	57.8
A2MW09-11	MW09-11-REG-GW_20220303		2022-03-03	2.05 - 5.05	N	0.344	0.075	0.016	< 0.010	< 0.0050	-	< 0.000015	< 0.010	0.014	< 0.0050	< 0.010	0.438	< 0.010	31.4	47.8	**94.2**	0.162	0.079	< 0.050	95.3
A2MW09-11	DUP02-FD-GW_20220303	MW09-11-REG-GW_20220303	2022-03-03	2.05 - 5.05	FD	0.336	0.100	0.018	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.418	< 0.010	30.1	49.4	**94.4**	0.164	0.100	< 0.260	95.5
A2MW09-11	A2MW09-11_20230329		2023-03-29	2.05 - 5.05	N	0.372	< 0.010	< 0.027	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.507	< 0.010	31.3	51.5	**131**	0.207	0.083	< 1.73	132
A2MW09-12	A2MW09-12_MW09-12-20140430		2014-04-30	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	0.10	< 0.05	< 0.05	< 0.05	-
A2MW09-12	A2MW09-12_MW09-12-20150507		2015-05-07	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-12	A2MW09-12_MW09-12-20160322		2016-03-22	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-12	A2MW09-12_MW09-12-20170418		2017-04-18	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-12	A2MW09-12_MW09-12-20180214		2018-02-14	2.14 - 5.14	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.02	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-12	A2MW09-12_MW09-12-20180426		2018-04-26	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-12	MW09-12-REG-GW_20180426		2018-04-26	2.14 - 5.14	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
A2MW09-12	A2MW09-12_MW09-12-20190319		2019-03-19	2.14 - 5.14	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-12	MW09-12-REG-GW_20190319		2019-03-19	2.14 - 5.14	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
A2MW09-12	A2MW09-12_MW09-12-20200326		2020-03-26	2.14 - 5.14	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-12	VA20A3974-004		2020-03-26	2.14 - 5.14	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	< 0.010	< 0.050	-
A2MW09-12	A2MW09-12_MW09-12-20210310		2021-03-10	2.14 - 5.14	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-12	MW09-12-REG-GW_20210310		2021-03-10	2.14 - 5.14	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.019	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-12	MW09-12-REG-GW_20220303		2022-03-03	2.14 - 5.14	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-12	A2MW09-12_20230329		2023-03-29	2.14 - 5.14	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-13	A2MW09-13_MW09-13-20140501		2014-05-01	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	0.20	< 0.05	< 0.05	< 0.05	-
A2MW09-13	A2MW09-13_MW09-13-20150511		2015-05-11	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-13	A2MW09-13_MW09-13-20160322		2016-03-22	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-13	A2MW09-13_MW09-13-20170410		2017-04-10	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-13	A2MW09-13_MW09-13-20180426		2018-04-26	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
A2MW09-13	MW09-13-REG-GW_20180426		2018-04-26	2.02 - 5.02	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
A2MW09-13	A2MW09-13_MW09-13-20190319		2019-03-19	2.02 - 5.02	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.01	< 0.05	-
A2MW09-13	MW09-13-REG-GW_20190319		2019-03-19	2.02 - 5.02	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.010	< 0.05	< 0.11
A2MW09-13	A2MW09-13_MW09-13-20210310		2021-03-10	2.02 - 5.02	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-13	MW09-13-REG-GW_20210310		2021-03-10	2.02 - 5.02	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-13	MW09-13-REG-GW_20220303		2022-03-03	2.02 - 5.02	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-13	A2MW09-13_20230329		2023-03-29	2.02 - 5.02	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-14	A2MW09-14_MW09-14-20140501		2014-05-01	2.03 - 5.03	N	0.36	< 0.05	< 0.09	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.31	< 0.05	-	-	< 0.6	< 0.05	< 0.05	< 0.2	-
A2MW09-14	A2MW09-14_MW09-14-20140807		2014-08-07	2.03 - 5.03	N	0.20	< 0.05	0.08	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.13	< 0.05	-	-	< 0.6	0.20	< 0.05	< 0.05	-
A2MW09-14	A2MW09-14_MW09-14-20150511		2015-05-11	2.03 - 5.03	N	2.23	< 0.05	< 0.3	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	1.64	< 0.05	-	-	< 2	0.53	< 0.05	< 4	-
A2MW09-14	A2MW09-14_MW09-14-20160331		2016-03-31	2.03 - 5.03	N	0.12	< 0.05	0.06	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.16	< 0.05	-	-	< 0.3	< 0.05	< 0.05	< 0.2	-
A2MW09-14	A2MW09-14_MW09-14-20170410		2017-04-10	2.03 - 5.03	N	0.59	< 0.05	< 0.2	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.32	< 0.05	-	-	< 0.9	< 0.05	< 0.05	< 0.8	-
A2MW09-14	A2MW09-14_MW09-14-20180426		2018-04-26	2.03 - 5.03	N	0.14	< 0.08	0.10	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.29	< 0.05	0.06	< 0.05	< 0.5	< 0.05	< 0.05	< 0.2	-
A2MW09-14	MW09-14-REG-GW_20180426		2018-04-26	2.03 - 5.03	N	0.144	< 0.08	0.096	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	0.291	< 0.05	0.055	< 0.05	< 0.5	< 0.05	< 0.05	< 0.2	0.59
A2MW09-14	A2MW09-14_MW09-14-20210310		2021-03-10	2.03 - 5.03	N	< 0.02	< 0.02	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.03	< 0.01	< 0.02	< 0.02	< 0.15	< 0.02	< 0.01	< 0.05	-
A2MW09-14	MW09-14-REG-GW_20210310		2021-03-10	2.03 - 5.03	N	< 0.020	< 0.020	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.033	< 0.010	< 0.020	< 0.020	< 0.150	< 0.020	< 0.010	< 0.050	< 0.158
A2MW09-14	MW09-14-REG-GW_20220317		2022-03-17	2.03 - 5.03	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-14	A2MW09-14_20230328		2023-03-28	2.03 - 5.03	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-15	A2MW09-15_MW09-15-20140501		2014-05-01	1.35 - 4.35	N	< 0.3	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.4	< 0.05	< 0.05	< 0.1	-
A2MW09-15	A2MW09-15_MW09-15-20140807		2014-08-07	1.35 - 4.35	N	< 0.3	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.5	< 0.05	< 0.05	< 0.2	-
A2MW09-15	A2MW09-15_MW09-15-20150511		2015-05-11	1.35 - 4.35	N	< 0.07	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.5	< 0.05	< 0.05	< 0.3	-
A2MW09-15	A2MW09-15_MW09-15-20160510		2016-05-10	1.35 - 4.35	N	0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.5	< 0.05	< 0.05	< 0.2	-
A2MW09-15	A2MW09-15_MW09-15-20160901		2016-09-01	1.35 - 4.35	N	0.09	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 1	< 0.05	< 0.05	< 0.2	-
A2MW09-15	A2MW09-15_MW09-15-20170410		2017-04-10	1.35 - 4.35	N	0.09	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.2	< 0.05	< 0.05	< 0.2	-
A2MW09-15	A2MW09-15_MW09-15-20180426		2018-04-26	1.35 - 4.35	N	< 0.1	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.4	< 0.05	< 0.05	< 0.4	-
A2MW09-15	MW09-15-REG-GW_20180426		2018-04-26	1.35 - 4.35	N	< 0.1	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	0.056	< 0.05	< 0.4	< 0.05	< 0.05	< 0.4	< 0.61
A2MW09-15	A2MW09-15_MW09-15-20210311		2021-03-11	1.35 - 4.35	N	< 0.1	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
A2MW09-15	MW09-15-REG-GW_20210311		2021-03-11	1.35 - 4.35	N	< 0.100	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.119
A2MW09-15	MW09-15-REG-GW_20220303		2022-03-03	1.35 - 4.35	N	0.030	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.016	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
A2MW09-15	A2MW09-15_20230328		2023-03-28	1.35 - 4.35	N	< 0.058	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.023	< 0.010	< 0.016	< 0.016	< 0.299	< 0.020	< 0.010	< 0.070	< 0.307
MW11-3S	MW11-3S-20140507	MW11-3S-20140507	2014-05-07	5.00 - 8.00	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3S	MW11-3S-20140813	MW11-3S-20140813	2014-08-13	5.00 - 8.00	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Parameter	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
						Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
						CSR-SCH-3.2C3-GENWAT-MW	60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
						SSSLs Parkland Refinery	60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
						Minimum RDL	0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																					
MW11-3S	MW11-3S-20150511	MW11-3S-20150511	2015-05-11	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S_MW11-3D-20150826		2015-08-26	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S-20150826	MW11-3S-20150826	2015-08-26	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S-20160322	MW11-3S-20160322	2016-03-22	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S_DUP-5-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	FD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3S	MW11-3S-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S_DUP-6-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	FD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3S	MW11-3S-20170815	MW11-3S-20170815	2017-08-15	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S-20180419	MW11-3S-20180419	2018-04-19	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3S	MW11-3S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-3S	MW11-3S-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3S	MW11-3S-REG-GW_20180821		2018-08-21	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3S	DUP-1-GW_20180821	MW11-3S-REG-GW_20180821	2018-08-21	5.00 - 8.00	FD		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3S	MW11-3S_DUP-1-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	FD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3S	MW11-3S-20190318	MW11-3S-20190318	2019-03-18	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3S	MW11-3S-REG-GW_20190318		2019-03-18	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3S	L2343824-1		2019-09-09	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.056	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3S	MW11-3S-20190909	MW11-3S-20190909	2019-09-09	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.06	< 0.02	< 0.01	< 0.05	-
MW11-3S	MW11-3S-20200401	MW11-3S-20200401	2020-04-01	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3S	VA20A4276-001		2020-04-01	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	-
MW11-3S	MW11-3S-20200817	MW11-3S-20200817	2020-08-17	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3S	VA20B2849-AA-001		2020-08-17	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3S	MW11-3S-20210309	MW11-3S-20210309	2021-03-09	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3S	MW11-3S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3S	MW11-3S-20210816	MW11-3S-20210816	2021-08-16	5.00 - 8.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.024	0.044	0.067	< 0.02	< 0.01	< 0.05	-
MW11-3S	MW11-3S-REG-GW_20210816		2021-08-16	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.024	0.044	0.067	< 0.020	< 0.010	< 0.050	0.067
MW11-3S	MW11-3S-REG-GW_20220316		2022-03-16	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3S	MW11-3S-20220809		2022-08-09	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.016	0.031	0.052	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3S	MW11-3S_20230327		2023-03-27	5.00 - 8.00	N		0.012	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.012	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	0.021	< 0.010	< 0.050	< 0.065
MW11-3S	MW11-3S-20230824		2023-08-24	5.00 - 8.00	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.024	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-20140507	MW11-3I-20140507	2014-05-07	11.00 - 12.50	N		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3I	MW11-3I-20140813	MW11-3I-20140813	2014-08-13	11.00 - 12.50	N		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3I	MW11-3I-20150511	MW11-3I-20150511	2015-05-11	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20150826	MW11-3I-20150826	2015-08-26	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20160322	MW11-3I-20160322	2016-03-22	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20160822	MW11-3I-20160822	2016-08-22	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20170404	MW11-3I-20170404	2017-04-04	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20170815	MW11-3I-20170815	2017-08-15	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-20180419	MW11-3I-20180419	2018-04-19	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3I	MW11-3I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-3I	MW11-3I-20180821	MW11-3I-20180821	2018-08-21	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3I	MW11-3I-REG-GW_20180821		2018-08-21	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3I	MW11-3I-20190318	MW11-3I-20190318	2019-03-18	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3I	MW11-3I-REG-GW_20190318		2019-03-18	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3I	L2343824-2		2019-09-09	11.00 - 12.50	N		< 0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.02	< 0.005	0.067	0.012	< 0.01	< 0.05	0.075	< 0.2	0.024	0.042	< 0.05	< 0.22
MW11-3I	MW11-3I-20190909	MW11-3I-20190909	2019-09-09	11.00 - 12.50	N		< 0.02	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.02	< 0.005	0.07	0.01	< 0.01	< 0.05	0.08	< 0.2	0.02	0.04	< 0.05	-
MW11-3I	MW11-3I-20200401	MW11-3I-20200401	2020-04-01	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3I	VA20A4276-002		2020-04-01	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.018	< 0.050	< 0.020	< 0.010	< 0.050	-
MW11-3I	MW11-3I-20200817	MW11-3I-20200817	2020-08-17	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3I	VA20B2849-AA-002		2020-08-17	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-20210309	MW11-3I-20210309	2021-03-09	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3I	MW11-3I-REG-GW_20210309		2021-03-09	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.018	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-20210816	MW11-3I-20210816	2021-08-16	11.00 - 12.50	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.020	0.040	0.057	< 0.02	< 0.01	< 0.05	-
MW11-3I	MW11-3I-REG-GW_20210816		2021-08-16	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.020	0.040	0.057	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-REG-GW_20220314		2022-03-14	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-20220809		2022-08-09	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I_20230328		2023-03-28	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	DUP-08_20230328	MW11-3I_20230328	2023-03-28	11.00 - 12.50	FD		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3I	MW11-3I-20230828		2023-08-28	11.00 - 12.50	N		< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-20140507	MW11-3D-20140507	2014-05-07	18.50 - 20.00	N		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3D	MW11-3D-20140813	MW11-3D-20140813	2014-08-13	18.50 - 20.00	N		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-3D	MW11-3D-20150512	MW11-3D-20150512	2015-05-12	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20150826	MW11-3D-20150826	2015-08-26	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20160322	MW11-3D-20160322	2016-03-22	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20160822	MW11-3D-20160822	2016-08-22	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20170404	MW11-3D-20170404	2017-04-04	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20170815	MW11-3D-20170815	2017-08-15	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-20180419	MW11-3D-20180419	2018-04-19	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-3D	MW11-3D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N		< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-3D	MW11-3D-20180821	MW11-3D-20180821	2018-08-21	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3D	MW11-3D-REG-GW_20180821		2018-08-21	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3D	MW11-3D-20190318	MW11-3D-20190318	2019-03-18	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3D	MW11-3D-REG-GW_20190318		2019-03-18	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-3D	L2343824-3		2019-09-09	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	0.053	< 0.2	< 0.02	< 0.01	< 0.05	< 0.22
MW11-3D	MW11-3D-20190909	MW11-3D-20190909	2019-09-09	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	0.05	< 0.2	< 0.02	< 0.01	< 0.05	-
MW11-3D	MW11-3D-20200401	MW11-3D-20200401	2020-04-01	18.50 - 20.00	N		< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
MW11-3D	VA20A4276-003		2020-04-01	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	-
MW11-3D	MW11-3D-20200813	MW11-3D-20200813	2020-08-13	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3D	VA20B2619-AA-001		2020-08-13	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.014	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-20210309	MW11-3D-20210309	2021-03-09	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-3D	MW11-3D-REG-GW_20210309		2021-03-09	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-20210816	MW11-3D-20210816	2021-08-16	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.020	0.035	0.050	< 0.02	< 0.01	< 0.05	-
MW11-3D	MW11-3D-REG-GW_20210816		2021-08-16	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.020	0.035	0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-REG-GW_20220314		2022-03-14	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-20220809		2022-08-09	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D_20230327		2023-03-27	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-3D	MW11-3D-20230828		2023-08-28	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4S	MW11-4S-20140507	MW11-4S-20140507	2014-05-07	5.00 - 8.00	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4S	MW11-4S-20150512	MW11-4S-20150512	2015-05-12	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20150826	MW11-4S-20150826	2015-08-26	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20160322	MW11-4S-20160322	2016-03-22	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20160822	MW11-4S-20160822	2016-08-22	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20170404	MW11-4S-20170404	2017-04-04	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20170815	MW11-4S-20170815	2017-08-15	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-20180419	MW11-4S-20180419	2018-04-19	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4S	MW11-4S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-4S	MW11-4S_20180820		2018-08-20	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-20180820	MW11-4S-20180820	2018-08-20	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-20190318	MW11-4S-20190318	2019-03-18	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-REG-GW_20190318		2019-03-18	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4S	L2343824-4		2019-09-09	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4S	MW11-4S-20190909	MW11-4S-20190909	2019-09-09	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-20200401	MW11-4S-20200401	2020-04-01	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.1	< 0.02	< 0.01	< 0.05	-
MW11-4S	VA20A4276-004		2020-04-01	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.012	0.017	< 0.100	< 0.020	< 0.010	< 0.050	-
MW11-4S	MW11-4S_DUP-8-20200401	MW11-4S-20200401	2020-04-01	5.00 - 8.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4S	VA20A4276-007	VA20A4276-004	2020-04-01	5.00 - 8.00	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.100	< 0.020	< 0.010	< 0.050	-
MW11-4S	MW11-4S-20200813	MW11-4S-20200813	2020-08-13	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.01	< 0.01	< 0.01	0.01	< 0.08	< 0.02	< 0.01	< 0.05	-
MW11-4S	VA20B2619-AA-002		2020-08-13	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.010	< 0.010	< 0.010	0.010	< 0.080	< 0.020	< 0.010	< 0.050	< 0.090
MW11-4S	MW11-4S-20210309	MW11-4S-20210309	2021-03-09	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.07	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
MW11-4S	DUP-07-FD-GW_20210309	MW11-4S-REG-GW_20210309	2021-03-09	5.00 - 8.00	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.018	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
MW11-4S	MW11-4S_DUP-07-20210309	MW11-4S-20210309	2021-03-09	5.00 - 8.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4S	MW11-4S-20210816	MW11-4S-20210816	2021-08-16	5.00 - 8.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.019	0.040	< 0.1	< 0.02	< 0.01	< 0.05	-
MW11-4S	MW11-4S-REG-GW_20210816		2021-08-16	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.019	0.040	< 0.100	< 0.020	< 0.010	< 0.050	< 0.108
MW11-4S	MW11-4S-REG-GW_20220316		2022-03-16	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4S	MW11-4S-20220809		2022-08-09	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.021	0.040	< 0.120	< 0.020	< 0.010	< 0.050	< 0.127
MW11-4S	MW11-4S_20230327		2023-03-27	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4S	MW11-4S-20230824		2023-08-24	5.00 - 8.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.013	0.018	< 0.065	< 0.020	< 0.010	< 0.050	< 0.077
MW11-4S	DUP-6-20230824	MW11-4S-20230824	2023-08-24	5.00 - 8.00	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.016	< 0.060	< 0.020	< 0.010	< 0.050	< 0.072
MW11-4I	MW11-4I-20140507	MW11-4I-20140507	2014-05-07	11.00 - 12.50	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	MW11-4I_DUP-16-20140507	MW11-4I-20140507	2014-05-07	11.00 - 12.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	MW11-4I-20140813	MW11-4I-20140813	2014-08-13	11.00 - 12.50	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	MW11-4I_DUP-8-20140813	MW11-4I-20140813	2014-08-13	11.00 - 12.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	MW11-4I-20150512	MW11-4I-20150512	2015-05-12	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-20150826	MW11-4I-20150826	2015-08-26	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I_DUP-6-20150826	MW11-4I-20150826	2015-08-26	11.00 - 12.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	MW11-4I-20160322	MW11-4I-20160322	2016-03-22	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-20160822	MW11-4I-20160822	2016-08-22	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-20170404	MW11-4I-20170404	2017-04-04	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-20170815	MW11-4I-20170815	2017-08-15	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-20180419	MW11-4I-20180419	2018-04-19	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4I	MW11-4I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-4I	MW11-4I_20180820		2018-08-20	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-20180820	MW11-4I-20180820	2018-08-20	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-REG-GW_20190318		2019-03-18	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4I	DUP-01-FD-GW_20190318	MW11-4I-REG-GW_20190318	2019-03-18	11.00 - 12.50	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4I	MW11-4I_DUP-01-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4I	L2343824-5		2019-09-09	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.087	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4I	MW11-4I-20190909	MW11-4I-20190909	2019-09-09	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.09	< 0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-20200401	MW11-4I-20200401	2020-04-01	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.1	< 0.02	< 0.01	< 0.05	-
MW11-4I	VA20A4276-005		2020-04-01	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.016	0.021	< 0.100	< 0.020	< 0.010	< 0.050	-
MW11-4I	MW11-4I-20200813	MW11-4I-20200813	2020-08-13	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.02	0.02	< 0.08	< 0.02	< 0.01	< 0.05	-
MW11-4I	VA20B2619-AA-003		2020-08-13	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.020	0.020	< 0.080	< 0.020	< 0.010	< 0.050	< 0.090
MW11-4I	MW11-4I-20210309	MW11-4I-20210309	2021-03-09	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.07	0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-REG-GW_20210309		2021-03-09	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.020	< 0.070	0.023	< 0.010	< 0.050	< 0.083
MW11-4I	MW11-4I-20210816	MW11-4I-20210816	2021-08-16	11.00 - 12.50	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.031	0.065	< 0.13	< 0.02	< 0.01	< 0.05	-
MW11-4I	MW11-4I-REG-GW_20210816		2021-08-16	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.031	0.065	< 0.130	< 0.020	< 0.010	< 0.050	< 0.136
MW11-4I	MW11-4I-REG-GW_20220316		2022-03-16	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4I	MW11-4I-20220809		2022-08-09	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.014	0.021	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4I	MW11-4I_20230327		2023-03-27	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4I	MW11-4I-20230828		2023-08-28	11.00 - 12.50	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4D	MW11-4D-20140507	MW11-4D-20140507	2014-05-07	18.50 - 20.00	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
					Parameter																				
					Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
					CSR-SCH-3.2C3-GENWAT-MW	60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
					SSSLs Parkland Refinery	60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
					Minimum RDL	0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
MW11-4D	MW11-4D-20140813	MW11-4D-20140813	2014-08-13	18.50 - 20.00	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4D	MW11-4D-20150512	MW11-4D-20150512	2015-05-12	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D-20150826	MW11-4D-20150826	2015-08-26	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D_DUP-12-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4D	MW11-4D-20160822	MW11-4D-20160822	2016-08-22	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D-20170404	MW11-4D-20170404	2017-04-04	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D_DUP-1-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4D	MW11-4D-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-
MW11-4D	MW11-4D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-4D	DUP-9-FD-GW_20180419	MW11-4D-REG-GW_20180419	2018-04-19	18.50 - 20.00	FD	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	-	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.21
MW11-4D	MW11-4D_DUP-9-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4D	MW11-4D_20180820		2018-08-20	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4D	MW11-4D-20180820	MW11-4D-20180820	2018-08-20	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4D	MW11-4D-20190318	MW11-4D-20190318	2019-03-18	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
MW11-4D	MW11-4D-REG-GW_20190318		2019-03-18	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4D	L2343824-6		2019-09-09	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.052	< 0.02	< 0.01	< 0.05	< 0.11
MW11-4D	MW11-4D-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.05	< 0.02	< 0.01	< 0.05	-
MW11-4D	L2343824-7	L2343824-6	2019-09-09	18.50 - 20.00	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	0.053	< 0.2	< 0.02	< 0.01	< 0.05	< 0.22
MW11-4D	MW11-4D_DUP-1-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW11-4D	MW11-4D-20200401	MW11-4D-20200401	2020-04-01	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.1	< 0.02	< 0.01	< 0.05	-
MW11-4D	VA20A4276-006		2020-04-01	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.019	< 0.100	< 0.020	< 0.010	< 0.050	-
MW11-4D	MW11-4D-20200813	MW11-4D-20200813	2020-08-13	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.02	0.02	< 0.07	< 0.02	< 0.01	< 0.05	-
MW11-4D	VA20B2619-AA-004		2020-08-13	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.020	0.021	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
MW11-4D	MW11-4D-20210309	MW11-4D-20210309	2021-03-09	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.03	< 0.07	< 0.02	< 0.01	< 0.05	-
MW11-4D	MW11-4D-REG-GW_20210309		2021-03-09	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.014	0.026	< 0.070	< 0.020	< 0.010	< 0.050	< 0.081
MW11-4D	MW11-4D-20210816	MW11-4D-20210816	2021-08-16	18.50 - 20.00	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.053	0.086	< 0.14	< 0.02	< 0.01	< 0.05	-
MW11-4D	MW11-4D-REG-GW_20210816		2021-08-16	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.053	0.086	< 0.140	< 0.020	< 0.010	< 0.050	< 0.146
MW11-4D	MW11-4D-REG-GW_20220314		2022-03-14	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.110	< 0.065
MW11-4D	MW11-4D-20220809		2022-08-09	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.011	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4D	MW11-4D_20230327		2023-03-27	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW11-4D	MW11-4D-20230828		2023-08-28	18.50 - 20.00	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3B	G2-3B-20140527	G2-3B-20140527	2014-05-27	10.10 - 13.10	N	0.10	< 0.05	0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05	-	-	< 0.05	< 0.05	**0.27**	< 0.05	-
G2-3B	G2-3B-20140826	G2-3B-20140826	2014-08-26	10.10 - 13.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	0.16	< 0.05	-
G2-3B	G2-3B-20150303	G2-3B-20150303	2015-03-03	10.10 - 13.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	0.07	< 0.05	-
G2-3B	G2-3B-20150916	G2-3B-20150916	2015-09-16	10.10 - 13.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	0.14	< 0.05	-
G2-3B	G2-3B-20160309	G2-3B-20160309	2016-03-09	10.10 - 13.10	N	0.06	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	0.08	< 0.05	-	-	< 0.05	< 0.05	0.20	< 0.05	-
G2-3B	G2-3B-20160811	G2-3B-20160811	2016-08-11	10.10 - 13.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	**0.21**	< 0.05	-
G2-3B	G2-3B-20170323	G2-3B-20170323	2017-03-23	10.10 - 13.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	0.11	< 0.05	-	-	< 0.05	< 0.05	0.16	< 0.05	-
G2-3B	G2-3B_20180827		2018-08-27	10.10 - 13.10	N	< 0.01	< 0.2	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.030	0.015	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	**0.334**	< 0.05	-
G2-3B	G2-3B-20180827	G2-3B-20180827	2018-08-27	10.10 - 13.10	N	< 0.01	< 0.2	< 0.04	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	0.03	0.02	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	**0.33**	< 0.05	-
G2-3B	G2-3B-20190321	G2-3B-20190321	2019-03-21	10.10 - 13.10	N	0.04	< 0.08	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.02	0.08	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.19	< 0.05	-
G2-3B	G2-3B-REG-GW_20190321		2019-03-21	10.10 - 13.10	N	0.040	< 0.08	< 0.05	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.021	0.082	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.189	< 0.05	0.33
G2-3B	G2-3B-20190912	G2-3B-20190912	2019-09-12	10.10 - 13.10	N	0.01	< 0.06	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.02	0.03	< 0.01	< 0.05	< 0.05	0.06	< 0.02	**0.24**	< 0.05	-
G2-3B	L2346508-3		2019-09-12	10.10 - 13.10	N	0.013	< 0.06	< 0.03	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.022	0.026	< 0.01	< 0.05	< 0.05	0.057	< 0.02	**0.235**	< 0.05	0.35
G2-3B	G2-3B-20200402	G2-3B-20200402	2020-04-02	10.10 - 13.10	N	0.12	< 0.3	< 0.09	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.04	0.20	< 0.01	0.03	0.02	< 0.09	< 0.02	**0.36**	< 0.06	-
G2-3B	VA20A4358-006		2020-04-02	10.10 - 13.10	N	0.116	< 0.300	< 0.090	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.041	0.198	< 0.010	0.026	0.015	< 0.090	< 0.020	**0.358**	< 0.060	-
G2-3B	G2-3B-20200813	G2-3B-20200813	2020-08-13	10.10 - 13.10	N	0.08	< 0.01	< 0.06	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.03	0.11	< 0.01	0.02	0.02	< 0.07	< 0.02	**0.28**	< 0.05	-
G2-3B	VA20B2619-AA-005		2020-08-13	10.10 - 13.10	N	0.076	< 0.010	< 0.060	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.032	0.114	< 0.010	0.018	0.015	< 0.070	< 0.020	**0.283**	< 0.050	0.506
G2-3B	G2-3B-20201209	G2-3B-20201209	2020-12-09	10.10 - 13.10	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3B	G2-3B_DUP-1-20201209	G2-3B-20201209	2020-12-09	10.10 - 13.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3B	G2-3B-20210315	G2-3B-20210315	2021-03-15	10.10 - 13.10	N	0.16	< 0.065	< 0.081	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.04	0.27	< 0.01	0.03	0.03	< 0.0295	< 0.02	**0.29**	< 0.075	-
G2-3B	G2-3B-REG-GW_20210315		2021-03-15	10.10 - 13.10	N	0.160	< 0.065	< 0.081	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.036	0.274	< 0.010	0.033	0.028	< 0.095	< 0.020	**0.293**	< 0.075	0.763
G2-3B	DUP-04-FD-GW_20210315	G2-3B-REG-GW_20210315	2021-03-15	10.10 - 13.10	FD	0.160	< 0.010	< 0.080	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.040	0.279	< 0.010	0.030	0.028	< 0.150	< 0.020	**0.324**	< 0.075	0.803
G2-3B	G2-3B_DUP-04-20210315	G2-3B-20210315	2021-03-15	10.10 - 13.10	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3B	G2-3B-20210819	G2-3B-20210819	2021-08-19	10.10 - 13.10	N	0.07	< 0.14	< 0.045	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.032	0.071	< 0.01	0.027	0.032	< 0.07	< 0.02	**0.278**	< 0.05	-
G2-3B	G2-3B-REG-GW_20210819		2021-08-19	10.10 - 13.10	N	0.067	< 0.140	< 0.045	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.032	0.071	< 0.010	0.027	0.032	< 0.070	< 0.020	**0.278**	< 0.050	0.448
G2-3B	G2-3B-REG-GW_20220310		2022-03-10	10.10 - 13.10	N	0.099	0.081	0.027	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.025	0.123	< 0.010	0.029	0.029	< 0.050	0.032	0.130	0.147	0.448
G2-3B	G2-3B-20220811		2022-08-11	10.10 - 13.10	N	0.073	< 0.147	< 0.061	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.011	< 0.0050	0.048	0.077	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	**0.453**	< 0.050	0.651
G2-3B	DUP--20220811	G2-3B-20220811	2022-08-11	10.10 - 13.10	FD	0.072	< 0.141	< 0.058	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.011	< 0.0050	0.048	0.077	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	**0.458**	< 0.050	0.655
G2-3B	G2-3B_20230405		2023-04-05	10.10 - 13.10	N	0.056	< 0.097	< 0.045	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.031	0.072	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	**0.302**	< 0.050	0.461
G2-3B	G2-3B-20230828		2023-08-28	10.10 - 13.10	N	0.016	< 0.041	< 0.017	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.016	0.013	< 0.010	< 0.010	0.024	< 0.050	< 0.020	0.181	< 0.050	0.226
G2-3C	G2-3C-20140527	G2-3C-20140527	2014-05-27	18.30 - 22.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3C	G2-3C-20140826	G2-3C-20140826	2014-08-26	18.30 - 22.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3C	G2-3C_DUP-17-20140826	G2-3C-20140826	2014-08-26	18.30 - 22.90	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3C	G2-3C-20150303	G2-3C-20150303	2015-03-03	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C-20150917	G2-3C-20150917	2015-09-17	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C-20160309	G2-3C-20160309	2016-03-09	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C-20160811	G2-3C-20160811	2016-08-11	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C-20170323	G2-3C-20170323	2017-03-23	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C-20170328	G2-3C-20170328	2017-03-28	18.30 - 22.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-3C	G2-3C_20180827		2018-08-27	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	G2-3C-20180827	G2-3C-20180827	2018-08-27	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	DUP-2_20180827	G2-3C_20180827	2018-08-27	18.30 - 22.90	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	G2-3C_DUP-2-20180827	G2-3C-20180827	2018-08-27	18.30 - 22.90	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3C	G2-3C-20190321	G2-3C-20190321	2019-03-21	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
G2-3C	G2-3C-REG-GW_20190321		2019-03-21	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-3C	G2-3C-20190917	G2-3C-20190917	2019-09-17	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	L2349075-1		2019-09-17	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-3C	G2-3C-20200402	G2-3C-20200402	2020-04-02	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	VA20A4358-007		2020-04-02	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	-
G2-3C	G2-3C-20200813	G2-3C-20200813	2020-08-13	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	VA20B2619-AA-006		2020-08-13	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3C	G2-3C-20201209	G2-3C-20201209	2020-12-09	18.30 - 22.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-3C	G2-3C-20210315	G2-3C-20210315	2021-03-15	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	G2-3C-REG-GW_20210315		2021-03-15	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3C	G2-3C-20210819	G2-3C-20210819	2021-08-19	18.30 - 22.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-3C	G2-3C-REG-GW_20210819		2021-08-19	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3C	G2-3C-REG-GW_20220310		2022-03-10	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3C	G2-3C-20220811		2022-08-11	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-3C	G2-3C_20230405		2023-04-05	18.30 - 22.90	N	< 0.010	< 0.095	< 0.012	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.012	< 0.0050	< 0.010	0.012	< 0.010	0.010	0.014	< 0.050	0.130	0.064	< 0.050	0.206
G2-3C	G2-3C-20230828		2023-08-28	18.30 - 22.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.012	0.042	0.082	< 0.020	< 0.010	< 0.050	0.082
G2-3C	DUP-7-20230828	G2-3C-20230828	2023-08-28	18.30 - 22.90	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.012	0.037	0.068	< 0.020	< 0.010	< 0.050	0.068
G2-9A	G2-9A-20140527	G2-9A-20140527	2014-05-27	6.10 - 9.10	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9A	G2-9A-20140826	G2-9A-20140826	2014-08-26	6.10 - 9.10	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9A	G2-9A-20150303	G2-9A-20150303	2015-03-03	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9A	G2-9A-20150916	G2-9A-20150916	2015-09-16	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9A	G2-9A-20160309	G2-9A-20160309	2016-03-09	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9A	G2-9A-20160811	G2-9A-20160811	2016-08-11	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9A	G2-9A-20170328	G2-9A-20170328	2017-03-28	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	0.06	< 0.05	-
G2-9A	G2-9A-20170823	G2-9A-20170823	2017-08-23	6.10 - 9.10	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9A	G2-9A-20180501	G2-9A-20180501	2018-05-01	6.10 - 9.10	N	< 0.01	< 0.04	< 0.02	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.18	< 0.05	-
G2-9A	G2-9A-REG-GW_20180501		2018-05-01	6.10 - 9.10	N	< 0.01	< 0.04	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.184	< 0.05	0.18
G2-9A	G2-9A_20180827		2018-08-27	6.10 - 9.10	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.077	< 0.05	-
G2-9A	G2-9A-20180827	G2-9A-20180827	2018-08-27	6.10 - 9.10	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.08	< 0.05	-
G2-9A	G2-9A-20190321	G2-9A-20190321	2019-03-21	6.10 - 9.10	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.07	< 0.05	-
G2-9A	G2-9A-REG-GW_20190321		2019-03-21	6.10 - 9.10	N	< 0.01	< 0.02	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.072	< 0.05	< 0.11
G2-9A	G2-9A-20190912	G2-9A-20190912	2019-09-12	6.10 - 9.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.05	< 0.02	0.03	< 0.05	-
G2-9A	L2346508-4		2019-09-12	6.10 - 9.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.053	< 0.02	0.031	< 0.05	< 0.11
G2-9A	G2-9A-20200402	G2-9A-20200402	2020-04-02	6.10 - 9.10	N	< 0.01	< 0.03	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	0.07	< 0.05	-
G2-9A	VA20A4358-004		2020-04-02	6.10 - 9.10	N	< 0.010	< 0.030	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.010	0.016	< 0.050	< 0.020	0.065	< 0.050	-
G2-9A	G2-9A-20200813	G2-9A-20200813	2020-08-13	6.10 - 9.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.06	< 0.02	0.03	< 0.05	-
G2-9A	VA20B2619-AA-007		2020-08-13	6.10 - 9.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.018	< 0.060	< 0.020	0.026	< 0.050	< 0.072
G2-9A	G2-9A-20201209	G2-9A-20201209	2020-12-09	6.10 - 9.10	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9A	G2-9A-20210315	G2-9A-20210315	2021-03-15	6.10 - 9.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.01	< 0.01	0.01	0.02	< 0.056	< 0.02	0.11	< 0.05	-
G2-9A	G2-9A-REG-GW_20210315		2021-03-15	6.10 - 9.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.011	< 0.010	0.014	0.024	< 0.056	< 0.020	0.107	< 0.050	0.118
G2-9A	G2-9A-20210819	G2-9A-20210819	2021-08-19	6.10 - 9.10	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.016	0.029	< 0.061	< 0.02	0.037	< 0.05	-
G2-9A	G2-9A-REG-GW_20210819		2021-08-19	6.10 - 9.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.016	0.029	< 0.061	< 0.020	0.037	< 0.050	< 0.073
G2-9A	G2-9A-REG-GW_20220310		2022-03-10	6.10 - 9.10	N	< 0.010	0.030	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.097	< 0.050	0.097
G2-9A	G2-9A-20220810		2022-08-10	6.10 - 9.10	N	< 0.010	< 0.020	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.019	0.038	0.077	< 0.020	0.061	< 0.050	0.138
G2-9A	G2-9A_20230406		2023-04-06	6.10 - 9.10	N	< 0.010	< 0.152	< 0.021	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.014	< 0.0050	0.012	0.030	< 0.010	0.015	0.021	< 0.050	0.256	0.127	< 0.050	0.425
G2-9A	G2-9A-20230828		2023-08-29	6.10 - 9.10	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.031	0.051	< 0.020	0.044	< 0.050	0.095
G2-9B	G2-9B-20140526	G2-9B-20140526	2014-05-26	18.90 - 21.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9B	G2-9B_DUP-25-20140526	G2-9B-20140526	2014-05-26	18.90 - 21.90	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9B	G2-9B-20140826	G2-9B-20140826	2014-08-26	18.90 - 21.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9B	G2-9B-20150303	G2-9B-20150303	2015-03-03	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B_DUP-1-20150303	G2-9B-20150303	2015-03-03	18.90 - 21.90	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9B	G2-9B-20150917	G2-9B-20150917	2015-09-17	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B-20160310	G2-9B-20160310	2016-03-10	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B-20160811	G2-9B-20160811	2016-08-11	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B-20170328	G2-9B-20170328	2017-03-28	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B-20170823	G2-9B-20170823	2017-08-23	18.90 - 21.90	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-9B	G2-9B-20180502	G2-9B-20180502	2018-05-02	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-REG-GW_20180502		2018-05-02	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-9B	G2-9B_20180827		2018-08-27	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-20180827	G2-9B-20180827	2018-08-27	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-20190320	G2-9B-20190320	2019-03-20	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-REG-GW_20190320		2019-03-20	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-9B	G2-9B-20190912	G2-9B-20190912	2019-09-12	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	L2346508-5		2019-09-12	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-9B	G2-9B-20200402	G2-9B-20200402	2020-04-02	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	VA20A4358-005		2020-04-02	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	-
G2-9B	G2-9B-20200813	G2-9B-20200813	2020-08-13	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	VA20B2619-AA-008		2020-08-13	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	G2-9B-20201209	G2-9B-20201209	2020-12-09	18.90 - 21.90	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-9B	G2-9B-20210315	G2-9B-20210315	2021-03-15	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-REG-GW_20210315		2021-03-15	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	G2-9B-20210819	G2-9B-20210819	2021-08-19	18.90 - 21.90	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-9B	G2-9B-REG-GW_20210819		2021-08-19	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	G2-9B-REG-GW_20220310		2022-03-10	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	G2-9B-20220811		2022-08-11	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	G2-9B_20230405		2023-04-05	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-9B	DUP-10_20230405	G2-9B_20230405	2023-04-05	18.90 - 21.90	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Parameter						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
G2-9B	G2-9B-20230828		2023-08-29	18.90 - 21.90	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.022	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-10	G2-10-20140515	G2-10-20140515	2014-05-15	4.90 - 6.40	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-10	G2-10-20140820	G2-10-20140820	2014-08-20	4.90 - 6.40	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-10	G2-10-20150303	G2-10-20150303	2015-03-03	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20150916	G2-10-20150916	2015-09-16	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20160307	G2-10-20160307	2016-03-07	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.1	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20160810	G2-10-20160810	2016-08-10	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20170328	G2-10-20170328	2017-03-28	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20170823	G2-10-20170823	2017-08-23	4.90 - 6.40	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
G2-10	G2-10-20180501	G2-10-20180501	2018-05-01	4.90 - 6.40	N	0.01	< 0.4	< 0.04	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	0.05	0.04	< 0.01	< 0.05	< 0.05	< 0.05	< 0.03	**0.30**	< 0.05	-
G2-10	G2-10-REG-GW_20180501		2018-05-01	4.90 - 6.40	N	0.010	< 0.4	< 0.04	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.050	0.039	< 0.01	< 0.05	< 0.05	< 0.05	< 0.03	**0.296**	< 0.05	< 0.42
G2-10	G2-10_20180827		2018-08-27	4.90 - 6.40	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.014	< 0.05	-
G2-10	G2-10-20180827	G2-10-20180827	2018-08-27	4.90 - 6.40	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.01	< 0.05	-
G2-10	G2-10-20190321	G2-10-20190321	2019-03-21	4.90 - 6.40	N	< 0.01	< 0.2	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.02	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.14	< 0.05	-
G2-10	G2-10-REG-GW_20190321		2019-03-21	4.90 - 6.40	N	< 0.01	< 0.2	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.024	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	0.136	< 0.05	< 0.23
G2-10	G2-10-20190917	G2-10-20190917	2019-09-17	4.90 - 6.40	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-10	L2349075-2		2019-09-17	4.90 - 6.40	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
G2-10	G2-10-20200402	G2-10-20200402	2020-04-02	4.90 - 6.40	N	< 0.01	< 0.2	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.02	0.02	< 0.01	0.01	0.02	< 0.05	< 0.02	0.13	< 0.05	-
G2-10	VA20A4358-003		2020-04-02	4.90 - 6.40	N	< 0.010	< 0.200	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.021	0.016	< 0.010	0.011	0.017	< 0.050	< 0.020	0.132	< 0.050	-
G2-10	G2-10-20200812	G2-10-20200812	2020-08-12	4.90 - 6.40	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
G2-10	VA20B2611-003		2020-08-12	4.90 - 6.40	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
G2-10	G2-10-20210315	G2-10-20210315	2021-03-15	4.90 - 6.40	N	< 0.01	< 0.01	< 0.02	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	0.02	0.03	< 0.01	< 0.01	0.01	< 0.05	< 0.02	0.11	< 0.05	-
G2-10	G2-10-REG-GW_20210315		2021-03-15	4.90 - 6.40	N	< 0.010	< 0.010	< 0.020	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.017	0.029	< 0.010	< 0.010	0.014	< 0.050	< 0.020	0.107	< 0.050	0.153
G2-10	G2-10_20210824		2021-08-24	4.90 - 6.40	N	< 0.010	< 0.030	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.019	< 0.050	< 0.020	0.064	< 0.050	< 0.065
G2-10	G2-10-20210824	G2-10-20210824	2021-08-24	4.90 - 6.40	N	< 0.01	< 0.03	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.011	0.019	< 0.05	< 0.02	0.064	< 0.05	-
G2-10	G2-10-REG-GW_20220310		2022-03-10	4.90 - 6.40	N	< 0.010	0.119	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.014	0.042	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.125	< 0.050	0.181
G2-10	G2-10-20220811		2022-08-11	4.90 - 6.40	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.013	0.023	0.052	< 0.020	< 0.010	< 0.050	< 0.065
G2-10	G2-10_20230411		2023-04-11	4.90 - 6.40	N	< 0.010	< 0.053	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.013	< 0.010	0.011	0.014	< 0.050	< 0.020	0.064	< 0.050	0.077
G2-10	G2-10-20230828		2023-08-28	4.90 - 6.40	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.022	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-20150305	WS2-D-20150305	2015-03-05	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20150818	WS2-D-20150818	2015-08-18	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20160308	WS2-D-20160308	2016-03-08	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20160808	WS2-D-20160808	2016-08-08	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20170308	WS2-D-20170308	2017-03-08	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20170823	WS2-D-20170823	2017-08-23	4.60 - 7.60	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D	WS2-D-20180502	WS2-D-20180502	2018-05-02	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-REG-GW_20180502		2018-05-02	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D	WS2-D_20180827		2018-08-27	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-20180827	WS2-D-20180827	2018-08-27	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-20190325	WS2-D-20190325	2019-03-25	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-REG-GW_20190325		2019-03-25	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D	L2346508-1		2019-09-12	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D	WS2-D-20190912	WS2-D-20190912	2019-09-12	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	VA20A4358-001		2020-04-02	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	-
WS2-D	WS2-D-20200402	WS2-D-20200402	2020-04-02	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	VA20B2611-001		2020-08-12	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-20200812	WS2-D-20200812	2020-08-12	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-20210308	WS2-D-20210308	2021-03-08	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-REG-GW_20210308		2021-03-08	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-20210819	WS2-D-20210819	2021-08-19	4.60 - 7.60	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.016	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D	WS2-D-REG-GW_20210819		2021-08-19	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-REG-GW_20220316		2022-03-16	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-20220822		2022-08-22	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.020	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D_20230405		2023-04-05	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.013	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D	WS2-D-20230824		2023-08-24	4.60 - 7.60	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2-20150305	WS2-D2-20150305	2015-03-05	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2-20150817	WS2-D2-20150817	2015-08-17	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2-20160310	WS2-D2-20160310	2016-03-10	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2-20160808	WS2-D2-20160808	2016-08-08	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01	< 0.1	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2-20170308	WS2-D2-20170308	2017-03-08	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2-20170823	WS2-D2-20170823	2017-08-23	10.70 - 12.20	N	< 0.05	< 0.05	< 0.05	< 0.05	< 0.005	< 0.1	-	< 0.05	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	-	-	< 0.05	< 0.05	< 0.05	< 0.05	-
WS2-D2	WS2-D2_DUP-2-20170823	WS2-D2-20170823	2017-08-23	10.70 - 12.20	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS2-D2	WS2-D2-20180502	WS2-D2-20180502	2018-05-02	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-REG-GW_20180502		2018-05-02	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D2	WS2-D2_DUP-13-20180502	WS2-D2-20180502	2018-05-02	10.70 - 12.20	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS2-D2	WS2-D2_20180827		2018-08-27	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-20180827	WS2-D2-20180827	2018-08-27	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.015	-	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-20190325	WS2-D2-20190325	2019-03-25	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-DUP1-20190325	WS2-D2-20190325	2019-03-25	10.70 - 12.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS2-D2	WS2-D2-REG-GW_20190325		2019-03-25	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D2	DUP-03-FD-GW_20190325	WS2-D2-REG-GW_20190325	2019-03-25	10.70 - 12.20	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D2	WS2-D2_DUP-03-20190325	WS2-D2-20190325	2019-03-25	10.70 - 12.20	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	L2346508-2		2019-09-12	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.051	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D2	WS2-D2-20190912	WS2-D2-20190912	2019-09-12	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	L2346508-6	L2346508-2	2019-09-12	10.70 - 12.20	FD	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	0.052	< 0.02	< 0.01	< 0.05	< 0.11
WS2-D2	WS2-D2_DUP-03-20190912	WS2-D2-20190912	2019-09-12	10.70 - 12.20	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS2-D2	VA20A4358-002		2020-04-02	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.011	0.020	< 0.050	< 0.020	< 0.010	< 0.050	-

AECOM

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
					Parameter																				
					Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
					CSR-SCH-3.2C3-GENWAT-MW	60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
					SSSLs Parkland Refinery	60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
					Minimum RDL	0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type																				
WS2-D2	WS2-D2-20200402	WS2-D2-20200402	2020-04-02	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	VA20B2611-002		2020-08-12	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.050	< 0.050	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2-20200812	WS2-D2-20200812	2020-08-12	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.05	< 0.05	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-20210308	WS2-D2-20210308	2021-03-08	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-REG-GW_20210308		2021-03-08	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2-20210819	WS2-D2-20210819	2021-08-19	10.70 - 12.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.01	0.03	< 0.05	< 0.02	< 0.01	< 0.05	-
WS2-D2	WS2-D2-REG-GW_20210819		2021-08-19	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.014	0.028	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	DUP-03-FD-GW_20210819	WS2-D2-REG-GW_20210819	2021-08-19	10.70 - 12.20	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.014	0.026	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2_DUP-03-20210819	WS2-D2-20210819	2021-08-19	10.70 - 12.20	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WS2-D2	WS2-D2-REG-GW_20220316		2022-03-16	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2-20220822		2022-08-22	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	DUP-04-20220822	WS2-D2-20220822	2022-08-22	10.70 - 12.20	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2_20230406		2023-04-06	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
WS2-D2	WS2-D2-20230824		2023-08-28	10.70 - 12.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.017	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW3	MW3-20170202	MW3-20170202	2017-02-02	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20180219	MW3-20180219	2018-02-19	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20180508	MW3-20180508	2018-05-08	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20180813	MW3-20180813	2018-08-13	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20181119	MW3-20181119	2018-11-19	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20190304	MW3-20190304	2019-03-04	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20190507	MW3-20190507	2019-05-07	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20190812	MW3-20190812	2019-08-12	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20191116	MW3-20191116	2019-11-16	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20200302	MW3-20200302	2020-03-02	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20200512	MW3-20200512	2020-05-12	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20200817	MW3-20200817	2020-08-17	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20201202	MW3-20201202	2020-12-02	4.70 - 6.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW3	MW3-20210315	MW3-20210315	2021-03-15	4.70 - 6.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
MW3	MW3-REG-GW_20210315		2021-03-15	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW3	MW3-20210819	MW3-20210819	2021-08-19	4.70 - 6.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	0.013	0.020	< 0.052	< 0.02	< 0.01	< 0.05	-
MW3	MW3-REG-GW_20210819		2021-08-19	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.013	0.020	< 0.052	< 0.020	< 0.010	< 0.050	< 0.066
MW3	MW3-REG-GW_20220317		2022-03-17	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW3	MW3-20220811		2022-08-11	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.016	0.028	< 0.057	< 0.020	< 0.010	< 0.050	< 0.070
MW3	MW3_20230411		2023-04-11	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW3	MW3-20230824		2023-08-24	4.70 - 6.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.016	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW5	MW5-20170202	MW5-20170202	2017-02-02	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20180220	MW5-20180220	2018-02-20	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20180509	MW5-20180509	2018-05-09	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20180813	MW5-20180813	2018-08-13	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20181119	MW5-20181119	2018-11-19	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20190304	MW5-20190304	2019-03-04	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20190507	MW5-20190507	2019-05-07	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20190812	MW5-20190812	2019-08-12	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20191116	MW5-20191116	2019-11-16	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20200302	MW5-20200302	2020-03-02	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20200512	MW5-20200512	2020-05-12	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20200817	MW5-20200817	2020-08-17	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20201202	MW5-20201202	2020-12-02	3.70 - 5.20	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-20210315	MW5-20210315	2021-03-15	3.70 - 5.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.05	< 0.02	< 0.01	< 0.05	-
MW5	MW5-REG-GW_20210315		2021-03-15	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.015	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW5	MW5_20210818		2021-08-18	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.022	< 0.010	0.022	0.033	0.058	< 0.020	0.035	< 0.050	0.115
MW5	MW5-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	0.022	< 0.01	0.022	0.033	0.058	< 0.02	0.035	< 0.05	-
MW5	DUP-02_20210818	MW5_20210818	2021-08-18	3.70 - 5.20	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.021	< 0.010	0.021	0.034	0.060	< 0.020	0.036	< 0.050	0.117
MW5	MW5_DUP-02-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	FD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW5	MW5-REG-GW_20220317		2022-03-17	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.013	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.029	< 0.050	< 0.065
MW5	DUP-05-FD-GW_20220317	MW5-REG-GW_20220317	2022-03-17	3.70 - 5.20	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.014	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.034	< 0.050	< 0.065
MW5	MW5-20220811		2022-08-11	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.013	< 0.010	0.015	0.026	< 0.050	< 0.020	0.047	< 0.050	< 0.065
MW5	MW5_20230406		2023-04-06	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW5	DUP-06_20230406	MW5_20230406	2023-04-06	3.70 - 5.20	FD	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
MW5	MW5-20230824		2023-08-24	3.70 - 5.20	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	0.014	< 0.010	< 0.010	0.012	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-1	U4-1-20170202	U4-1-20170202	2017-02-02	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20180220	U4-1-20180220	2018-02-20	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20180509	U4-1-20180509	2018-05-09	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20180814	U4-1-20180814	2018-08-14	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20181120	U4-1-20181120	2018-11-20	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20190305	U4-1-20190305	2019-03-05	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20190508	U4-1-20190508	2019-05-08	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20190813	U4-1-20190813	2019-08-13	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20191127	U4-1-20191127	2019-11-27	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20200303	U4-1-20200303	2020-03-03	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20200513	U4-1-20200513	2020-05-13	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20200818	U4-1-20200818	2020-08-18	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20201203	U4-1-20201203	2020-12-03	6.40 - 9.45	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-1	U4-1-20210315	U4-1-20210315	2021-03-15	6.40 - 9.45	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U4-1	U4-1-REG-GW_20210315		2021-03-15	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-1	U4-1-20210819	U4-1-20210819	2021-08-19	6.40 - 9.45	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U4-1	U4-1-REG-GW_20210819		2021-08-19	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065

TABLE 2-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval (mbgs)	Sample Type	Acenaphthene	Acridine	Anthracene	Benzo(A)Anthracene	Benzo(A)Pyrene	Benzo(b+k)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(G,H,I)Perylene	Chrysene	Dibenzo(A,H)Anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline (Benzo(b)pyridir	Total PAH
Parameter																									
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						60	0.5	1	1	0.1	--	--	--	1	--	2	120	--	--	--	10	3	0.2	34	--
SSSLs Parkland Refinery						60	30	40	--	2.8	--	--	--	1	--	40	120	--	--	--	440	3	40	34	--
Minimum RDL						0.01	0.01	0.01	0.01	0.005	0.015	0.000015	0.01	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.0295	0.02	0.01	0.05	0.11
U4-1	U4-1-REG-GW_20220317		2022-03-17	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-1	U4-1-20220825		2022-08-25	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-1	U4-1_20230406		2023-04-06	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-1	U4-1-20230824		2023-08-24	6.40 - 9.45	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	0.016	0.050	0.106	< 0.020	< 0.010	< 0.050	0.106
U4-3	U4-3-20170202	U4-3-20170202	2017-02-02	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20180220	U4-3-20180220	2018-02-20	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20180509	U4-3-20180509	2018-05-09	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20180813	U4-3-20180813	2018-08-13	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20181120	U4-3-20181120	2018-11-20	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20190305	U4-3-20190305	2019-03-05	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20190508	U4-3-20190508	2019-05-08	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20190813	U4-3-20190813	2019-08-13	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20191127	U4-3-20191127	2019-11-27	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20200303	U4-3-20200303	2020-03-03	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20200513	U4-3-20200513	2020-05-13	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20200818	U4-3-20200818	2020-08-18	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20201203	U4-3-20201203	2020-12-03	8.70 - 11.70	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U4-3	U4-3-20210315	U4-3-20210315	2021-03-15	8.70 - 11.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U4-3	U4-3-REG-GW_20210315		2021-03-15	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-3	U4-3_20210818		2021-08-18	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-3	U4-3-20210818	U4-3-20210818	2021-08-18	8.70 - 11.70	N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	-	< 0.000015	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.05	< 0.02	< 0.01	< 0.05	-
U4-3	U4-3-REG-GW_20220317		2022-03-17	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-3	U4-3-20220824		2022-08-24	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	< 0.010	< 0.050	< 0.065
U4-3	U4-3_20230411		2023-04-11	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.035	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.020	0.021	< 0.050	< 0.065
U4-3	U4-3-20230828		2023-08-28	8.70 - 11.70	N	< 0.010	< 0.010	< 0.010	< 0.010	0.0088	-	< 0.000015	< 0.010	< 0.010	< 0.0050	0.022	0.010	< 0.010	< 0.010	0.015	< 0.050	0.030	0.017	< 0.050	0.088

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 14 Amendments, July 2022)
FD	Field duplicate sample
N	Normal environmental sample
mbgs	Metres below ground surface
mg/L	Milligrams per litre
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
-	Sample not analyzed for indicated parameter
--	No standard/guideline

Notes:
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Marine Water
Exceeds Parkland Refinery Site Specific Screening Levels (SSSLs)
Detection Limit Exceeds Applicable Standard/Guideline

AECOM

TABLE 2-4
AREA 2 CONCENTRATIONS OF DISSOLVED METALS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Parameter	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium (6+	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Sodium	Thallium	Titanium	Uranium	Vanadium	Zinc
						Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
						CSR-SCH-3.2C3-GENWAT-MW	--	2500	125	5000	1000	12000	15	--	--	40	20	--	20	--	--	0.25	10000	83	20	15	--	3	1000	85	--	100
						SSSLs Parkland Refinery	--	2500	125	5000	1000	12000	90	--	--	1100	62	--	1400	--	--	--	--	750	--	--	--	--	--	1000	--	900
						Minimum RDL	1	0.1	0.1	0.1	0.02	10	0.005	50	0.1	0.1	0.2	10	0.05	5	0.1	0.005	0.05	0.5	0.05	0.01	50	0.01	0.3	0.01	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type																										
PW03-1A	PW03-1A-20140429	PW03-1A-20140429	2014-04-29	2.40 - 4.00	N	< 10	< 0.5	< 1	23.00	< 5	< 100	0.14	20000.00	< 0.5	0.81	< 1	< 30	< 1	5520.00	1420.00	< 0.2	< 1	< 5	< 1	< 0.05	8300.00	< 0.2	< 50	< 0.2	< 30	5.10
PW03-1B	PW03-1B-20140429	PW03-1B-20140429	2014-04-29	1.10 - 3.70	N	38.00	< 0.5	< 1	77.00	< 5	< 100	0.07	24300.00	< 0.5	< 0.5	< 1	< 30	< 1	5610.00	10.00	< 0.2	< 1	< 5	< 1	< 0.05	3500.00	< 0.2	< 50	< 0.2	< 30	6.40
PW03-2A	PW03-2A-20140429	PW03-2A-20140429	2014-04-29	1.80 - 4.60	N	19.00	< 0.5	< 1	45.00	< 5	< 100	0.31	9920.00	< 0.5	< 0.5	2.40	< 30	< 1	1820.00	261.00	< 0.2	< 1	< 5	< 1	< 0.05	11200.00	< 0.2	< 50	< 0.2	< 30	9.80
PW03-2B	PW03-2B-20140429	PW03-2B-20140429	2014-04-29	1.10 - 3.70	N	< 10	< 0.5	< 1	53.00	< 5	< 100	< 0.05	80800.00	< 0.5	< 0.5	< 1	< 30	< 1	11200.00	< 10	< 0.2	< 1	< 5	< 1	< 0.05	14100.00	< 0.2	< 50	0.23	< 30	8.90
PW03-3	PW03-3-20140429	PW03-3-20140429	2014-04-29	1.20 - 4.10	N	12.00	< 0.5	< 1	< 20	< 5	< 100	0.08	8900.00	< 0.5	1.79	< 1	110.00	< 1	2700.00	252.00	< 0.2	< 1	< 5	< 1	< 0.05	10200.00	< 0.2	< 50	< 0.2	< 30	6.00
PW03-4	PW03-4-20140429	PW03-4-20140429	2014-04-29	1.80 - 4.00	N	< 10	< 0.5	< 1	< 20	< 5	< 100	< 0.05	12100.00	0.61	< 0.5	< 1	< 30	< 1	2930.00	< 10	< 0.2	< 1	< 5	< 1	< 0.05	17200.00	< 0.2	< 50	< 0.2	< 30	< 5
PW03-5	PW03-5-20140429	PW03-5-20140429	2014-04-29	7.60 - 8.50	N	< 10	< 0.5	< 1	30.00	< 5	< 100	0.07	21900.00	< 0.5	3.71	1.20	< 30	< 1	6980.00	258.00	< 0.2	< 1	6.20	< 1	< 0.05	15000.00	< 0.2	< 50	< 0.2	< 30	11.60
PW03-6	PW03-6-20140429	PW03-6-20140429	2014-04-29	1.10 - 3.15	N	< 10	< 0.5	< 1	< 20	< 5	< 100	< 0.05	14200.00	< 0.5	< 0.5	< 1	< 30	< 1	2830.00	56.00	< 0.2	< 1	< 5	< 1	< 0.05	5700.00	< 0.2	< 50	< 0.2	< 30	< 5
U8	U8-20140429	U8-20140429	2014-04-29	3.22 - 6.22	N	42.00	< 0.5	1.00	41.00	< 5	< 100	< 0.05	8770.00	< 0.5	5.70	< 1	3440.00	< 1	1650.00	819.00	< 0.2	< 1	< 5	< 1	< 0.05	4700.00	< 0.2	< 50	< 0.2	< 30	< 5
U8	U8-20180501		2018-05-01	3.22 - 6.22	N	-	-	-	-	-	-	-	-	-	-	0.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U8	U8-REG-GW_20180501		2018-05-01	3.22 - 6.22	N	-	-	-	-	-	-	-	-	-	-	0.71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U9	U9-20140429	U9-20140429	2014-04-29	3.30 - 6.30	N	44.00	< 0.5	< 1	46.00	< 5	< 100	0.07	9670.00	< 0.5	1.88	2.20	558.00	< 1	1570.00	348.00	< 0.2	< 1	< 5	< 1	< 0.05	3600.00	< 0.2	< 50	< 0.2	< 30	5.50
G2-11A	G2-11A-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	N	-	-	-	-	-	-	-	-	-	-	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-REG-GW_20180430		2018-04-30	4.60 - 6.10	N	-	-	-	-	-	-	-	-	-	-	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A_DUP-12-20180430	G2-11A-20180430	2018-04-30	4.60 - 6.10	FD	-	-	-	-	-	-	-	-	-	-	0.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-20180828	G2-11A-20180828	2018-08-28	4.60 - 6.10	N	-	-	-	-	-	-	-	-	-	-	0.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11A	G2-11A-REG-GW_20180828		2018-08-28	4.60 - 6.10	N	-	-	-	-	-	-	-	-	-	-	0.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-20180430	G2-11B-20180430	2018-04-30	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	< 0.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-REG-GW_20180430		2018-04-30	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	< 0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-20180828	G2-11B-20180828	2018-08-28	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B-REG-GW_20180828		2018-08-28	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G2-11B	G2-11B_20230328		2023-03-28	7.00 - 8.50	N	-	-	-	-	-	-	-	-	-	0.67	< 0.20	-	-	-	-	-	-	0.82	-	-	-	-	-	-	-	4.6
MW02-02	MW02-02-20140501	MW02-02-20140501	2014-05-01	1.20 - 4.30	N	92.00	< 0.50	10.50	< 20.00	< 5.00	< 100.00	< 0.05	3240.00	< 0.50	1.44	3.40	159.00	< 1.00	940.00	310.00	< 0.20	7.00	< 5.00	< 1.00	< 0.05	216000.00	< 0.20	< 50.00	< 0.20	31.00	< 5.00
MW02-02	MW02-02_20230328		2023-03-28	1.20 - 4.30	N	-	-	-	-	-	-	-	-	-	0.17	0.56	-	-	-	-	-	-	1.08	-	-	-	-	-	-	-	1.9
MW02-03	MW02-03-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	N	18.00	< 0.50	5.30	42.00	< 5.00	< 100.00	< 0.05	26200.00	< 0.50	8.11	< 1.00	14700.00	< 1.00	6860.00	2370.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	28900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-03	MW02-03_DUP-13-20140501	MW02-03-20140501	2014-05-01	1.50 - 4.60	FD	18.00	< 0.50	5.60	42.00	< 5.00	< 100.00	< 0.05	25900.00	< 0.50	8.29	< 1.00	14700.00	< 1.00	6900.00	2370.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	28000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-03	MW02-03-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	N	27.00	< 0.50	5.10	< 20.00	< 5.00	< 100.00	< 0.05	9220.00	< 0.50	2.94	< 1.00	5800.00	< 1.00	2470.00	893.00	-	< 1.00	< 5.00	< 1.00	< 0.05	18400.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-03	MW02-03_DUP-4-20140807	MW02-03-20140807	2014-08-07	1.50 - 4.60	FD	27.00	< 0.50	5.10	< 20.00	< 5.00	< 100.00	< 0.05	9480.00	< 0.50	2.97	< 1.00	5740.00	< 1.00	2450.00	879.00	-	< 1.00	< 5.00	< 1.00	< 0.05	18500.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-03	MW02-03-20180426	MW02-03-20180426	2018-04-26	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	-	2.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	MW02-03-REG-GW_20180426		2018-04-26	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	-	2.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-03	MW02-03_20230321		2023-03-21	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	9.52	1.36	-	-	-	-	-	-	0.86	-	-	-	-	-	-	-	3.5
MW02-03	DUP-07_20230321	MW02-03_20230321	2023-03-21	1.50 - 4.60	FD	-	-	-	-	-	-	-	-	-	9.39	1.31	-	-	-	-	-	-	0.87	-	-	-	-	-	-	-	3.5
MW02-04	MW02-04-20140501	MW02-04-20140501	2014-05-01	1.50 - 4.60	N	< 10.00	< 0.50	< 1.00	21.00	< 5.00	< 100.00	0.08	33900.00	< 0.50	2.94	1.20	177.00	< 1.00	10300.00	785.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	28400.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-04	MW02-04-20140807	MW02-04-20140807	2014-08-07	1.50 - 4.60	N	< 10.00	< 0.50	< 1.00	35.00	< 5.00	< 100.00	0.20	50200.00	< 0.50	2.83	1.50	< 30.00	< 1.00	15700.00	1130.00	-	1.60	< 5.00	< 1.00	< 0.05	46700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW02-04	MW02-04-20180419	MW02-04-20180419	2018-04-19	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	-	0.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-04	MW02-04-REG-GW_20180419		2018-04-19	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	-	0.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02-04	MW02-04_20230321		2023-03-21	1.50 - 4.60	N	-	-	-	-	-	-	-	-	-	1.77	0.81	-	-	-	-	-	-	0.56	-	-	-	-	-	-	-	4.6
MW03-02	MW03-02-20140430	MW03-02-20140430	2014-04-30	3.70 - 7.60	N	< 10.00	< 0.50	< 1.00	< 20.00	< 5.00	< 100.00	< 0.05	12400.00	< 0.50	< 0.50	2.90	< 30.00	< 1.00	3530.00	136.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	42100.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW03-02	MW03-02-20140812	MW03-02-20140812	2014-08-12	3.70 - 7.60	N	< 10.00	< 0.50	< 1.00	27.00	< 5.00	< 100.00	0.11	14700.00	< 0.50	< 0.50	2.40	< 30.00	< 1.00	4320.00	106.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	39900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW03-02	MW03-02-20180426	MW03-02-20180426	2018-04-26	3.70 - 7.60	N	-	-	-	-	-	-	-	-	-	-	0.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-02	MW03-02_20230329		2023-03-29	3.70 - 7.60	N	-	-	-	-	-	-	-	-	-	0.12	0.84	-	-	-	-	-	-	< 0.50	-	-	-	-	-	-	-	1.6
MW03-03	MW03-03-20180419	MW03-03-20180419	2018-04-19	6.10 - 13.70	N	-	-	-	-	-	-	-	-	-	-	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03-03	MW03-03-REG-GW_20180419		2018-04-19	6.10 - 13.70	N	-	-	-	-	-	-	-	-	-	-	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20140430		2014-04-30	9.18 - 10.68	N	< 10.00	< 0.50	< 1.00	32.00	< 5.00	< 100.00	< 0.05	52300.00	< 0.50	< 0.50	< 1.00	2810.00	< 1.00	17500.00	1470.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	10700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-05I	A2MW09-05I_MW09-05I-20140812		2014-08-12	9.18 - 10.68	N	< 10.00	< 0.50	< 1.00	36.00	< 5.00	< 100.00	< 0.05	72900.00	< 0.50	< 0.50	< 1.00	3300.00	< 1.00	23400.00	1890.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	11900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-05I	A2MW09-05I_DUP-6-20140812	A2MW09-05I_MW09-05I-20140812	2014-08-12	9.18 - 10.68	FD	< 10.00	< 0.50	< 1.00	37.00	< 5.00	< 100.00	< 0.05	73200.00	< 0.50	< 0.50	< 1.00	3310.00	< 1.00	23400.00	1880.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	11900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-05I	A2MW09-05I_MW09-05I-20180426		2018-04-26	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-05I-REG-GW_20180426		2018-04-26	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_DUP-10-20180426	A2MW09-05I_MW09-05I-20180426	2018-04-26	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_MW09-05I-20180530		2018-05-30	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-05I-REG-GW_20180530		2018-05-30	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I_DUP-14-20180530	A2MW09-05I_MW09-05I-20180530	2018-05-30	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	DUP-14-FD-GW_20180530	MW09-05I-REG-GW_20180530	2018-05-30	9.18 - 10.68	FD	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	A2MW09-05I-20180822		2018-08-22	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-05I	MW09-5I-REG-GW_20180822		2018-08-22	9.18 - 10.68	N	-	-	-	-	-	-	-	-	-	-	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06S	A2MW09-06S_MW09-06S-20140430		2014-04-30	2.44 - 5.44	N	< 10.00	< 0.50	< 1.00	< 20.00	< 5.00	< 100.00	< 0.05	13500.00	< 0.50	4.02	< 1.00	2190.00	< 1.00	3620.00	1380.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	5700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-06I	A2MW09-06I_MW09-06I-20140430		2014-04-30	9.33 - 10.83	N	< 10.00	< 0.50	1.20	32.00	< 5.00	< 100.00	< 0.05	24100.00	< 0.50	< 0.50	< 1.00	3410.00	< 1.00	10300.00	1970.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	13000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-06I	A2MW09-06I_DUP-12-20140430	A2MW09-06I_MW09-06I-20140430	2014-04-30	9.33 - 10.83	FD	< 10.00	< 0.50	1.20	32.00	< 5.00	< 100.00	< 0.05	23800.00	< 0.50	< 0.50	< 1.00	3400.00	< 1.00	10300.00	1970.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	12800.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-06I	A2MW09-06I_MW09-06I-20140812		2014-08-12	9.33 - 10.83	N	< 10.00	< 0.50	1.90	72.00	< 5.00	< 100.00	< 0.05	53900.00	< 0.50	< 0.50	< 1.00	5670.00	< 1.00	20400.00	6230.00	< 0.20	1.10	< 5.00	< 1.00	< 0.05	23000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-06I	A2MW09-06I_MW09-06I-20180426		2018-04-26	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	< 0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-06I-REG-GW_20180426		2018-04-26	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-06I	MW09-61-REG-GW_20180822		2018-08-22	9.33 - 10.83	N	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-10	A2MW09-10_MW09-10-20140430		2014-04-30	2.22 - 5.22	N	11.00	< 0.50	5.70	60.00	< 5.00	< 100.00	< 0.05	47200.00	< 0.50	8.04	< 1.00	44600.00	< 1.00	12700.00	8260.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	62200.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-11	A2MW09-11_MW09-11-20140430		2014-04-30	2.05 - 5.05	N	17.00	< 0.50	17.40	44.00	< 5.00	< 100.00	< 0.10	43100.00	< 1.00	15.20	< 1.00	71000.00	< 1.00	11700.00	11600.00	< 0.20	1.60	< 5.00	< 2.00	< 0.05	7800.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-11	A2MW09-11_MW09-11-20180214		2018-02-14	2.05 - 5.05	N	54.30	0.14	5.81	53.70	< 0.10	< 10.00	0.04	15000.00	0.16	18.00	1.96	58000.00	0.26	2720.00	5010.00	< 0.01	0.32	1.56	0.39	< 0.01	5760.00	0.01	0.89	< 0.01	2.45	4.30
A2MW09-11	A2MW09-11_MW09-11-20180426		2018-04-26	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	MW09-11-REG-GW_20180426		2018-04-26	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	-	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-11	A2MW09-11_20230329		2023-03-29	2.05 - 5.05	N	-	-	-	-	-	-	-	-	-	8.92	< 0.40	-	-	-	-	-	-	< 1.00	-	-	-	-	-	-	-	< 2.0
A2MW09-12	A2MW09-12_MW09-12-20140430		2014-04-30	2.14 - 5.14	N	< 10.00	< 0.50	< 1.00	< 20.00	< 5.00	< 100.00	< 0.05	7260.00	0.76	< 0.50	1.20	< 30.00	< 1.00	2340.00	54.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	10700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-12	A2MW09-12_MW09-12-20180214		2018-02-14	2.14 - 5.14	N	13.70	< 0.10	< 0.10	14.70	< 0.10	< 10.00	0.25	9970.00	< 0.10	0.27	1.76	31.00	< 0.05	2520.00	97.30	< 0.01	< 0.05	1.13	< 0.05	< 0.01	4630.00	< 0.01	< 0.30	< 0.01	< 0.50	3.40
A2MW09-12	A2MW09-12_MW09-12-20180426		2018-04-26	2.14 - 5.14	N	-	-	-	-	-	-	-	-	-	-	0.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-12	MW09-12-REG-GW_20180426		2018-04-26	2.14 - 5.14	N	-	-	-	-	-	-	-	-	-	-	0.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-12	A2MW09-12_20230329		2023-03-29	2.14 - 5.14	N	-	-	-	-	-	-	-	-	-	< 0.10	0.50	-	-	-	-	-	-	< 0.50	-	-	-	-	-	-	-	1.4
A2MW09-13	A2MW09-13_MW09-13-20140501		2014-05-01	2.02 - 5.02	N	21.00	< 0.50	< 1.00	< 20.00	< 5.00	< 100.00	< 0.05	5880.00	< 0.50	1.00	< 1.00	103.00	< 1.00	900.00	158.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	10200.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-13	A2MW09-13_MW09-13-20180426		2018-04-26	2.02 - 5.02	N	-	-	-	-	-	-	-	-	-	-	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-13	MW09-13-REG-GW_20180426		2018-04-26	2.02 - 5.02	N	-	-	-	-	-	-	-	-	-	-	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-13	A2MW09-13_20230329		2023-03-29	2.02 - 5.02	N	-	-	-	-	-	-	-	-	-	0.12	0.36	-	-	-	-	-	-	< 0.50	-	-	-	-	-	-	-	1.5
A2MW09-14	A2MW09-14_MW09-14-20140501		2014-05-01	2.03 - 5.03	N	15.00	< 0.50	2.80	37.00	< 5.00	< 100.00	< 0.05	23300.00	< 0.50	7.48	< 1.00	15000.00	< 1.00	4740.00	2200.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	20100.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-14	A2MW09-14_MW09-14-20140807		2014-08-07	2.03 - 5.03	N	12.00	< 0.50	4.50	65.00	< 5.00	< 100.00	< 0.05	23200.00	< 0.50	5.27	< 1.00	12800.00	< 1.00	4770.00	2630.00	-	< 1.00	< 5.00	< 1.00	< 0.05	24600.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-14	A2MW09-14_MW09-14-20180426		2018-04-26	2.03 - 5.03	N	-	-	-	-	-	-	-	-	-	-	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-14	MW09-14-REG-GW_20180426		2018-04-26	2.03 - 5.03	N	-	-	-	-	-	-	-	-	-	-	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AECOM

TABLE 2-4
AREA 2 CONCENTRATIONS OF DISSOLVED METALS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Parameter	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium (6+)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Sodium	Thallium	Titanium	Uranium	Vanadium	Zinc
						Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
						CSR-SCH-3.2C3-GENWAT-MW	--	2500	125	5000	1000	12000	15	--	15	40	20	--	20	--	--	0.25	10000	83	20	15	--	3	1000	85	--	100
						SSSLs Parkland Refinery	--	2500	125	5000	1000	12000	90	--	--	1100	62	--	1400	--	--	--	--	750	--	--	--	--	--	1000	--	900
						Minimum RDL	1	0.1	0.1	0.1	0.02	10	0.005	50	0.1	0.1	0.2	10	0.05	5	0.1	0.005	0.05	0.5	0.05	0.01	50	0.01	0.3	0.01	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type																										
A2MW09-14	A2MW09-14_20230328		2023-03-28	2.03 - 5.03	N	-	-	-	-	-	-	-	-	-	11.2	2.20	-	-	-	-	-	-	5.32	-	-	-	-	-	-	7.3
A2MW09-15	A2MW09-15_MW09-15-20140501		2014-05-01	1.35 - 4.35	N	18.00	< 0.50	5.60	< 20.00	< 5.00	< 100.00	< 0.05	11800.00	< 0.50	1.31	1.80	356.00	< 1.00	3500.00	473.00	< 0.20	7.70	< 5.00	< 1.00	< 0.05	179000.00	< 0.20	< 50.00	0.34	< 30.00	< 5.00
A2MW09-15	A2MW09-15_MW09-15-20140807		2014-08-07	1.35 - 4.35	N	24.00	< 0.50	4.90	< 20.00	< 5.00	< 100.00	< 0.05	8300.00	< 0.50	0.91	< 1.00	366.00	< 1.00	2410.00	381.00	-	4.50	< 5.00	< 1.00	< 0.05	154000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
A2MW09-15	A2MW09-15_MW09-15-20180426		2018-04-26	1.35 - 4.35	N	-	-	-	-	-	-	-	-	-	-	0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-15	MW09-15-REG-GW_20180426		2018-04-26	1.35 - 4.35	N	-	-	-	-	-	-	-	-	-	-	0.32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A2MW09-15	A2MW09-15_20230328		2023-03-28	1.35 - 4.35	N	-	-	-	-	-	-	-	-	-	0.92	1.68	-	-	-	-	-	-	1.34	-	-	-	-	-	-	-	< 1.0
MW11-3S	MW11-3S-20150921		2015-09-21	5.00 - 8.00	N	-	-	-	-	-	-	-	-	-	-	< 10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.40
MW11-3S	MW11-3S-20160322	MW11-3S-20160322	2016-03-22	5.00 - 8.00	N	< 10.00	< 0.50	< 1.00	45.00	< 5.00	< 100.00	0.07	19000.00	< 0.50	< 0.50	< 1.00	< 30.00	< 1.00	2380.00	30.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	66000.00	< 0.20	< 50.00	< 0.20	< 30.00	7.40
MW11-3S	MW11-3S-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	N	15.00	< 0.50	< 1.00	47.00	< 5.00	< 100.00	0.05	11800.00	< 0.50	< 0.50	< 1.00	< 30.00	< 1.00	2230.00	64.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	95400.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3S	MW11-3S_DUP-5-20160822	MW11-3S-20160822	2016-08-22	5.00 - 8.00	FD	16.00	< 0.50	< 1.00	47.00	< 5.00	< 100.00	0.09	11900.00	< 0.50	< 0.50	< 1.00	< 30.00	< 1.00	2230.00	64.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	94900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3S	MW11-3S-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	N	< 10.00	< 0.50	< 1.00	48.00	< 5.00	< 100.00	0.05	21900.00	< 0.50	< 0.50	2.70	< 30.00	< 1.00	2270.00	36.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	66000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3S	MW11-3S_DUP-6-20170404	MW11-3S-20170404	2017-04-04	5.00 - 8.00	FD	< 10.00	< 0.50	< 1.00	48.00	< 5.00	< 100.00	0.05	21800.00	< 0.50	< 0.50	< 1.00	< 30.00	< 1.00	2310.00	38.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	67200.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3S	MW11-3S-20170815	MW11-3S-20170815	2017-08-15	5.00 - 8.00	N	17.00	< 0.50	< 1.00	55.00	< 5.00	< 100.00	0.10	14600.00	< 0.50	< 0.50	1.60	< 30.00	< 1.00	2680.00	69.00	-	< 1.00	< 5.00	< 1.00	< 0.05	98500.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3S	MW11-3S-20180419	MW11-3S-20180419	2018-04-19	5.00 - 8.00	N	32.50	< 0.10	0.22	41.10	< 0.10	13.00	0.02	18500.00	< 0.10	< 0.10	0.23	65.00	0.07	1470.00	13.10	-	0.10	0.89	< 0.05	0.02	40700.00	< 0.01	< 1.50	0.04	< 0.50	1.50
MW11-3S	MW11-3S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N	32.5	< 0.1	0.22	41.1	< 0.1	13	0.0231	18500	-	< 0.1	0.23	65	0.071	1470	13.1	-	0.100	0.89	< 0.05	0.016	40700	< 0.01	< 1.5	0.040	< 0.5	1.5
MW11-3S	MW11-3S-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	N	17.60	< 0.10	0.25	58.40	< 0.10	21.00	0.10	15400.00	0.10	0.16	0.40	< 10.00	< 0.05	2960.00	69.00	< 0.01	< 0.05	1.35	< 0.05	0.01	80800.00	0.01	< 0.30	< 0.01	< 0.50	2.10
MW11-3S	MW11-3S-REG-GW_20180821		2018-08-21	5.00 - 8.00	N	17.6	< 0.1	0.25	58.4	< 0.1	21	0.0993	15400	-	0.16	0.40	< 10	< 0.05	2960	69.0	< 0.005	< 0.05	1.35	< 0.05	0.012	80800	0.013	< 0.3	< 0.01	< 0.5	2.1
MW11-3S	DUP-1-GW_20180821	MW11-3S-REG-GW_20180821	2018-08-21	5.00 - 8.00	FD	18.0	< 0.1	0.25	58.3	< 0.1	19	0.101	14200	-	0.16	0.41	< 10	< 0.05	2970	69.9	< 0.005	< 0.05	1.40	< 0.05	0.011	81700	0.011	< 0.3	< 0.01	< 0.5	2.0
MW11-3S	MW11-3S_DUP-1-20180821	MW11-3S-20180821	2018-08-21	5.00 - 8.00	FD	18.00	< 0.10	0.25	58.30	< 0.10	19.00	0.10	14200.00	< 0.10	0.16	0.41	< 10.00	< 0.05	2970.00	69.90	< 0.01	< 0.05	1.40	< 0.05	0.01	81700.00	0.01	< 0.30	< 0.01	< 0.50	2.00
MW11-3S	MW11-3S-20190318	MW11-3S-20190318	2019-03-18	5.00 - 8.00	N	14.20	< 0.10	0.24	58.90	< 0.10	21.00	0.12	16000.00	0.18	0.16	0.45	< 10.00	< 0.05	3050.00	82.10	-	< 0.05	1.35	< 0.05	0.01	86700.00	0.01	< 0.30	< 0.01	< 0.50	6.00
MW11-3S	MW11-3S-REG-GW_20190318_L2245600		2019-03-18	5.00 - 8.00	N	14.2	< 0.1	0.24	58.9	< 0.1	21	0.118	16000	-	0.16	0.45	< 10	< 0.05	3050	82.1	-	< 0.05	1.35	< 0.05	0.010	86700	0.010	< 0.3	< 0.01	< 0.5	6.0
MW11-3S	L2343824-1		2019-09-09	5.00 - 8.00	N	14.6	< 0.1	0.45	38.6	< 0.1	30	0.164	15000	-	15.3	**33.6**	33	< 0.05	4180	1790	-	0.063	13.1	0.137	< 0.01	228000	0.025	< 0.3	0.028	< 0.5	12.7
MW11-3S	MW11-3S-20190909	MW11-3S-20190909	2019-09-09	5.00 - 8.00	N	27.00	< 0.10	0.25	112.00	< 0.10	22.00	0.23	34400.00	< 0.10	0.22	0.36	< 10.00	< 0.05	6310.00	175.00	-	< 0.05	2.49	0.05	0.01	109000.00	0.02	< 0.30	< 0.01	< 0.50	4.50
MW11-3S	MW11-3S-20200401	MW11-3S-20200401	2020-04-01	5.00 - 8.00	N	13.60	< 0.10	0.39	79.10	< 0.02	20.00	0.14	25100.00	< 0.50	0.88	< 0.20	188.00	< 0.05	5080.00	229.00	< 0.01	< 0.05	1.97	0.06	< 0.01	94300.00	0.02	< 0.30	0.01	< 0.50	4.40
MW11-3S	VA20A4270-001		2020-04-01	5.00 - 8.00	N	13.6	< 0.10	0.39	79.1	< 0.020	20	0.138	25100	-	0.88	< 0.20	188	< 0.050	5080	229	< 0.0050	< 0.050	1.97	0.059	< 0.010	94300	0.017	< 0.30	0.011	< 0.50	4.4
MW11-3S	MW11-3S-20200817	MW11-3S-20200817	2020-08-17	5.00 - 8.00	N	24.50	< 0.10	0.23	127.00	0.04	21.00	0.24	34700.00	< 0.50	0.22	0.41	< 10.00	< 0.05	7280.00	246.00	< 0.01	< 0.05	2.45	< 0.05	0.03	123000.00	0.01	< 0.30	< 0.01	< 0.50	4.00
MW11-3S	VA20B2849-AB-001		2020-08-17	5.00 - 8.00	N	24.5	< 0.100	0.23	127	0.036	21	0.236	34700	-	0.22	0.41	< 10.0	< 0.0500	7280	246	< 0.00500	< 0.0500	2.45	< 0.0500	0.031	123000	0.014	< 0.300	< 0.0100	< 0.500	4.0
MW11-3S	MW11-3S-20210309	MW11-3S-20210309	2021-03-09	5.00 - 8.00	N	9.20	< 0.10	0.51	59.80	< 0.02	26.00	0.09	17200.00	< 0.50	0.64	< 0.20	210.00	< 0.05	3110.00	148.00	-	< 0.05	1.49	0.08	< 0.01	94400.00	0.01	< 0.30	< 0.01	< 0.50	2.50
MW11-3S	MW11-3S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N	9.2	< 0.100	0.51	59.8	< 0.0200	26	0.0930	17200	-	0.64	< 0.200	210	< 0.0500	3110	148	-	< 0.0500	1.49	0.076	< 0.0100	94400	0.011	< 0.300	< 0.0100	< 0.500	2.5
MW11-3S	MW11-3S-20210816	MW11-3S-20210816	2021-08-16	5.00 - 8.00	N	28.40	< 0.10	0.25	76.20	0.03	22.00	0.12	22500.00	< 0.50	0.18	0.56	43.00	< 0.05	4500.00	105.00	-	< 0.05	1.55	0.06	0.02	95900.00	0.01	0.48	0.01	< 0.50	4.00
MW11-3S	MW11-3S-REG-GW_20210816		2021-08-16	5.00 - 8.00	N	28.4	< 0.10	0.25	76.2	0.026	22	0.120	22500	-	0.18	0.56	43	< 0.050	4500	105	-	< 0.050	1.55	0.058	0.017	95900	0.013	0.48	0.010	< 0.50	4.0
MW11-3S	MW11-3S-REG-GW_20220316		2022-03-16	5.00 - 8.00	N	4.1	< 0.10	0.86	41.1	< 0.020	19	0.0470	11400	-	1.36	0.24	1330	< 0.050	1990	246	-	0.063	1.86	< 0.050	< 0.010	63300	0.014	< 0.30	< 0.010	< 0.50	2.6
MW11-3S	MW11-3S-20220809		2022-08-09	5.00 - 8.00	N	16.9	< 0.10	0.27	40.4	< 0.020	22	0.0452	10900	-	0.12	0.54	< 10	< 0.050	2180	29.4	-	< 0.050	0.62	0.129	< 0.010	69700	< 0.010	< 0.30	< 0.010	< 0.50	1.6
MW11-3S	MW11-3S_20230327		2023-03-27	5.00 - 8.00	N	4.8	< 0.100	0.59	30.5	< 0.0200	22	0.0356	8160	-	0.33	< 0.200	261	< 0.0500	1480	48.9	-	< 0.0500	0.74	0.055	< 0.0100	56900	< 0.0100	< 0.300	< 0.0100	< 0.500	1.3
MW11-3S	MW11-3S-20230824		2023-08-24	5.00 - 8.00	N	8.3	< 0.100	0.48	42.8	< 0.0200	24	0.0437	10600	-	0.12	0.35	69	< 0.0500	2210	20.6	-	< 0.0500	0.71	0.066	< 0.0100	72800	< 0.0100	< 0.300	< 0.0100	< 0.500	1.2
MW11-3I	MW11-3I-20150921		2015-09-21	11.00 - 12.50	N	-	-	-	-	-	-	-	-	-	-	< 10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.70
MW11-3I	MW11-3I-20160322	MW11-3I-20160322	2016-03-22	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	35.00	< 5.00	< 100.00	0.08	18200.00	< 0.50	0.87	< 1.00	39.00	< 1.00	4580.00	220.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	92200.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3I	MW11-3I-20160822	MW11-3I-20160822	2016-08-22	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	39.00	< 5.00	< 100.00	0.08	19000.00	< 0.50	0.92	< 1.00	< 30.00	< 1.00	4850.00	235.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	105000.00	< 0.20	< 50.00	< 0.20	< 30.00	5.10
MW11-3I	MW11-3I-20170404	MW11-3I-20170404	2017-04-04	11.00 - 12.50	N	13.00	< 0.50	< 1.00	39.00	< 5.00	< 100.00	0.11	18700.00	< 0.50	0.82	3.10	< 30.00	< 1.00	4550.00	213.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	97800.00	< 0.20	< 50.00	< 0.20	< 30.00	7.50
MW11-3I	MW11-3I-20170815	MW11-3I-20170815	2017-08-15	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	42.00	< 5.00	< 100.00	0.08	21100.00	< 0.50	0.86	< 1.00	< 30.00	< 1.00	5330.00	254.00	-	< 1.00	< 5.00	< 1.00	< 0.05	104000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3I	MW11-3I-20180419	MW11-3I-20180419	2018-04-19	11.00 - 12.50	N	2.40	< 0.10	0.27	45.20	< 0.10	30.00	0.10	20500.00	< 0.10	0.84	0.34	< 10.00	< 0.05	5340.00	219.00	-	0.11	3.05	< 0.05	< 0.01	107000.00	< 0.01	< 0.30	0.01	< 0.50	2.90
MW11-3I	MW11-3I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N	2.4	< 0.1	0.27	45.2	< 0.1	30	0.0952	20500	-	0.84	0.34	< 10	< 0.05	5340	219	-	0.108	3.05	< 0.05	< 0.01	107000	< 0.01	< 0.3	0.011	< 0.5	2.9
MW11-3I	MW11-3I-20180821	MW11-3I-20180821	2018-08-21	11.00 - 12.50	N	2.10	< 0.10	0.28	46.80	< 0.10	27.00	0.10	23200.00	< 0.10	0.83	0.47	< 10.00	< 0.05	6520.00	219.00	< 0.01	0.12	3.20	0.05	< 0.01	93300.00	< 0.01	< 0.30	0.01	< 0.50	2.90
MW11-3I	MW11-3I-REG-GW_20180821		2018-08-21	11.00 - 12.50	N	2.1	< 0.1	0.28	46.8	< 0.1	27	0.0950	23200	-	0.83	0.47	< 10	< 0.05	6520	219	< 0.005	0.124	3.20	0.052	< 0.01	93300	< 0.01	< 0.3	0.012	< 0.5	2.9
MW11-3I	MW11-3I-20190318	MW11-3I-20190318	2019-03-18	11.00 - 12.50	N	2.00	< 0.10	0.23	33.40	< 0.10	29.00	0.06	15600.00	< 0.10	0.55	0.53	< 10.00	< 0.05	4320.00	122.00	-	0.12	2.21	< 0.05	< 0.01	85700.00	< 0.01	< 0.30	< 0.01	< 0.50	1.80
MW11-3I	MW11-3I-REG-GW_20190318_L2245600		2019-03-18	11.00 - 12.50	N	2.0	< 0.1	0.23	33.4	< 0.1	29	0.0638	15600	-	0.55	0.53	< 10	< 0.05	4320	122	-	0.119	2.21	< 0.05	< 0.01	85700	< 0.01	< 0.3	< 0.01	< 0.5	1.8
MW11-3I	L2343824-2		2019-09-09	11.00 - 12.50	N	9.3	< 0.1	1.43	64.4	< 0.1	25	0.167	31900	-	12.9	0.98	1200	< 0.05	8820	1040	-	0.218	3.92	< 0.05	< 0.01	197000	< 0.01	0.40	0.028	< 0.5	5.0
MW11-3I	MW11-3I-20190909	MW11-3I-20190909	2019-09-09	11.00 - 12.50	N	9.30	< 0.10	1.43	64.40	< 0.10	25.00	0.17	31900.00	< 0.10	12.90	0.98	1200.00	< 0.05	8820.00	1040.00	-	0.22	3.92	< 0.05	< 0.01	197000.00	< 0.01	0.40	0.03	< 0.50	5.00
MW11-3D	MW11-3D-20150921		2015-09-21	18.50 - 20.00	N	-	-	-	-	-	-	-	-	-	-	< 10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.70
MW11-3D	MW11-3D-20160322	MW11-3D-20160322	2016-03-22	18.50 - 20.00	N	< 10.00	< 0.50	4.20	164.00	< 5.00	< 100.00	< 0.05	103000.00	< 0.50	0.93	< 1.00	4320.00	< 1.00	28200.00	1300.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	57700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3D	MW11-3D-20160822	MW11-3D-20160822	2016-08-22	18.50 - 20.00	N	< 10.00	< 0.50	4.60	166.00	< 5.00	< 100.00	< 0.05	105000.00	< 0.50	0.94	< 1.00	4100.00	< 1.00	28700.00	1310.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	61600.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3D	MW11-3D-20170404	MW11-3D-20170404	2017-04-04	18.50 - 20.00	N	< 10.00	< 0.50	4.30	164.00	< 5.00	< 100.00	< 0.05	103000.00	< 0.50	0.92	2.10	4320.00	< 1.00	28200.00	1310.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	61900.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3D	MW11-3D-20170815	MW11-3D-20170815	2017-08-15	18.50 - 20.00	N	< 10.00	< 0.50	4.30	162.00	< 5.00	< 100.00	< 0.05	103000.00	< 0.50	0.89	1.30	4170.00	< 1.00	28500.00	1310.00	-	< 1.00	< 5.00	< 1.00	< 0.05	63700.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-3D	MW11-3D-20180419	MW11-3D-20180419	2018-04-19	18.50 - 20.00	N	28.50	< 0.10	4.24	155.00	< 0.10	29.00	< 0.01	98000.00	< 0.10	0.91	< 0.20	4090.00	< 0.05	25700.00	1300.00	-	0.14	1.70	< 0.05	< 0.01	63000.00	< 0.01	1.17	0.01	< 0.50	1.60
MW11-3D	MW11-3D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N	28.5	< 0.1	4.24	155	< 0.1	29	< 0.005	98000	-	0.91	< 0.2	4090	< 0.05	25700	1300	-	0.142	1.70	< 0.05	< 0.01	63000	< 0.01	1.17	0.013	< 0.5	1.6
MW11-3D	MW11-3D-20180821	MW11-3D-20180821	2018-08-21	18.50 - 20.00	N	< 1.00	< 0.10	4.07	143.00	< 0.10	30.00	0.07	94600.00	< 0.10	0.85	< 0.20	3680.00	< 0.05	25300.00	1230.00	< 0.01	0.18	1.76	< 0.05	< 0.01	63500.00	< 0.01	< 0.30	0.02	< 0.50	6.30
MW11-3D	MW11-3D-REG-GW_20180821		2018-08-21	18.50 - 20.00	N	< 1	< 0.1	4.07	143	< 0.1	30	0.0696	94600	-	0.85	< 0.2	3680	< 0.05	25300	1230	< 0.005	0.183	1.76	< 0.05	< 0.01	63500	< 0.01	< 0.3	0.023	< 0.5	6.3
MW11-3D	MW11-3D-20190318	MW11-3D-20190318	2019-03-18	18.50 - 20.00	N	< 1.00	< 0.10	4.47	168.00	< 0.10	31.00	< 0.01	99300.00	< 0.10	0.88	< 0.20	3910.00	< 0.05	26700.00	1310.00	-	0.15	1.77	< 0.05	< 0.01	65500.00	< 0.01	< 0.30	0.01	< 0.50	1.20
MW11-3D	MW11-3D-REG-GW_20190318_L2245600		2019-03-18	18.50 - 20.00	N	< 1	< 0.1	4.47	168	< 0.1	31	< 0.005	99300	-	0.88	< 0.2	3910	< 0.05	26700	1310	-	0.145	1.77	< 0.05	< 0.01	65500	< 0.01	< 0.3	0.010	< 0.5	1.2
MW11-3D	L2343824-3		2019-09-09	18.50 - 20.00	N	3.4	< 0.1	0.59	67.6	< 0.1	23	0.0724	41200	-	6.71	0.68	4790	< 0.05	14000	892	-	0.084	2.57	< 0.05	< 0.01	173000	< 0.01	< 0.3	0.014	< 0.5	3.1
MW11-3D	MW11-3D-20190909	MW11-3D-20190909	2019-09-09	18.50 - 20.00	N	3.40	< 0.10	0.59	67.60	< 0.10	23.00	0.07	41200.00	< 0.10	6.71	0.68	4790.00	< 0.05	14000.00	892.00	-	0.08	2.57	< 0.05	< 0.01	173000.00	< 0.01	< 0.30	0.01	< 0.50	3.10
MW11-4S	MW11-4S-20140507	MW11-4S-20140507	2014-05-07	5.00 - 8.00	N	27.00	< 0.50	< 1.00	41.00	< 5.00	< 100.00	0.17	17600.00	< 0.50	14.00	**29.90**	305.00	< 1.00	3590.00	1560.00	< 0.20	< 1.00	11.80	< 1.00	< 0.05	196000.00	< 0.20	< 50.00	< 0.20	< 30.00	25.90
MW11-4S	MW11-4S-20150826	MW11-4S-20150826	2015-08-26	5.00 - 8.00	N	19.00	< 0.50	< 1.00	36.00	< 5.00	< 100.00	0.12	12000.00	< 0.50	11.40	16.60	95.00	< 1.00	2880.00	1190.00	< 0.20	< 1.00	10.80	< 1.00	< 0.05	185000.00	< 0.20	< 50.00	< 0.20	< 30.00	19.30
MW11-4S	MW11-4S-20150921		2015-09-21	5.00 - 8.00	N	-	-	-	-	-	-	-	-	-	-	**31.00**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.80
MW11-4S	MW11-4S-20160322	MW11-4S-20160322	2016-03-22	5.00 - 8.00	N	18.00	< 0.50	< 1.00	32.00	< 5.00	< 100.00	0.12	12300.00	< 0.50	9.30	**28.30**	< 30.00	< 1.00	2560.00	1090.00	< 0.20	< 1.00	8.70	< 1.00	< 0.05	178000.00	< 0.20	< 50.00	< 0.20	< 30.00	13.20
MW11-4S	MW11-4S-20160822	MW11-4S-20160822	2016-08-22	5.00 - 8.00	N	19.00	< 0.50	< 1.00	35.00	< 5.00	< 100.00	0.10	13700.00	< 0.50	10.30	**32.70**	< 30.00	< 1.00	2940.00	1280.00	< 0.20	< 1.00	9.00	< 1.00	< 0.05	205000.00	< 0.20	< 50.00	< 0.20	< 30.00	15.70
MW11-4S	MW11-4S-20170404	MW11-4S-20170404	2017-04-04	5.00 - 8.00	N	14.00	< 0.50	< 1.00	32.00	< 5.00	< 100.00	0.09	10600.00	< 0.50	7.24	**29.90**	< 30.00	< 1.00	2300.00	1000.00	< 0.20	< 1.00	7.10	< 1.00	< 0.05	179000.00	< 0.20	< 50.00	< 0.20	< 30.00	12.20
MW11-4S	MW11-4S-20170815	MW11-4S-20170815	2017-08-15	5.00 - 8.00	N	< 10.00	< 0.50	< 1.00	55.00	< 5.00	< 100.00	0.07	17300.00	< 0.50	9.15	6.60	4640.00	< 1.00	3620.00	1300.00	-	< 1.00	5.90	< 1.00	< 0.05	212000.00	< 0.20	< 50.00	< 0.20	< 30.00	9.60
MW11-4S	MW11-4S-20180419	MW11-4S-20180419	2018-04-19	5.00 - 8.00	N	13.80	< 0.10	0.67	58.10	< 0.10	29.00	0.08	20000.00	0.10	9.15	4.79	3150.00	< 0.05	4170.00	1470.00	-	0.08	6.29	0.07	< 0.01	209000.00	0.02	< 0.30	0.02	< 0.50	6.30
MW11-4S	MW11-4S-REG-GW_20180419		2018-04-19	5.00 - 8.00	N	13.8	< 0.1	0.67	58.1	< 0.1	29	0.0791	20000	-	9.15	4.79	3150	< 0.05	4170	1470	-	0.081	6.29	0.066	< 0.01	209000	0.024	< 0.3	0.017	< 0.5	6.3
MW11-4S	MW11-4S_20180820		2018-08-20	5.00 - 8.00	N	20.0	< 0.1	0.54	52.6	< 0.1	30	0.174	17800	-	14.5	12.0	884	< 0.05	4470	1730	< 0.005	0.072	12.3	0.078	< 0.01	238000	0.026	< 0.3	0.016	< 0.5	11.3
MW11-4S	MW11-4S-20180820	MW11-4S-20180820	2018-08-20	5.00 - 8.00	N	20.00	< 0.10	0.54	52.60	< 0.10	30.00	0.17	17800.00	< 0.10	14.50	12.00	884.00	< 0.05	4470.00	1730.00	< 0.01	0.07	12.30	0.08	< 0.01	238000.00	0.03	< 0.30	0.02	< 0.50	11.30
MW11-4S	MW11-4S-20190318	MW11-4S-20190318	2019-03-18	5.00 - 8.00	N	15.00	< 0.10	0.59	42.20	< 0.10	33.00	0.13	18400.00	0.19	11.60	**23.90**	627.00	< 0.05	4870.00	1780.00	-	0.10	10.30	0.10	< 0.01	222000.00	0.03	< 0.30	0.05	< 0.50	10.80
MW11-4S	MW11-4S-REG

AECOM

TABLE 2-4
AREA 2 CONCENTRATIONS OF DISSOLVED METALS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

						Parameter	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium (6+)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Sodium	Thallium	Titanium	Uranium	Vanadium	Zinc
						Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
						CSR-SCH-3.2C3-GENWAT-MW	--	2500	125	5000	1000	12000	15	--	15	40	20	--	20	--	--	0.25	10000	83	20	15	--	3	1000	85	--	100
						SSSLs Parkland Refinery	--	2500	125	5000	1000	12000	90	--	--	1100	62	--	1400	--	--	--	--	750	--	--	--	--	--	1000	--	900
						Minimum RDL	1	0.1	0.1	0.1	0.02	10	0.005	50	0.1	0.1	0.2	10	0.05	5	0.1	0.005	0.05	0.5	0.05	0.01	50	0.01	0.3	0.01	0.5	0.5
Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type																										
MW11-4S	MW11-4S-REG-GW_20210309		2021-03-09	5.00 - 8.00	N	13.4	< 0.10	0.45	43.1	< 0.020	34	0.140	23100	-	12.4	**23.9**	54	< 0.050	4880	2100	-	0.112	11.2	0.145	< 0.010	210000	0.027	< 0.30	0.053	< 0.50	12.6
MW11-4S	DUP-07-FD-GW_20210309	MW11-4S-REG-GW_20210309	2021-03-09	5.00 - 8.00	FD	12.7	< 0.10	0.44	43.4	< 0.020	32	0.140	22700	-	12.3	**24.0**	45	< 0.050	4810	2030	-	0.095	11.1	0.132	< 0.010	206000	0.027	< 0.30	0.046	< 0.50	12.1
MW11-4S	MW11-4S_DUP-07-20210309	MW11-4S-20210309	2021-03-09	5.00 - 8.00	FD	12.70	< 0.10	0.44	43.40	< 0.02	32.00	0.14	22700.00	< 0.50	12.30	**24.00**	45.00	< 0.05	4810.00	2030.00	-	0.10	11.10	0.13	< 0.01	206000.00	0.03	< 0.30	0.05	< 0.50	12.10
MW11-4S	MW11-4S-20210816	MW11-4S-20210816	2021-08-16	5.00 - 8.00	N	15.90	< 0.10	0.42	47.80	< 0.02	30.00	0.16	19800.00	< 0.50	16.70	**21.40**	51.00	< 0.05	5470.00	2150.00	-	0.07	13.30	0.08	< 0.01	225000.00	0.03	< 0.30	0.04	< 0.50	12.60
MW11-4S	MW11-4S-REG-GW_20210816		2021-08-16	5.00 - 8.00	N	15.9	< 0.10	0.42	47.8	< 0.020	30	0.162	19800	-	16.7	**21.4**	51	< 0.050	5470	2150	-	0.067	13.3	0.083	< 0.010	225000	0.029	< 0.30	0.039	< 0.50	12.6
MW11-4S	MW11-4S-REG-GW_20220316		2022-03-16	5.00 - 8.00	N	12.8	< 0.10	0.48	40.8	< 0.020	26	0.0996	19300	-	7.33	**26.8**	29	< 0.050	4300	1560	-	0.148	7.66	0.066	< 0.010	187000	0.021	< 0.30	0.059	< 0.50	8.0
MW11-4S	MW11-4S-20220809		2022-08-09	5.00 - 8.00	N	19.7	< 0.10	0.56	40.4	< 0.020	29	0.0890	17400	-	9.47	**28.6**	11	< 0.050	4610	1590	-	0.122	6.85	0.149	< 0.010	178000	0.025	< 0.30	0.056	< 0.50	7.7
MW11-4S	MW11-4S_20230327		2023-03-27	5.00 - 8.00	N	11.5	< 0.100	0.48	33.4	< 0.0200	28	0.0908	14000	-	10.3	**21.5**	24	< 0.0500	3670	1460	-	0.110	7.83	0.114	< 0.0100	166000	0.022	< 0.300	0.037	< 0.500	7.4
MW11-4S	MW11-4S-20230824		2023-08-24	5.00 - 8.00	N	9.8	< 0.100	0.50	32.8	< 0.0200	30	0.113	13100	-	10.7	**21.2**	36	< 0.0500	3720	1510	-	0.085	7.71	0.075	< 0.0100	174000	0.023	< 0.300	0.027	< 0.500	7.3
MW11-4S	DUP-6-20230824	MW11-4S-20230824	2023-08-24	5.00 - 8.00	FD	10.1	< 0.100	0.54	35.2	< 0.0200	30	0.118	13800	-	11.2	**22.4**	37	< 0.0500	4140	1560	-	0.087	8.22	0.095	< 0.0100	181000	0.023	< 0.300	0.030	< 0.500	7.8
MW11-4I	MW11-4I-20140507	MW11-4I-20140507	2014-05-07	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	67.00	< 5.00	< 100.00	0.11	41900.00	< 0.50	3.95	1.30	2260.00	< 1.00	11600.00	907.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	194000.00	< 0.20	< 50.00	< 0.20	< 30.00	6.10
MW11-4I	MW11-4I_DUP-16-20140507	MW11-4I-20140507	2014-05-07	11.00 - 12.50	FD	< 10.00	< 0.50	< 1.00	67.00	< 5.00	< 100.00	0.12	41600.00	< 0.50	3.96	1.10	2080.00	< 1.00	11800.00	911.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	197000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-4I	MW11-4I-20140813	MW11-4I-20140813	2014-08-13	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	66.00	< 5.00	< 100.00	0.20	42100.00	< 0.50	4.30	1.30	2010.00	< 1.00	11600.00	936.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	201000.00	< 0.20	< 50.00	< 0.20	< 30.00	6.20
MW11-4I	MW11-4I_DUP-8-20140813	MW11-4I-20140813	2014-08-13	11.00 - 12.50	FD	< 10.00	< 0.50	< 1.00	68.00	< 5.00	< 100.00	0.19	42100.00	< 0.50	4.27	1.20	2030.00	< 1.00	11700.00	944.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	205000.00	< 0.20	< 50.00	< 0.20	< 30.00	6.90
MW11-4I	MW11-4I-20150921		2015-09-21	11.00 - 12.50	N	-	-	-	-	-	-	-	-	-	-	< 10.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.60
MW11-4I	MW11-4I-20160322	MW11-4I-20160322	2016-03-22	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	52.00	< 5.00	< 100.00	0.12	29500.00	< 0.50	4.78	< 1.00	1040.00	< 1.00	7620.00	777.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	169000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-4I	MW11-4I-20160822	MW11-4I-20160822	2016-08-22	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	55.00	< 5.00	< 100.00	0.09	29700.00	< 0.50	6.37	1.10	1020.00	< 1.00	7220.00	851.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	185000.00	< 0.20	< 50.00	< 0.20	< 30.00	9.00
MW11-4I	MW11-4I-20170404	MW11-4I-20170404	2017-04-04	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	52.00	< 5.00	< 100.00	0.15	26000.00	< 0.50	5.12	3.80	563.00	< 1.00	6690.00	776.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	173000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-4I	MW11-4I-20170815	MW11-4I-20170815	2017-08-15	11.00 - 12.50	N	< 10.00	< 0.50	< 1.00	53.00	< 5.00	< 100.00	0.08	26000.00	< 0.50	6.29	3.70	557.00	< 1.00	6320.00	882.00	-	< 1.00	< 5.00	< 1.00	< 0.05	185000.00	< 0.20	< 50.00	< 0.20	< 30.00	6.40
MW11-4I	MW11-4I-20180419	MW11-4I-20180419	2018-04-19	11.00 - 12.50	N	6.70	< 0.10	0.50	66.70	< 0.10	26.00	0.13	32500.00	< 0.10	6.93	1.41	1170.00	< 0.05	9060.00	982.00	-	0.21	4.31	< 0.05	< 0.01	211000.00	0.01	< 0.30	0.03	< 0.50	6.30
MW11-4I	MW11-4I-REG-GW_20180419		2018-04-19	11.00 - 12.50	N	6.7	< 0.1	0.50	66.7	< 0.1	26	0.133	32500	-	6.93	1.41	1170	< 0.05	9060	982	-	0.212	4.31	< 0.05	< 0.01	211000	0.012	< 0.3	0.026	< 0.5	6.3
MW11-4I	MW11-4I_20180820		2018-08-20	11.00 - 12.50	N	9.1	< 0.1	0.47	66.3	< 0.1	27	0.143	32100	-	8.63	1.87	616	< 0.05	8040	1090	< 0.005	0.241	4.72	< 0.05	< 0.01	211000	0.012	< 0.3	0.020	< 0.5	7.8
MW11-4I	MW11-4I-20180820	MW11-4I-20180820	2018-08-20	11.00 - 12.50	N	9.10	< 0.10	0.47	66.30	< 0.10	27.00	0.14	32100.00	< 0.10	8.63	1.87	616.00	< 0.05	8040.00	1090.00	< 0.01	0.24	4.72	< 0.05	< 0.01	211000.00	0.01	< 0.30	0.02	< 0.50	7.80
MW11-4I	MW11-4I-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	N	5.50	< 0.10	0.43	56.00	< 0.10	27.00	0.13	28500.00	< 0.10	11.70	1.38	449.00	< 0.05	7610.00	988.00	-	0.20	3.58	< 0.05	< 0.01	187000.00	0.01	< 0.30	0.03	< 0.50	8.60
MW11-4I	MW11-4I-REG-GW_20190318_L2245600		2019-03-18	11.00 - 12.50	N	5.5	< 0.1	0.43	56.0	< 0.1	27	0.125	28500	-	11.7	1.38	449	< 0.05	7610	988	-	0.203	3.58	< 0.05	< 0.01	187000	0.011	< 0.3	0.028	< 0.5	8.6
MW11-4I	DUP-01-FD-GW_20190318_L2245600	MW11-4I-REG-GW_20190318_L2245600	2019-03-18	11.00 - 12.50	FD	6.1	< 0.1	0.44	57.2	< 0.1	27	0.126	29900	-	11.6	1.41	453	< 0.05	7380	957	-	0.207	3.48	< 0.05	< 0.01	189000	0.011	< 0.3	0.030	< 0.5	10.5
MW11-4I	MW11-4I_DUP-01-20190318	MW11-4I-20190318	2019-03-18	11.00 - 12.50	FD	6.10	< 0.10	0.44	57.20	< 0.10	27.00	0.13	29900.00	< 0.10	11.60	1.41	453.00	< 0.05	7380.00	957.00	-	0.21	3.48	< 0.05	< 0.01	189000.00	0.01	< 0.30	0.03	< 0.50	10.50
MW11-4I	L2343824-5		2019-09-09	11.00 - 12.50	N	1.9	< 0.1	0.33	47.7	< 0.1	25	0.0843	21500	-	0.63	< 0.2	103	< 0.05	6590	186	-	0.113	3.29	< 0.05	< 0.01	93100	< 0.01	< 0.3	< 0.01	< 0.5	2.8
MW11-4I	MW11-4I-20190909	MW11-4I-20190909	2019-09-09	11.00 - 12.50	N	1.90	< 0.10	0.33	47.70	< 0.10	25.00	0.08	21500.00	< 0.10	0.63	< 0.20	103.00	< 0.05	6590.00	186.00	-	0.11	3.29	< 0.05	< 0.01	93100.00	< 0.01	< 0.30	< 0.01	< 0.50	2.80
MW11-4I	MW11-4I-20200401	MW11-4I-20200401	2020-04-01	11.00 - 12.50	N	8.50	< 0.10	0.48	60.80	< 0.02	26.00	0.11	30300.00	< 0.50	9.74	1.64	1045.00	< 0.05	9040.00	938.00	< 0.01	0.15	3.24	0.10	< 0.01	193000.00	< 0.01	< 0.30	0.03	< 0.50	5.10
MW11-4I	VA20A4270-002		2020-04-01	11.00 - 12.50	N	8.5	< 0.10	0.48	60.8	< 0.020	26	0.105	30300	-	9.74	1.64	1450	< 0.050	9040	938	< 0.0050	0.154	3.24	0.095	< 0.010	193000	< 0.010	< 0.30	0.026	< 0.50	5.1
MW11-4I	MW11-4I-20200813	MW11-4I-20200813	2020-08-13	11.00 - 12.50	N	5.30	< 0.10	0.53	62.10	< 0.02	25.00	0.11	34200.00	< 0.10	13.90	1.24	1480.00	< 0.05	8730.00	953.00	< 0.01	0.18	3.18	0.06	< 0.01	208000.00	< 0.01	< 0.30	0.02	< 0.50	6.70
MW11-4I	VA20B2619-AB-003		2020-08-13	11.00 - 12.50	N	5.3	< 0.100	0.53	62.1	< 0.0200	25	0.112	34200	-	13.9	1.24	1480	< 0.0500	8730	953	< 0.00500	0.184	3.18	0.056	< 0.0100	208000	< 0.0100	< 0.300	0.023	< 0.500	6.7
MW11-4I	MW11-4I-20210309	MW11-4I-20210309	2021-03-09	11.00 - 12.50	N	6.30	< 0.10	0.49	65.80	< 0.02	27.00	0.12	36200.00	< 0.50	16.80	1.03	1140.00	< 0.05	9370.00	1190.00	-	0.17	3.45	0.05	< 0.01	218000.00	< 0.01	< 0.30	0.03	< 0.50	5.30
MW11-4I	MW11-4I-REG-GW_20210309		2021-03-09	11.00 - 12.50	N	6.3	< 0.100	0.49	65.8	< 0.0200	27	0.117	36200	-	16.8	1.03	1140	< 0.0500	9370	1190	-	0.165	3.45	0.052	< 0.0100	218000	< 0.0100	< 0.300	0.025	< 0.500	5.3
MW11-4I	MW11-4I-20210816	MW11-4I-20210816	2021-08-16	11.00 - 12.50	N	6.00	< 0.10	0.53	66.40	< 0.02	25.00	0.04	31400.00	< 0.50	12.80	0.59	1170.00	< 0.05	8680.00	1150.00	-	0.14	3.46	0.05	< 0.01	202000.00	< 0.01	< 0.30	0.02	< 0.50	5.00
MW11-4I	MW11-4I-REG-GW_20210816		2021-08-16	11.00 - 12.50	N	6.0	< 0.10	0.53	66.4	< 0.020	25	0.0384	31400	-	12.8	0.59	1170	< 0.050	8680	1150	-	0.135	3.46	0.053	< 0.010	202000	< 0.010	< 0.30	0.017	< 0.50	5.0
MW11-4I	MW11-4I-REG-GW_20220316		2022-03-16	11.00 - 12.50	N	9.2	0.12	0.53	62.1	< 0.020	20	0.346	30700	-	8.69	1.22	1250	< 0.050	9430	908	-	0.166	3.13	0.052	< 0.010	194000	0.016	0.46	0.023	< 0.50	12.2
MW11-4I	MW11-4I-20220809		2022-08-09	11.00 - 12.50	N	54.7	0.27	0.96	65.2	< 0.020	24	0.366	29300	-	8.68	1.35	1280	0.076	8440	861	-	0.219	2.88	0.094	< 0.010	176000	0.019	< 2.40	0.037	0.91	8.0
MW11-4I	MW11-4I_20230327		2023-03-27	11.00 - 12.50	N	4.6	< 0.100	0.47	52.7	0.025	24	0.0987	26200	-	7.50	1.56	1050	< 0.0500	7230	792	-	0.200	2.58	0.075	< 0.0100	161000	< 0.0100	< 0.300	0.032	< 0.500	3.2
MW11-4I	MW11-4I-20230828		2023-08-28	11.00 - 12.50	N	5.6	< 0.100	0.48	47.3	< 0.0200	24	0.125	25700	-	9.30	1.17	1150	< 0.0500	7260	838	-	0.177	2.55	< 0.0500	< 0.0100	167000	< 0.0100	< 0.300	0.028	< 0.500	3.4
MW11-4D	MW11-4D-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	N	< 10.00	< 0.50	< 1.00	50.00	< 5.00	< 100.00	0.08	31000.00	< 0.50	4.55	< 1.00	543.00	< 1.00	8700.00	635.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	164000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-4D	MW11-4D_DUP-12-20160322	MW11-4D-20160322	2016-03-22	18.50 - 20.00	FD	< 10.00	< 0.50	< 1.00	50.00	< 5.00	< 100.00	0.09	30800.00	< 0.50	4.59	1.10	533.00	< 1.00	8580.00	625.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	163000.00	< 0.20	< 50.00	< 0.20	< 30.00	5.30
MW11-4D	MW11-4D-20160822	MW11-4D-20160822	2016-08-22	18.50 - 20.00	N	< 10.00	< 0.50	< 1.00	60.00	< 5.00	< 100.00	0.07	44200.00	< 0.50	5.05	< 1.00	3800.00	< 1.00	12800.00	859.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	156000.00	< 0.20	< 50.00	< 0.20	< 30.00	13.20
MW11-4D	MW11-4D-20170404	MW11-4D-20170404	2017-04-04	18.50 - 20.00	N	< 10.00	< 0.50	< 1.00	58.00	< 5.00	< 100.00	0.08	38800.00	< 0.50	3.63	2.60	3410.00	< 1.00	11700.00	734.00	< 0.20	< 1.00	< 5.00	< 1.00	< 0.05	150000.00	< 0.20	< 50.00	< 0.20	< 30.00	< 5.00
MW11-4D	MW11-4D-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	N	< 10.00	< 0.50	< 1.00	75.00	< 5.00	< 100.00	0.06	52200.00	< 0.50	4.89	3.00	6070.00	< 1.00	16200.00	994.00	-	< 1.00	< 5.00	< 1.00	< 0.05	147000.00	< 0.20	< 50.00	< 0.20	< 30.00	16.00
MW11-4D	MW11-4D_DUP-1-20170815	MW11-4D-20170815	2017-08-15	18.50 - 20.00	FD	< 10.00	< 0.50	< 1.00	75.00	< 5.00	< 100.00	0.06	52200.00	< 0.50	4.89	3.00	6070.00	< 1.00	16200.00	994.00	-	< 1.00	< 5.00	< 1.00	< 0.05	147000.00	< 0.20	< 50.00	< 0.20	< 30.00	16.00
MW11-4D	MW11-4D-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	N	4.40	< 0.10	0.59	72.10	< 0.10	22.00	0.10	41500.00	< 0.10	4.72	1.25	4220.00	< 0.05	13800.00	881.00	-	0.12	3.72	< 0.05	< 0.01	177000.00	< 0.01	< 0.30	0.02	< 0.50	3.10
MW11-4D	MW11-4D-REG-GW_20180419		2018-04-19	18.50 - 20.00	N	4.4	< 0.1	0.59	72.1	< 0.1	22	0.0953	41500	-	4.72	1.25	4220	< 0.05	13800	881	-	0.115	3.72	< 0.05	< 0.01	177000	< 0.01	< 0.3	0.018	< 0.5	3.1
MW11-4D	DUP-9-FD-GW_20180419	MW11-4D-REG-GW_20180419	2018-04-19	18.50 - 20.00	FD	4.2	< 0.1	0.59	71.6	< 0.1	22	0.0922	41400	-	4.61	1.24	4210	< 0.05	13600	852	-	0.113	3.65	< 0.05	< 0.01	172000	< 0.01	< 0.3	0.019	< 0.5	2.9
MW11-4D	MW11-4D_DUP-9-20180419	MW11-4D-20180419	2018-04-19	18.50 - 20.00	FD	4.20	< 0.10	0.59	71.60	< 0.10	22.00	0.09	41400.00	< 0.10	4.61	1.24	4210.00	< 0.05	13600.00	852.00	-	0.11	3.65	< 0.05	< 0.01	172000.00	< 0.01	< 0.30	0.02	< 0.50	2.90
MW11-4D	MW11-4D_20180820		2018-08-20	18.50 - 20.00	N	30.1	< 0.1	0.69	75.4	< 0.1	25	0.242	45600	-	6.91	1.76	3750	0.075	14200	1070	< 0.005	0.103	3.68	0.051	< 0.01	183000	< 0.01	< 1.5	0.015	< 0.5	9.7
MW11-4D	MW11-4D-20180820	MW11-4D-20180820	2018-08-20	18.50 - 20.00	N	30.10	< 0.10	0.69	75.40	< 0.10	25.00	0.24	45600.00	< 0.10	6.91	1.76	3750.00	0.08	14200.00	1070.00	< 0.01	0.10	3.68	0.05	< 0.01	183000.00	< 0.01	< 1.50	0.02	< 0.50	9.70
MW11-4D	MW11-4D-20190318	MW11-4D-20190318	2019-03-18	18.50 - 20.00	N	3.50	< 0.10	0.53	60.90	< 0.10	24.00	0.08	38400.00	0.10	5.57	0.61	3650.00	< 0.05	12600.00	802.00	-	0.07	2.56	< 0.05	0.03	167000.00	< 0.01	< 0.30	0.01	< 0.50	2.40
MW11-4D	MW11-4D-REG-GW_20190318_L2245600		2019-03-18	18.50 - 20.00	N	3.5	< 0.1	0.53	60.9	< 0.1	24	0.0789	38400	-	5.57	0.61	3650	< 0.05	12600	802	-	0.074	2.56	< 0.05	0.025	167000	< 0.01	< 0.3	0.014	< 0.5	2.4
MW11-4D	L2343824-6		2019-09-09	18.50 - 20.00	N	2.9	< 0.1	4.45	156	< 0.1	32	< 0.005	94900	-	0.87	< 0.2	3840	< 0.05	25800	1310	-	0.148	1.69	< 0.05	< 0.01	68000	< 0.01	< 0.3	0.012	< 0.5	< 1
MW11-4D	MW11-4D-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	N	2.90	< 0.10	4.45	156.00	< 0.10	32.00	< 0.01	94900.00	0.11	0.87	< 0.20	3840.00	< 0.05	25800.00	1310.00	-	0.15	1.69	< 0.05	< 0.01	68000.00	< 0.01	< 0.30	0.01	< 0.50	< 1.00
MW11-4D	L2343824-7	L2343824-6	2019-09-09	18.50 - 20.00	FD	5.2	< 0.1	0.64	71.6	< 0.1	23	0.0639	41400	-	6.64	0.72	4860	< 0.05	14000	911	-	0.092	2.64	0.053	< 0.01	172000	< 0.01	< 0.3	0.015	< 0.5	3.2
MW11-4D	MW11-4D_DUP-01-20190909	MW11-4D-20190909	2019-09-09	18.50 - 20.00	FD	5.20	< 0.10	0.64	71.60	< 0.10	23.00	0.06	41400.00	< 0.10	6.64	0.72	4860.00	< 0.05	14000.00	911.00	-	0.09	2.64	0.05	< 0.01	172000.00	< 0.01	< 0.30	0.02	< 0.50	3.20
MW3	MW3-20170202	MW3-20170202	2017-02-02	4.70 - 6.20	N	-	-	-	-	-	-	0.06	-	< 0.5	-	< 1	-	< 1	-	-	-	-	< 5	-	-	-	-	-	-	< 30	< 5
MW3	MW3-20180219	MW3-20180219	2018-02-19	4.70 - 6.20	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.89	-	< 0.05	-	-	-	-	0.97	-	-	-	-	-	-	< 0.5	3.30
MW3	MW3-20180508	MW3-20180508	2018-05-08	4.70 - 6.20	N	-	-	-	-	-	-	0.03	-	< 0.1	-	0.52	-	< 0.05	-	-	-	-	1.45	-	-	-	-	-	-	< 0.5	1.30
MW3	MW3-20180813	MW3-20180813	2018-08-13	4.70 - 6.20	N	-	-	-	-	-	-	0.05	-	< 0.1	-	0.39	-	< 0.05	-	-	-	-	2.24	-	-	-	-	-	-	< 0.5	1.90
MW3	MW3-20181119	MW3-20181119	2018-11-19	4.70 - 6.20	N	-	-	-	-	-	-	< 0.005	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	0.75	-	-	-	-	-	-	< 0.5	< 1
MW3	MW3-20190304	MW3-20190304	2019-03-04	4.70 - 6.20	N	-	-	-	-	-	-	< 0.005	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	1.18	-	-	-	-	-	-	< 0.5	< 1
MW3	MW3-20190507	MW3-20190507	2019-05-07	4.70 - 6.20	N	-	-	-	-	-	-	< 0.005	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	0.59	-	-	-	-	-	-	< 0.5	< 1
MW3	MW3-20190812	MW3-20190812	2019-08-12	4.70 - 6.20	N	-	-	-	-	-	-	< 0.005	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	0.86	-	-	-	-	-	-	< 0.5	< 1
MW3	MW3-20191116	MW3-20191116	2019-11-16	4.70 - 6.20	N	-	-	-	-	-	-	0.01	-	< 0.1	-	0.29	-	< 0.05	-	-	-	-	2.09	-	-	-	-	-	-	< 0.5	2.70
MW3	MW3-20200302	MW3-20200302	2020-03-02	4.70 - 6.20	N	-	-	-	-	-	-	< 0.05	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	1.31	-	-	-	-	-	-	< 0.5	< 1
MW3	MW3-20200512	MW3-20200512	2020-05-12	4.70 - 6.20	N	-	-	-	-	-	-	0.01	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	1.33	-	-	-	-	-	-	< 0.5	1.80
MW3	MW3-20200817	MW3-20200817	2020-08-17	4.70 - 6.20	N	-	-	-	-	-	-	< 0.05	-	< 0.5	-	0.25	-	< 0.05	-	-	-	-	0.75	-	-	-	-	-	-	< 0.5	< 0.5
MW3	MW3-20201202	MW3-20201202	2020-12-02	4.70 - 6.20	N	-	-	-	-	-	-	< 0.05	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	1.46	-	-	-	-	-	-	< 0.5	1.60
MW3	MW3_20230411		2023-04-11	4.70 - 6.20	N	< 1.00	< 0.100	0.18	23.4	< 0.0200	20	0.0097	94700	-	0.92	< 0.200	7620	< 0.0500	92800	2690	-	< 0.0500	2.05	< 0.0500	< 0.0100	35000	< 0.0100	< 0.300	0.154	< 0.500	1.7
MW3	MW3-20230824		2023-08-24	4.70 - 6.20	N	< 1.00	< 0.100	0.30	27.1	< 0.0200	21	0.0090	97600	-	0.49	< 0.200	17600	< 0.0500	103000	2370	-	< 0.0500	1.44	0.090	< 0.0100	38300	< 0.0100	< 0.300	0.116	< 0.500	1.5
MW5	MW5-20170202	MW5-20170202	2017-02-02	3.70 - 5.20	N	-	-	-	-	-	-	0.29	-	< 0.5	-	2.90	-	< 1	-	-	-	-	5.50	-	-	-	-	-	-	< 30	24.30
MW5	MW5-20180220	MW5-20180220	2018-02-20	3.70 - 5.20	N	-	-	-	-	-	-	0.17	-	0.15	-	4.87	-	0.13	-	-	-	-	2.64	-	-	-	-	-	-	< 0.5	11.00
MW5	MW5-20180509	MW5-20180509	2018-05-09	3.70 - 5.20	N	-	-	-	-	-	-	0.17	-	< 0.1	-	2.03	-	0.06	-	-	-	-	3.33	-	-	-	-	-	-	< 0.5	10.50
MW5	MW5-20180813	MW5-20180813

AECOM

TABLE 2-4
AREA 2 CONCENTRATIONS OF DISSOLVED METALS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Location	Sample ID	Parent Sample ID	Date	Screen Interval	Sample Type	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium (6+)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Sodium	Thallium	Titanium	Uranium	Vanadium	Zinc
Parameter																															
Units						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
CSR-SCH-3.2C3-GENWAT-MW						--	2500	125	5000	1000	12000	15	--	15	40	20	--	20	--	--	0.25	10000	83	20	15	--	3	1000	85	--	100
SSSLs Parkland Refinery						--	2500	125	5000	1000	12000	90	--	--	1100	62	--	1400	--	--	--	--	750	--	--	--	--	--	1000	--	900
Minimum RDL						1	0.1	0.1	0.1	0.02	10	0.005	50	0.1	0.1	0.2	10	0.05	5	0.1	0.005	0.05	0.5	0.05	0.01	50	0.01	0.3	0.01	0.5	0.5
MW5	MW5-20190812	MW5-20190812	2019-08-12	3.70 - 5.20	N	-	-	-	-	-	-	0.83	-	< 0.1	-	7.29	-	< 0.05	-	-	-	-	16.00	-	-	-	-	-	-	< 0.5	66.30
MW5	MW5-20191116	MW5-20191116	2019-11-16	3.70 - 5.20	N	-	-	-	-	-	-	1.09	-	< 0.1	-	12.90	-	< 0.05	-	-	-	-	20.00	-	-	-	-	-	-	< 0.5	93.50
MW5	MW5-20200302	MW5-20200302	2020-03-02	3.70 - 5.20	N	-	-	-	-	-	-	< 1	-	< 0.1	-	< 7.78	-	< 0.05	-	-	-	-	19.70	-	-	-	-	-	-	< 0.5	99.20
MW5	MW5-20200512	MW5-20200512	2020-05-12	3.70 - 5.20	N	-	-	-	-	-	-	0.80	-	< 0.1	-	8.80	-	< 0.05	-	-	-	-	15.40	-	-	-	-	-	-	< 0.5	79.30
MW5	MW5-20200817	MW5-20200817	2020-08-17	3.70 - 5.20	N	-	-	-	-	-	-	0.71	-	< 0.5	-	7.03	-	< 0.05	-	-	-	-	13.30	-	-	-	-	-	-	< 0.5	64.30
MW5	MW5-20201202	MW5-20201202	2020-12-02	3.70 - 5.20	N	-	-	-	-	-	-	0.61	-	< 0.1	-	< 7.04	-	< 0.05	-	-	-	-	12.00	-	-	-	-	-	-	< 0.5	61.60
MW5	MW5_20210818		2021-08-18	3.70 - 5.20	N	284	< 0.10	0.18	46.8	0.363	17	0.462	28900	-	20.8	3.96	65	< 0.050	6370	1680	-	< 0.050	9.65	0.056	< 0.010	40300	0.044	< 0.30	0.025	< 0.50	47.1
MW5	MW5-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	N	284	< 0.1	0.18	46.8	0.363	17	0.462	28900	< 0.5	20.8	3.96	65	< 0.05	6370	1680	-	< 0.05	9.65	0.056	< 0.01	40300	0.044	< 0.3	0.025	< 0.5	47.1
MW5	DUP-02_20210818	MW5_20210818	2021-08-18	3.70 - 5.20	FD	287	< 0.10	0.16	46.2	0.360	17	0.468	28000	-	20.7	4.03	65	< 0.050	6220	1700	-	< 0.050	9.63	0.064	0.011	40000	0.044	< 0.30	0.025	< 0.50	47.4
MW5	MW5_DUP-02-20210818	MW5-20210818	2021-08-18	3.70 - 5.20	FD	287.00	< 0.10	0.16	46.20	0.36	17.00	0.47	28000.00	< 0.50	20.70	4.03	65.00	< 0.05	6220.00	1700.00	-	< 0.05	9.63	0.06	0.01	40000.00	0.04	< 0.30	0.03	< 0.50	47.40
MW5	MW5_20230406		2023-04-06	3.70 - 5.20	N	79.0	0.10	0.15	46.4	0.155	12	0.188	29800	-	8.18	1.81	< 10.0	< 0.0500	4280	790	-	0.124	4.40	0.070	< 0.0100	31400	0.028	< 0.300	0.073	< 0.500	22.0
MW5	DUP-06_20230406	MW5_20230406	2023-04-06	3.70 - 5.20	FD	81.4	0.11	0.17	47.6	0.151	12	0.207	30900	-	8.36	1.83	< 10.0	< 0.0500	4280	779	-	0.119	4.55	< 0.0500	< 0.0100	30800	0.029	< 0.300	0.074	< 0.500	23.4
MW5	MW5-20230824		2023-08-24	3.70 - 5.20	N	66.8	0.11	0.17	49.4	0.094	17	0.242	33400	-	7.70	1.93	11	< 0.0500	5020	601	-	< 0.0500	5.30	0.085	< 0.0100	35900	0.033	< 0.300	0.080	< 0.500	20.8
U4-1	U4-1-20170202	U4-1-20170202	2017-02-02	6.40 - 9.45	N	-	-	-	-	-	-	< 0.05	-	< 0.5	-	< 1	-	< 1	-	-	-	-	< 5	-	-	-	-	-	-	< 30	< 5
U4-1	U4-1-20180219		2018-02-19	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.10	-	0.30	-	0.17	-	-	-	-	1.08	-	-	-	-	-	-	< 0.50	4.20
U4-1	U4-1-20180509	U4-1-20180509	2018-05-09	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.65	-	< 0.5	-	-	-	-	1.00	-	-	-	-	-	-	< 0.5	1.30
U4-1	U4-1-20180814	U4-1-20180814	2018-08-14	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.49	-	< 0.05	-	-	-	-	1.10	-	-	-	-	-	-	< 0.5	3.10
U4-1	U4-1-20181120	U4-1-20181120	2018-11-20	6.40 - 9.45	N	-	-	-	-	-	-	0.10	-	< 0.1	-	0.58	-	< 0.05	-	-	-	-	1.30	-	-	-	-	-	-	< 0.5	3.60
U4-1	U4-1-20190305	U4-1-20190305	2019-03-05	6.40 - 9.45	N	-	-	-	-	-	-	0.03	-	< 0.1	-	1.08	-	< 0.05	-	-	-	-	0.96	-	-	-	-	-	-	< 0.5	2.40
U4-1	U4-1-20190508	U4-1-20190508	2019-05-08	6.40 - 9.45	N	-	-	-	-	-	-	0.05	-	1.65	-	6.46	-	1.72	-	-	-	-	2.46	-	-	-	-	-	-	8.14	< 1
U4-1	U4-1-20190813	U4-1-20190813	2019-08-13	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.35	-	< 0.05	-	-	-	-	0.92	-	-	-	-	-	-	< 0.5	1.20
U4-1	U4-1-20191127	U4-1-20191127	2019-11-27	6.40 - 9.45	N	-	-	-	-	-	-	0.01	-	< 0.1	-	0.29	-	< 0.05	-	-	-	-	0.84	-	-	-	-	-	-	< 0.5	1.70
U4-1	U4-1-20200303	U4-1-20200303	2020-03-03	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.5	-	0.60	-	< 0.05	-	-	-	-	1.06	-	-	-	-	-	-	< 0.5	1.70
U4-1	U4-1-20200513	U4-1-20200513	2020-05-13	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.5	-	0.37	-	< 0.05	-	-	-	-	0.94	-	-	-	-	-	-	< 0.5	2.20
U4-1	U4-1-20200818	U4-1-20200818	2020-08-18	6.40 - 9.45	N	-	-	-	-	-	-	0.02	-	< 0.5	-	0.31	-	< 0.05	-	-	-	-	0.95	-	-	-	-	-	-	0.81	2.00
U4-1	U4-1-20201203	U4-1-20201203	2020-12-03	6.40 - 9.45	N	-	-	-	-	-	-	0.01	-	< 0.5	-	0.26	-	< 0.05	-	-	-	-	0.97	-	-	-	-	-	-	< 0.5	1.40
U4-1	U4-1_20230406		2023-04-06	6.40 - 9.45	N	6.1	< 0.100	< 0.100	7.73	< 0.0200	< 10.0	0.0154	5950	-	< 0.100	0.42	< 10.0	< 0.0500	5230	0.91	-	< 0.0500	0.90	< 0.0500	< 0.0100	4200	< 0.0100	< 0.300	< 0.0100	< 0.500	1.3
U4-1	U4-1-20230824		2023-08-24	6.40 - 9.45	N	2.0	< 0.100	< 0.100	9.22	< 0.0200	< 10.0	0.0274	8040	-	< 0.100	0.37	< 10.0	< 0.0500	6720	0.78	-	< 0.0500	0.98	0.122	< 0.0100	7200	< 0.0100	< 0.300	< 0.0100	< 0.500	1.8
U4-3	U4-3-20170202	U4-3-20170202	2017-02-02	8.70 - 11.70	N	-	-	-	-	-	-	< 0.05	-	< 0.5	-	< 1	-	< 0.1	-	-	-	-	< 5	-	-	-	-	-	-	< 30	< 5
U4-3	U4-3-20180220	U4-3-20180220	2018-02-20	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.73	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	4.10
U4-3	U4-3-20180509	U4-3-20180509	2018-05-09	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.44	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	1.40
U4-3	U4-3-20180813	U4-3-20180813	2018-08-13	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.91	-	< 0.05	-	-	-	-	0.55	-	-	-	-	-	-	< 0.5	3.30
U4-3	U4-3-20181120	U4-3-20181120	2018-11-20	8.70 - 11.70	N	-	-	-	-	-	-	0.05	-	< 0.1	-	0.33	-	< 0.5	-	-	-	-	0.51	-	-	-	-	-	-	< 0.5	3.00
U4-3	U4-3-20190305	U4-3-20190305	2019-03-05	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	< 0.2	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	1.40
U4-3	U4-3-20190508	U4-3-20190508	2019-05-08	8.70 - 11.70	N	-	-	-	-	-	-	0.03	-	0.18	-	1.60	-	0.28	-	-	-	-	0.65	-	-	-	-	-	-	0.98	4.30
U4-3	U4-3-20190813	U4-3-20190813	2019-08-13	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	0.23	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	< 1
U4-3	U4-3-20191127	U4-3-20191127	2019-11-27	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.1	-	1.10	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	1.70
U4-3	U4-3-20200303	U4-3-20200303	2020-03-03	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.5	-	< 0.2	-	< 0.05	-	-	-	-	< 0.5	-	-	-	-	-	-	< 0.5	1.30
U4-3	U4-3-20200513	U4-3-20200513	2020-05-13	8.70 - 11.70	N	-	-	-	-	-	-	0	-	< 0.5	-	< 0.2	-	< 0.05	-	-	-	-	4.75	-	-	-	-	-	-	< 0.5	2.80
U4-3	U4-3-20200818	U4-3-20200818	2020-08-18	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.5	-	0.27	-	< 0.05	-	-	-	-	0.54	-	-	-	-	-	-	0.68	2.70
U4-3	U4-3-20201203	U4-3-20201203	2020-12-03	8.70 - 11.70	N	-	-	-	-	-	-	0.02	-	< 0.5	-	0.23	-	0.54	-	-	-	-	0.55	-	-	-	-	-	-	< 0.5	2.10
U4-3	U4-3_20210818		2021-08-18	8.70 - 11.70	N	92.6	< 0.10	0.18	12.3	< 0.020	90	0.0215	27700	-	0.25	0.75	167	0.143	15200	21.8	-	0.098	0.58	0.102	< 0.010	19100	< 0.010	4.81	0.044	0.70	5.6
U4-3	U4-3-20210818	U4-3-20210818	2021-08-18	8.70 - 11.70	N	92.6	< 0.1	0.18	12.3	< 0.02	90	0.0215	27700	< 0.5	0.25	0.75	167	0.143	15200	21.8	-	0.098	0.58	0.102	< 0.01	19100	< 0.01	4.81	0.044	0.70	5.6
U4-3	U4-3_20230411		2023-04-11	8.70 - 11.70	N	1.7	0.11	< 0.100	12.0	< 0.0200	84	0.0179	26200	-	0.18	0.21	< 10.0	< 0.0500	14600	7.73	-	0.089	< 0.500	0.079	< 0.0100	18600	< 0.0100	< 0.300	0.030	< 0.500	3.9
U4-3	U4-3-20230828		2023-08-28	8.70 - 11.70	N	2.8	0.11	0.10	11.6	< 0.0200	97	0.0303	28400	-	0.60	0.86	< 10.0	< 0.0500	15600	17.7	-	0.123	0.80	< 0.0500	< 0.0100	20400	< 0.0100	< 0.300	0.036	< 0.500	5.7

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 14 Amendments, July 2022)
FD	Field duplicate sample
N	Normal environmental sample
mbgs	Metres below ground surface
mg/L	Milligrams per litre
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
-	Sample not analyzed for indicated parameter
--	No standard/guideline

Notes:
Exceeds BC CSR Schedule 3.2 - Aquatic Life - Marine Water
Exceeds Parkland Refinery Site Specific Screening Levels (SSSLs)
Detection Limit Exceeds Applicable Standard/Guideline

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	March 26, 2014							June 24-25 and July 7, 2014							September 29-30, 2014							December 15-17, 2014						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	234	14	0.16	0.03	1,578	0.00	0.00	248	15	0.15	0.03	1,578	0.00	0.00	256	8	0.05	0.01	1,578	0.00	0.00	280	24.3	0.34	0.06	1,578	0.00	0.00
UEIB-3/UEIB-53[14]	561	36	0.38	0.07	4,465	0.00	0.00	595	34	0.38	0.07	4,465	0.00	0.00	605	10	0.07	0.01	4,465	0.00	0.00	633	27.5	0.38	0.07	4,465	0.00	0.00
UEIB-4/UEIB-54[14]	334	13	0.17	0.03	154	0.00	0.00	346	12	0.13	0.02	153.92	0.00	0.00	353	6	0.02	0.00	153.92	0.00	0.00	383	30.4	0.47	0.09	153.92	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	311	4	0.04	0.01	5,644	0.00	0.00	315	4	0.05	0.01	5,644	0.00	0.00	316	0.2	0.00	0.00	5,644	0.00	0.00	320	4.7	0.07	0.01	5,644	0.00	0.00
UEIB-8/UEIB-48[14]	1,220	30	0.31	0.06	0.00	0.00	0.00	1,274	54	0.59	0.11	0.00	0.00	0.00	1,299	25	0.01	0.00	0.00	0.00	0.00	1,345	46.3	0.58	0.11	2.83	2.83	0.04
UEIB-9/UEIB-49[14]	1,904	68	0.78	0.14	0.00	0.00	0.00	1,970	66	0.96	0.18	0.00	0.00	0.00	2,020	50	0.44	0.08	0.00	0.00	0.00	2,104	84.3	1.05	0.19	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	792	N/A	N/A	N/A	0.00	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	86	1	0.01	0.00	825	0.00	0.00	90	4	0.04	0.01	825	0.00	0.00	91	0.3	0.00	0.00	825	0.00	0.00	92	1.1	0.02	0.00	825	0.00	0.00
UEIB-15	3,033	217	1.12	0.21	0.00	0.00	0.00	3,152	119	0.84	0.15	0.00	0.00	0.00	3,616	464	2.05	0.38	0.00	0.00	0.00	4,442	826.0	11.46	2.10	0.00	0.00	0.00
UEIB-16	3,536	1,460	18.42	3.38	0.00	0.00	0.00	4,053	516	4.68	0.86	0.00	0.00	0.00	4,679	626	1.65	0.30	0.00	0.00	0.00	5,294	615.0	9.58	1.76	0.00	0.00	0.00
UEIB-17	1,869	338	2.94	0.54	0.00	0.00	0.00	2,057	188	0.72	0.13	0.00	0.00	0.00	2,257	200	2.57	0.47	0.00	0.00	0.00	2,444	187.0	2.02	0.37	0.00	0.00	0.00
UEIB-18	2,593	357	2.42	0.44	0.00	0.00	0.00	2,826	233	2.31	0.42	0.00	0.00	0.00	3,002	177	1.93	0.35	0.00	0.00	0.00	3,374	371.9	4.25	0.78	0.00	0.00	0.00
UEIB-19	3,519	370	3.17	0.58	0.00	0.00	0.00	4,013	493	5.02	0.92	0.00	0.00	0.00	4,301	288	0.99	0.18	0.00	0.00	0.00	4,308	7.3	0.13	0.02	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	6,510	312	2.52	0.46	0.00	0.00	0.00	6,667	157	1.70	0.31	0.00	0.00	0.00	7,003	336	4.09	0.75	0.00	0.00	0.00	7,584	581.4	4.32	0.79	0.00	0.00	0.00
UEIB-21	5,065	655	8.26	1.52	0.00	0.00	0.00	6,581	1,516	4.12	0.76	0.00	0.00	0.00	6,924	343	5.70	1.05	0.00	0.00	0.00	7,647	723.5	8.90	1.63	0.00	0.00	0.00
UEIB-22	1,979	309	3.14	0.58	0.00	0.00	0.00	2,293	315	2.94	0.54	0.00	0.00	0.00	2,557	264	2.70	0.49	0.00	0.00	0.00	3,322	764.7	9.77	1.79	0.00	0.00	0.00
UEIB-23	1,465	376	4.72	0.87	0.00	0.00	0.00	1,946	482	4.54	0.83	0.00	0.00	0.00	2,453	507	6.03	1.11	0.00	0.00	0.00	4,145	1,692.0	24.26	4.45	0.00	0.00	0.00
UEIB-24	5,429	360	3.72	0.68	0.00	0.00	0.00	5,439	10	0.10	0.02	0.00	0.00	0.00	5,548	109	1.37	0.25	0.00	0.00	0.00	5,820	272.1	2.48	0.46	0.00	0.00	0.00
UEIB-25	3,317	434	3.99	0.73	0.00	0.00	0.00	3,317	0	0.76	0.14	0.00	0.00	0.00	3,598	281	3.75	0.69	0.00	0.00	0.00	4,126	527.8	7.16	1.31	0.00	0.00	0.00
UEIB-26	4,486	2,413	32.98	6.05	0.00	0.00	0.00	4,783	297	3.32	0.61	0.00	0.00	0.00	4,961	178	1.97	0.36	0.00	0.00	0.00	5,425	463.4	0.67	0.12	0.00	0.00	0.00
UEIB-27	3,563	506	4.96	0.91	0.00	0.00	0.00	3,918	355	3.48	0.64	0.00	0.00	0.00	4,412	493	8.08	1.48	0.00	0.00	0.00	5,512	1,100.7	12.45	2.28	0.00	0.00	0.00
UEIB-28	2,307	14	0.20	0.04	0.00	0.00	0.00	2,428	121	1.64	0.30	0.00	0.00	0.00	2,547	119	1.97	0.36	0.00	0.00	0.00	2,864	317.3	3.98	0.73	0.00	0.00	0.00
UEIB-29	5,604	679	7.07	1.30	0.00	0.00	0.00	5,937	334	2.57	0.47	0.00	0.00	0.00	6,185	248	2.95	0.54	0.00	0.00	0.00	6,621	435.6	3.30	0.60	0.00	0.00	0.00
UEIB-30	3,162	248	2.60	0.48	0.00	0.00	0.00	3,167	5	0.96	0.18	0.00	0.00	0.00	3,409	242	3.37	0.62	0.00	0.00	0.00	3,844	434.7	4.89	0.90	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	2,157	308	4.68	0.86	0.00	0.00	0.00	2,545	388	3.97	0.73	0.00	0.00	0.00	3,942	1,397	21.77	3.99	0.00	0.00	0.00	3,947	5.2	0.03	0.01	0.00	0.00	0.00
UEIB-32	2,966	91	0.79	0.14	39.34	10.94	0.13	3,071	105	1.17	0.21	44.62	5.27	0.04	3,177	105	1.04	0.19	44.62	0.00	0.00	3,315	138.2	1.53	0.28	44.62	0.00	0.00
UEIB-33	3,792	753	7.34	1.35	54.26	0.00	0.00	3,792	0	0.16	0.03	54.26	0.00	0.00	3,808	16	0.28	0.05	54.26	0.00	0.00	3,968	160.7	2.07	0.38	54.26	0.00	0.00
UEIB-34	3,057	253	2.70	0.49	0.00	0.00	0.00	3,472	415	4.28	0.79	0.00	0.00	0.00	3,952	480	4.48	0.82	24.02	24.02	0.26	4,337	385.2	3.40	0.62	40.07	16.06	0.20
UEIB-35	7,997	692	6.66	1.22	0.00	0.00	0.00	8,328	331	3.68	0.67	0.00	0.00	0.00	8,401	74	0.02	0.00	0.00	0.00	0.00	8,891	489.3	7.17	1.31	0.00	0.00	0.00
UEIB-36	3,264	242	2.75	0.50	0.00	0.00	0.00	3,498	234	2.60	0.48	0.00	0.00	0.00	3,833	335	3.51	0.64	16.77	16.77	0.23	4,193	359.6	3.04	0.56	33.16	16.39	0.20
UEIB-37[6]	1,892	454	4.83	0.89	0.00	0.00	0.00	2,207	315	3.49	0.64	0.00	0.00	0.00	3,359	1,152	17.29	3.17	0.00	0.00	0.00	3,926	566.8	5.70	1.05	0.00	0.00	0.00
UEIB-38	713	96	1.00	0.18	0.00	0.00	0.00	802	89	0.81	0.15	0.00	0.00	0.00	810	8	0.09	0.02	0.00	0.00	0.00	810	-	0.08	0.01	0.00	0.00	0.00
UEIB-39[6]	1,572	251	2.80	0.51	0.00	0.00	0.00	1,750	178	1.97	0.36	0.00	0.00	0.00	1,921	171	1.58	0.29	0.00	0.00	0.00	2,142	221.0	2.60	0.48	0.00	0.00	0.00
UEIB-40[6]	1,617	322	3.53	0.65	0.00	0.00	0.00	1,904	288	3.19	0.59	0.00	0.00	0.00	2,168	264	3.68	0.67	0.00	0.00	0.00	2,493	325.2	3.77	0.69	0.00	0.00	0.00
UEIB-41[6]	2,871	464	5.14	0.94	0.00	0.00	0.00	3,100	229	2.80	0.51	0.00	0.00	0.00	4,721	1,621	3.26	0.60	0.00	0.00	0.00	5,132	410.7	3.74	0.69	0.00	0.00	0.00
UEIB-42[6]	4,577	83	1.19	0.22	0.00	0.00	0.00	4,843	266	2.96	0.54	0.00	0.00	0.00	5,083	240	2.53	0.46	0.00	0.00	0.00	5,666	582.8	6.74	1.24	0.00	0.00	0.00
UEIB-43	6,242	1,044	10.87	1.99	0.00	0.00	0.00	6,533	291	8.10	1.49	0.00	0.00	0.00	7,879	1,346	10.70	1.96	0.00	0.00	0.00	8,870	991.8	9.22	1.69	0.00	0.00	0.00
UEIB-44	1,432	73	0.67	0.12	23.87	0.69	0.01	1,584	153	1.69	0.31	30.01	6.14	0.05	1,714	130	1.25	0.23	42.96	12.95	0.18	1,714	0.3	0.00	0.00	42.98	0.01	0.00
UEIB-45[8]	4,713	803	8.40	1.54	255.22	67.10	0.80	5,294	581	5.23	0.96	337.72	82.50	1.33	6,477	1,182	10.69	1.96	455.95	118.23	1.53	7,018	541.4	5.38	0.99	501.07	45.12	0.58
UEIB-46[9]	662	129	1.44	0.26	10.17	0.00	0.00	812	150	1.65	0.30	10.17	0.00	0.00	937	124	1.18	0.22	10.17	0.00	0.00	1,111	174.0	2.27	0.42	10.17	0.00	0.00
CPR-1[11]	2,806	393	3.49	0.64	155	20.58	0.17	2,969	163	2.87	1	155	0.00	0.00	2,970	1	0.02	0	155	0.06	0.00	3,330	359.4	4.67	0.86	170	14.88	0.18
CPR-2[11]	377	51	0.45	0.08	34	2.55	0.03	386	9	0.27	0	35	0.46	0.00	386	0	0.00	0	35	0.00	0.00	494	107.9	1.44	0.26	35	0.00	0.00
EX-1[11]	5,779	49	0.69	0.13	N/A	N/A	N/A	5,888	109	1.13	0	N/A	N/A	N/A	5,947	59	0.71	0	N/A	N/A	N/A	6,049	102.7	1.07	0.20	N/A	N/A	N/A
EX-2[11]	576	6	0.09	0.02	N/A	N/A	N/A	591	15	0.15	0	N/A	N/A	N/A	599	9	0.11	0	N/A	N/A	N/A	616	16.9	0.19	0.03	N/A	N/A	N/A
EX-3[11]	2,124	33	0.46	0.08	N/A	N/A	N/A	2,177	54	0.62	0	N/A	N/A	N/A	2,200	22	0.28	0	N/A	N/A	N/A	2,272	72.5	0.82	0.15	N/A	N/A	N/A
EX-4[11]	534	7	0.08	0.01	N/A	N/A	N/A	541	6	0.07	0	N/A	N/A	N/A	544	3	0.04	0	N/A	N/A	N/A	549	5.6	0.06	0.01	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	125755	15813	174	32	22127	102	1	135456	9700	95	17	22222	94	1	149167	13712	136	25	22394	172	2	164724	15556	178	33	22489	95	1

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	February 24-25, 2015							May 26-28, 2015						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	303	23.1	0.25	0.05	1,578	0.00	0.00	317	13.5	0.09	0.02	1,578	0.00	0.00
UEIB-3/UEIB-53[14]	648	15.0	0.13	0.02	4,465	0.00	0.00	653	4.9	0.00	0.00	4,465	0.00	0.00
UEIB-4/UEIB-54[14]	390	6.8	0.06	0.01	153.92	0.00	0.00	391	0.7	0.00	0.00	153.92	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	323	3.2	0.04	0.01	5,644	0.00	0.00	324	0.9	0.00	0.00	5,644	0.00	0.00
UEIB-8/UEIB-48[14]	1,431	85.8	1.03	0.19	6.80	3.97	0.07	1,467	36.1	0.20	0.04	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	2,159	55.0	0.58	0.11	0.00	0.00	0.00	2,222	63.3	0.57	0.10	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	792	N/A	N/A	N/A	0.00	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	93	1.7	0.02	0.00	825	0.00	0.00	94	0.5	0.00	0.00	825	0.00	0.00
UEIB-15	5,558	1,116.2	8.90	1.63	0.00	0.00	0.00	6,305	747.3	7.69	1.41	0.00	0.00	0.00
UEIB-16	5,298	4.4	0.01	0.00	0.00	0.00	0.00	5,299	0.3	0.01	0.00	0.00	0.00	0.00
UEIB-17	2,819	375.0	2.18	0.40	0.00	0.00	0.00	2,873	53.7	0.73	0.13	0.00	0.00	0.00
UEIB-18	3,788	413.9	5.72	1.05	0.00	0.00	0.00	4,272	483.9	5.71	1.05	0.00	0.00	0.00
UEIB-19	4,343	34.8	0.44	0.08	0.00	0.00	0.00	4,355	12.1	0.21	0.04	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	8,094	510.0	6.01	1.10	0.00	0.00	0.00	8,837	743.0	6.33	1.16	0.00	0.00	0.00
UEIB-21	8,362	714.7	6.83	1.25	0.00	0.00	0.00	8,850	488.3	6.69	1.23	0.00	0.00	0.00
UEIB-22	3,477	155.0	1.92	0.35	0.00	0.00	0.00	3,824	347.6	3.99	0.73	0.00	0.00	0.00
UEIB-23	4,598	452.7	5.76	1.06	0.00	0.00	0.00	4,942	344.2	4.88	0.90	0.00	0.00	0.00
UEIB-24	5,979	158.4	11.55	2.12	0.00	0.00	0.00	6,894	915.1	8.88	1.63	0.00	0.00	0.00
UEIB-25	4,672	546.5	3.69	0.68	0.00	0.00	0.00	4,965	293.0	3.21	0.59	0.00	0.00	0.00
UEIB-26	5,524	99.1	4.68	0.86	0.00	0.00	0.00	8,175	2,651.4	46.00	8.44	0.00	0.00	0.00
UEIB-27	6,042	529.4	1.41	0.26	0.00	0.00	0.00	6,540	498.7	4.46	0.82	0.00	0.00	0.00
UEIB-28	3,191	326.5	10.18	1.87	0.00	0.00	0.00	3,494	303.3	2.31	0.42	0.00	0.00	0.00
UEIB-29	7,007	386.4	3.88	0.71	0.00	0.00	0.00	7,706	698.6	5.00	0.92	0.00	0.00	0.00
UEIB-30	4,403	559.4	7.80	1.43	0.00	0.00	0.00	4,750	346.8	2.90	0.53	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	3,993	46.2	3.10	0.57	0.00	0.00	0.00	4,160	167.0	0.09	0.02	0.00	0.00	0.00
UEIB-32	3,442	127.5	1.46	0.27	44.62	0.00	0.00	3,544	102.0	1.06	0.19	44.62	0.00	0.00
UEIB-33	4,276	307.4	3.46	0.63	54.26	0.00	0.00	4,458	182.5	1.40	0.26	54.26	0.00	0.00
UEIB-34	4,703	365.8	4.35	0.80	40.07	0.00	0.00	4,970	266.4	2.75	0.50	40.07	0.00	0.00
UEIB-35	9,479	588.5	6.57	1.21	0.00	0.00	0.00	9,896	416.5	3.77	0.69	0.00	0.00	0.00
UEIB-36	4,326	132.7	1.57	0.29	33.16	0.00	0.00	4,392	66.4	1.07	0.20	33.16	0.00	0.00
UEIB-37[6]	4,443	517.1	5.87	1.08	0.00	0.00	0.00	4,521	77.2	0.72	0.13	0.00	0.00	0.00
UEIB-38	810	0.0	0.00	0.00	0.00	0.00	0.00	810	0.0	0.00	0.00	0.00	0.00	0.00
UEIB-39[6]	2,396	254.2	2.96	0.54	0.00	0.00	0.00	2,518	121.5	1.34	0.25	0.00	0.00	0.00
UEIB-40[6]	2,793	299.2	3.33	0.61	0.00	0.00	0.00	2,946	153.3	1.63	0.30	0.00	0.00	0.00
UEIB-41[6]	5,440	308.6	3.54	0.65	0.00	0.00	0.00	5,653	213.2	2.33	0.43	0.00	0.00	0.00
UEIB-42[6]	6,620	953.8	11.00	2.02	0.00	0.00	0.00	7,210	590.5	8.12	1.49	0.00	0.00	0.00
UEIB-43	9,694	824.1	9.74	1.79	0.00	0.00	0.00	9,760	65.8	0.00	0.00	0.00	0.00	0.00
UEIB-44	1,732	18.0	0.33	0.06	42.98	0.00	0.00	1,821	88.5	0.93	0.17	42.98	0.00	0.00
UEIB-45[8]	7,738	719.9	8.87	1.63	557.72	56.65	0.82	8,450	711.5	7.39	1.35	632.50	74.78	0.95
UEIB-46[9]	1,232	121.2	1.36	0.25	10.17	0.00	0.00	1,299	66.8	0.53	0.10	10.17	0.00	0.00
CPR-1[11]	3,558	228.4	3.00	0.55	170	0.00	0.00	3,680	122.5	1.22	0.22	170	0.00	0.00
CPR-2[11]	586	92.6	1.22	0.22	35	0.00	0.00	610	23.8	0.2	0.04	35	0.00	0.00
EX-1[11]	6,137	87.6	1.15	0.21	N/A	N/A	N/A	6,239	101.9	0.97	0.18	N/A	N/A	N/A
EX-2[11]	630	13.7	0.18	0.03	N/A	N/A	N/A	646	16.1	0.14	0.03	N/A	N/A	N/A
EX-3[11]	2,326	54.2	0.71	0.13	N/A	N/A	N/A	2,378	52.1	0.36	0.07	N/A	N/A	N/A
EX-4[11]	554	4.6	0.05	0.01	N/A	N/A	N/A	559	4.7	0.05	0.01	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	177362	12638	157	29	22550	61	1	190019	12657	146	27	22624	75	1

Extraction Well	August 11-13, 2015							November 16-19, 2015						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	317	0.1	0.00	0.00	1,578	0.00	0.00	326	9.3	0.12	0.02	1,578	0.00	0.00
UEIB-3/UEIB-53[14]	653	0.0	0.00	0.00	4,465	0.00	0.00	660	7.5	0.12	0.02	4,465	0.00	0.00
UEIB-4/UEIB-54[14]	391	0.0	0.00	0.00	154	0.00	0.00	391	0.4	0.01	0.00	154	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	324	0.1	0.00	0.00	5,644	0.00	0.00	327	2.8	0.04	0.01	5,644	0.00	0.00
UEIB-8/UEIB-48[14]	1,467	0.2	0.00	0.00	6.80	0.00	0.00	1,512	45.0	0.40	0.07	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	2,255	32.3	0.30	0.06	0.00	0.00	0.00	2,337	82.8	1.02	0.19	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	792	N/A	N/A	N/A	0.00	N/A	N/A	793	1.5	0.00	0.00	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	94	0.2	0.00	0.00	825	0.00	0.00	95	0.8	0.01	0.00	825	0.00	0.00
UEIB-15	7,443	1,137.6	2.62	0.48	0.00	0.00	0.00	7,540	97.5	2.31	0.42	0.00	0.00	0.00
UEIB-16	5,313	14.6	0.23	0.04	0.00	0.00	0.00	5,379	65.2	0.54	0.10	0.00	0.00	0.00
UEIB-17	3,149	276.3	4.87	0.89	0.00	0.00	0.00	3,524	375.0	2.62	0.48	0.00	0.00	0.00
UEIB-18	4,795	523.2	4.92	0.90	0.00	0.00	0.00	5,147	352.1	4.67	0.86	0.00	0.00	0.00
UEIB-19	5,232	876.8	3.61	0.66	0.00	0.00	0.00	5,589	356.8	1.34	0.25	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	9,712	874.6	8.34	1.53	0.00	0.00	0.00	10,734	1,022.7	10.62	1.95	0.00	0.00	0.00
UEIB-21	9,623	772.1	8.51	1.56	0.00	0.00	0.00	10,243	620.2	7.15	1.31	0.00	0.00	0.00
UEIB-22	3,981	157.2	1.37	0.25	0.00	0.00	0.00	4,203	221.1	2.58	0.47	0.00	0.00	0.00
UEIB-23	5,381	438.4	4.31	0.79	0.00	0.00	0.00	5,609	228.5	2.26	0.41	0.00	0.00	0.00
UEIB-24	7,546	652.4	3.45	0.63	0.00	0.00	0.00	7,974	428.2	4.91	0.90	0.00	0.00	0.00
UEIB-25	5,177	211.8	2.12	0.39	0.00	0.00	0.00	5,377	199.5	2.35	0.43	0.00	0.00	0.00
UEIB-26	8,339	164.1	1.61	0.30	0.00	0.00	0.00	8,628	289.1	3.78	0.69	0.00	0.00	0.00
UEIB-27	6,739	198.9	2.15	0.40	0.00	0.00	0.00	7,005	265.4	3.18	0.58	0.00	0.00	0.00
UEIB-28	3,594	99.9	1.22	0.22	0.00	0.00	0.00	3,749	155.2	2.24	0.41	0.00	0.00	0.00
UEIB-29	7,983	277.7	1.55	0.28	0.00	0.00	0.00	8,405	421.1	4.56	0.84	0.00	0.00	0.00
UEIB-30	5,006	256.1	3.30	0.61	0.00	0.00	0.00	5,011	5.3	0.01	0.00	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	4,237	76.9	0.74	0.14	0.00	0.00	0.00	4,455	218.1	2.52	0.46	0.00	0.00	0.00
UEIB-32	3,619	74.5	0.75	0.14	44.62	0.00	0.00	3,695	76.6	0.92	0.17	44.62	0.00	0.00
UEIB-33	4,528	69.3	0.69	0.13	54.26	0.00	0.00	4,718	190.0	2.70	0.50	54.26	0.00	0.00
UEIB-34	5,150	180.5	1.62	0.30	40.07	0.00	0.00	5,270	119.9	0.98	0.18	40.07	0.00	0.00
UEIB-35	10,162	266.0	2.64	0.48	0.00	0.00	0.00	10,419	257.1	3.24	0.59	0.00	0.00	0.00
UEIB-36	4,463	71.0	0.82	0.15	33.16	0.00	0.00	4,579	115.5	1.19	0.22	33.16	0.00	0.00
UEIB-37[6]	4,607	86.3	0.94	0.17	0.00	0.00	0.00	4,664	56.8	0.66	0.12	0.00	0.00	0.00
UEIB-38	814	3.5	0.05	0.01	0.00	0.00	0.00	852	37.7	0.42	0.08	0.00	0.00	0.00
UEIB-39[6]	2,619	101.5	1.02	0.19	0.00	0.00	0.00	2,700	80.6	1.01	0.19	0.00	0.00	0.00
UEIB-40[6]	3,080	133.8	1.34	0.25	0.00	0.00	0.00	3,213	133.7	1.60	0.29	0.00	0.00	0.00
UEIB-41[6]	5,872	218.1	2.35	0.43	0.00	0.00	0.00	6,090	218.2	2.61	0.48	0.00	0.00	0.00
UEIB-42[6]	7,883	673.1	6.75	1.24	0.00	0.00	0.00	8,471	587.8	7.03	1.29	0.00	0.00	0.00
UEIB-43	9,828	67.6	0.89	0.16	0.00	0.00	0.00	10,403	575.5	5.22	0.96	0.00	0.00	0.00
UEIB-44	1,893	71.8	0.69	0.13	42.98	0.00	0.00	1,942	49.0	0.53	0.10	42.98	0.00	0.00
UEIB-45[8]	8,982	532.4	6.14	1.13	688.13	55.63	0.71	9,386	403.6	4.46	0.82	728.20	40.07	0.42
UEIB-46[9]	1,354	55.2	0.52	0.10	10.17	0.00	0.00	1,437	83.2	0.93	0.17	10.17	0.00	0.00
CPR-1[11]	3,688	7.5	0.10	0.02	170	0.00	0.00	3,803	115.5	2.21	0.41	177	6.15	0.18
CPR-2[11]	610	0.0	0.0	0.00	35	0.00	0.00	641	31.4	0.6	0.11	36	1.57	0.04
EX-1[11]	6,327	87.9	0.91	0.17	N/A	N/A	N/A	6,441	113.8	1.30	0.24	N/A	N/A	N/A
EX-2[11]	658	11.9	0.13	0.02	N/A	N/A	N/A	676	18.2	0.22	0.04	N/A	N/A	N/A
EX-3[11]	2,427	48.1	0.49	0.09	N/A	N/A	N/A	2,506	79.2	0.99	0.18	N/A	N/A	N/A
EX-4[11]	562	3.5	0.04	0.01	N/A	N/A	N/A	566	4.3	0.05	0.01	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	199824	9805	84	15	22680	56	1	208643	8819	98	18	22728	48	1

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	February 1-3, 2016							May 30,31 June 8, 9, and 15, 2016							August 29-31, 2016							November 14, 16, and 17, 2016						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	340	14.0	0.17	0.03	1,578	0.00	0.00	350	9.6	0.09	0.02	1,578	0.00	0.00	356	5.9	0.05	0.01	1,578	0.00	0.00	365	9.8	0.14	0.03	1,578	0.00	0.00
UEIB-3/UEIB-53[14]	672	11.4	0.14	0.03	4,465	0.00	0.00	675	3.0	0.01	0.00	4,465	0.00	0.00	675	NA	0.01	0.00	4,465	N/A	N/A	675	NA	0.01	0.00	4,465	N/A	N/A
UEIB-4/UEIB-54[14]	392	1.1	0.01	0.00	154	0.00	0.00	393	0.5	0.00	0.00	154	0.00	0.00	394	1.2	0.02	0.00	154	0.00	0.00	399	5.4	0.07	0.01	154	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	329	1.6	0.02	0.00	5,644	0.00	0.00	330	0.8	0.01	0.00	5,644	0.00	0.00	330	0.7	0.01	0.00	5,644	0.00	0.00	332	1.5	0.02	0.00	5,644	0.00	0.00
UEIB-8/UEIB-48[14]	1,618	106.3	1.27	0.23	6.80	0.00	0.00	1,713	95.0	0.97	0.18	6.80	0.00	0.00	1,742	28.8	0.09	0.02	6.80	0.00	0.00	1,793	50.4	0.79	0.14	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	2,419	81.3	0.89	0.16	0.00	0.00	0.00	2,483	64.5	0.64	0.12	0.00	0.00	0.00	2,530	46.3	0.45	0.08	0.00	0.00	0.00	2,574	44.7	0.59	0.11	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	803	10.1	0.11	0.02	0.00	0.00	0.00	811	7.7	0.09	0.02	0.00	0.00	0.00	819	8.5	0.10	0.02	0.00	0.00	0.00	831	11.9	0.16	0.03	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A
UEIB-15	7,709	168.7	2.42	0.44	0.00	0.00	0.00	7,891	182.0	1.37	0.25	0.00	0.00	0.00	8,671	780.1	12.38	2.27	0.00	0.00	0.00	9,013	342.0	4.28	0.79	0.00	0.00	0.00
UEIB-16	5,707	328.6	4.00	0.73	0.00	0.00	0.00	5,951	243.9	2.11	0.39	0.00	0.00	0.00	6,163	211.8	2.58	0.47	0.00	0.00	0.00	6,430	267.4	2.97	0.55	0.00	0.00	0.00
UEIB-17	3,875	350.9	3.83	0.70	0.00	0.00	0.00	4,000	125.0	1.63	0.30	0.00	0.00	0.00	4,131	130.8	1.18	0.22	0.00	0.00	0.00	4,686	555.5	8.65	1.59	0.00	0.00	0.00
UEIB-18	5,568	420.7	4.48	0.82	0.00	0.00	0.00	5,939	370.8	3.55	0.65	0.00	0.00	0.00	6,201	262.2	2.90	0.53	0.00	0.00	0.00	6,568	367.4	4.66	0.86	0.00	0.00	0.00
UEIB-19	5,798	209.0	2.63	0.48	0.00	0.00	0.00	6,053	254.9	2.55	0.47	0.00	0.00	0.00	6,422	369.2	4.74	0.87	0.00	0.00	0.00	6,574	152.4	0.54	0.10	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	11,244	510.1	5.17	0.95	0.00	0.00	0.00	11,766	521.6	5.87	1.08	0.00	0.00	0.00	12,223	457.3	4.66	0.86	0.00	0.00	0.00	12,384	160.3	-	0.00	0.00	0.00	0.00
UEIB-21	10,371	128.1	2.21	0.40	0.00	0.00	0.00	10,371	0.0	0.00	0.00	0.00	0.00	0.00	10,633	262.3	6.36	1.17	0.00	0.00	0.00	11,282	649.1	9.14	1.68	0.00	0.00	0.00
UEIB-22	4,494	291.4	3.12	0.57	0.00	0.00	0.00	4,735	240.7	2.30	0.42	0.00	0.00	0.00	4,794	59.8	0.28	0.05	0.00	0.00	0.00	5,009	214.7	3.43	0.63	0.00	0.00	0.00
UEIB-23	5,948	339.3	4.08	0.75	0.00	0.00	0.00	6,100	151.3	1.38	0.25	0.00	0.00	0.00	6,150	50.1	0.36	0.07	0.00	0.00	0.00	6,268	118.4	1.78	0.33	0.00	0.00	0.00
UEIB-24	8,325	351.2	3.37	0.62	0.00	0.00	0.00	8,617	291.7	3.22	0.59	0.00	0.00	0.00	9,061	443.7	5.45	1.00	0.00	0.00	0.00	9,339	278.3	2.83	0.52	0.00	0.00	0.00
UEIB-25	5,733	356.8	4.59	0.84	0.00	0.00	0.00	6,134	401.0	4.11	0.75	0.00	0.00	0.00	6,379	244.4	2.15	0.39	0.00	0.00	0.00	6,578	199.7	2.43	0.45	0.00	0.00	0.00
UEIB-26	9,030	401.3	4.41	0.81	0.00	0.00	0.00	9,304	274.3	2.79	0.51	0.00	0.00	0.00	9,522	218.1	2.23	0.41	0.00	0.00	0.00	9,857	334.9	4.94	0.91	0.00	0.00	0.00
UEIB-27	7,381	376.4	3.16	0.58	0.00	0.00	0.00	7,570	188.4	1.86	0.34	0.00	0.00	0.00	8,076	506.7	7.09	1.30	0.00	0.00	0.00	8,225	148.5	0.06	0.01	0.00	0.00	0.00
UEIB-28	4,111	361.8	4.74	0.87	0.00	0.00	0.00	4,472	360.7	3.80	0.70	0.00	0.00	0.00	4,706	234.1	2.07	0.38	0.00	0.00	0.00	4,978	272.3	2.72	0.50	0.00	0.00	0.00
UEIB-29	8,665	260.7	2.21	0.40	0.00	0.00	0.00	8,840	174.4	1.96	0.36	0.00	0.00	0.00	9,642	802.4	10.53	1.93	0.00	0.00	0.00	10,612	969.7	12.47	2.29	0.00	0.00	0.00
UEIB-30	5,024	12.4	0.18	0.03	0.00	0.00	0.00	5,113	89.1	0.97	0.18	0.00	0.00	0.00	5,160	46.8	0.42	0.08	0.00	0.00	0.00	5,445	285.6	4.10	0.75	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	4,667	211.4	2.29	0.42	0.00	0.00	0.00	4,667	0.0	0.00	0.00	0.00	0.00	0.00	4,667	0.0	0.00	0.00	0.00	0.00	0.00	4,667	0.0	0.00	0.00	0.00	0.00	0.00
UEIB-32	3,803	107.7	1.24	0.23	44.62	0.00	0.00	3,901	97.8	1.07	0.20	44.62	0.00	0.00	3,986	85.4	0.89	0.16	44.62	0.00	0.00	4,079	93.1	1.28	0.23	44.62	0.00	0.00
UEIB-33	5,039	321.2	3.76	0.69	54.26	0.00	0.00	5,228	188.9	1.82	0.33	54.26	0.00	0.00	5,341	113.7	0.99	0.18	54.26	0.00	0.00	5,489	148.1	1.97	0.36	54.26	0.00	0.00
UEIB-34	5,376	106.1	1.19	0.22	40.07	0.00	0.00	5,447	71.1	0.71	0.13	40.07	0.00	0.00	5,521	74.0	0.93	0.17	40.07	0.00	0.00	5,618	96.6	1.24	0.23	40.07	0.00	0.00
UEIB-35	10,964	545.2	6.42	1.18	0.00	0.00	0.00	11,335	371.5	3.74	0.69	0.00	0.00	0.00	11,605	269.5	2.75	0.50	0.00	0.00	0.00	11,914	309.2	4.10	0.75	0.00	0.00	0.00
UEIB-36	4,591	12.3	0.16	0.03	33.16	0.00	0.00	4,591	0.0	0.00	0.00	33.16	0.00	0.00	4,592	1.3	0.02	0.00	33.16	0.00	0.00	4,689	96.6	1.27	0.23	33.16	0.00	0.00
UEIB-37[6]	4,747	82.9	0.93	0.17	0.00	0.00	0.00	4,797	50.2	0.49	0.09	0.00	0.00	0.00	4,847	50.1	0.57	0.10	0.00	0.00	0.00	4,908	61.3	0.79	0.14	0.00	0.00	0.00
UEIB-38	901	49.5	0.56	0.10	0.00	0.00	0.00	942	40.5	0.42	0.08	0.00	0.00	0.00	980	38.4	0.44	0.08	0.00	0.00	0.00	1,038	58.1	0.79	0.14	0.00	0.00	0.00
UEIB-39[6]	2,867	166.9	2.00	0.37	0.00	0.00	0.00	2,980	113.6	1.13	0.21	0.00	0.00	0.00	3,018	37.7	0.30	0.05	0.00	0.00	0.00	3,022	3.8	0.05	0.01	0.00	0.00	0.00
UEIB-40[6]	3,345	131.5	1.44	0.26	0.00	0.00	0.00	3,501	155.9	2.02	0.37	0.00	0.00	0.00	3,682	181.4	1.93	0.35	0.00	0.00	0.00	3,813	131.0	1.50	0.28	0.00	0.00	0.00
UEIB-41[6]	6,398	308.5	3.59	0.66	0.00	0.00	0.00	6,404	5.5	0.06	0.01	0.00	0.00	0.00	6,643	239.5	3.05	0.56	0.00	0.00	0.00	8,580	1,937.0	4.26	0.78	0.00	0.00	0.00
UEIB-42[6]	9,225	754.2	8.40	1.54	0.00	0.00	0.00	9,958	732.2	8.04	1.48	0.00	0.00	0.00	10,600	642.8	6.81	1.25	0.00	0.00	0.00	11,114	513.9	6.46	1.19	0.00	0.00	0.00
UEIB-43	10,700	296.7	3.70	0.68	0.00	0.00	0.00	11,035	334.6	2.78	0.51	0.00	0.00	0.00	11,035	0.4	0.01	0.00	0.00	0.00	0.00	11,071	35.8	0.51	0.09	0.00	0.00	0.00
UEIB-44	1,992	50.2	0.59	0.11	42.98	0.00	0.00	2,041	49.4	0.54	0.10	42.98	0.00	0.00	2,082	40.5	0.42	0.08	42.98	0.00	0.00	2,166	84.6	1.22	0.22	42.98	0.00	0.54
UEIB-45[8]	9,820	434.1	4.89	0.90	762.56	34.36	0.45	10,240	420.6	4.53	0.83	817.36	54.80	6.87	10,695	454.7	2.85	0.52	866.97	49.61	0.54	10,995	300.0	3.84	0.70	893.55	26.58	0.34
UEIB-46[9]	1,550	112.8	1.23	0.23	10.17	0.00	0.00	1,600	49.8	0.35	0.06	10.17	0.00	0.00	1,671	71.0	1.12	0.21	12.47	2.30	0.03	1,774	103.1	1.37	0.25	16.23	3.76	0.05
CPR-1[11]	4,333	529.8	3.88	0.71	177	0.00	0.00	4,347	14.1	0.07	0.01	203.60	27.09	0.47	4,349	1.3	0.00	0.00	203.60	0.00	0.00	4,363	14.2	0.17	0.03	203.60	0.00	0.00
CPR-2[11]	720	79.0	0.67	0.12	36	0.00	0.00	720	0.0	0.00	0.00	40.17	3.95	0.07	720	0.0	0.00	0.00	40.17	0.00	0.00	1,050	329.1	3.87	0.71	40.17	0.00	0.00
EX-1[11]	6,558	117.5	1.28	0.24	N/A	N/A	N/A	6,640	81.8	0.86	0.16	N/A	N/A	N/A	6,709	68.6	0.82	0.15	N/A	N/A	N/A	6,760	50.9	0.60	0.11	N/A	N/A	N/A
EX-2[11]	699	22.4	0.25	0.05	N/A	N/A	N/A	718	19.4	0.21	0.04	N/A	N/A	N/A	732	14.4	0.15	0.03	N/A	N/A	N/A	772	39.6	0.47	0.09	N/A	N/A	N/A
EX-3[11]	2,603	97.2	1.13	0.21	N/A	N/A	N/A	2,651	47.8	0.53	0.10	N/A	N/A	N/A	2,678	26.8	0.28	0.05	N/A	N/A	N/A	2,713	35.5	0.42	0.08	N/A	N/A	N/A
EX-4[11]	571	5.0	0.05	0.01	N/A	N/A	N/A	576	4.3	0.05	0.01	N/A	N/A	N/A	579	3.7	0.04	0.01	N/A	N/A	N/A	583	3.2	0.04	0.01	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	218278	9635	107	20	22762	34	0	225178	6900	71	13	22848	86	7	232765	7587	90	17	22900	52	1	242650	9885	103	19	22930	30	1

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Feburary 20, 21, and 22, 2017							June 12-14, 2017							September 12-14, 2017							December 4-7, 2017						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)
UEIB-1 [1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2 [2]/UEIB-52 [14]	380	14.1	0.15	0.03	1,578	0.00	0.00	392	12.5	0.11	0.02	1,578	0.00	0.00	392	0.0	0.00	0.00	1,578	0.00	0.00	435	43.1	0.69	0.13	1,578	0.00	0.00
UEIB-3/UEIB-53 [14]	675	NA	0.01	0.00	4,465	N/A	N/A	675	NA	NA	NA	4,465	N/A	N/A	675	NA	NA	NA	4,465	N/A	N/A	696	21.8	0.33	0.06	4,465	0.00	0.00
UEIB-4/UEIB-54 [14]	408	8.8	0.06	0.01	154	0.00	0.00	413	5.2	0.02	0.00	154	0.00	0.00	413	0.0	0.00	0.00	154	0.00	0.00	457	43.5	0.44	0.08	154	0.00	0.00
UEIB-5 [8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6 [9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47 [14]	333	0.9	0.01	0.00	5,644	0.00	0.00	335	1.8	0.02	0.00	5,644	0.00	0.00	335	0.1	0.00	0.00	5,644	0.00	0.00	340	5.5	0.11	0.02	5,644	0.00	0.00
UEIB-8/UEIB-48 [14]	1,889	96.0	1.07	0.20	6.80	0.00	0.00	1,976	87.8	0.75	0.14	6.80	0.00	0.00	1,976	-	-	0.00	6.80	0.00	0.00	2,098	121.5	1.80	0.33	6.80	0.00	0.00
UEIB-9/UEIB-49 [14]	2,621	46.5	0.48	0.09	0.00	0.00	0.00	2,675	54.3	0.50	0.09	0.00	0.00	0.00	2,695	19.7	0.18	0.03	0.00	0.00	0.00	2,760	65.1	0.87	0.16	0.00	0.00	0.00
UEIB-10 [4]/UEIB-50 [14]	846	14.7	0.16	0.03	0.00	0.00	0.00	867	20.6	0.19	0.03	0.00	0.00	0.00	869	2.1	0.02	0.00	0.00	0.00	0.00	925	56.0	0.89	0.16	0.00	0.00	0.00
UEIB-11 [3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14 [1,4]/UEIB-51 [14]	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A
UEIB-15	9,479	465.7	5.43	1.00	0.00	0.00	0.00	10,223	743.9	7.19	1.32	0.00	0.00	0.00	10,385	162.8	2.18	0.40	0.00	0.00	0.00	10,579	193.3	2.65	0.49	0.00	0.00	0.00
UEIB-16	6,996	565.5	5.50	1.01	0.00	0.00	0.00	7,093	97.7	0.85	0.16	0.00	0.00	0.00	7,356	262.4	3.35	0.61	0.00	0.00	0.00	7,633	276.7	3.43	0.63	0.00	0.00	0.00
UEIB-17	5,168	481.8	3.76	0.69	0.00	0.00	0.00	5,390	222.0	3.09	0.57	0.00	0.00	0.00	5,514	124.3	1.13	0.21	0.00	0.00	0.00	5,847	332.5	5.10	0.94	0.00	0.00	0.00
UEIB-18	7,015	446.2	4.87	0.89	0.00	0.00	0.00	7,482	467.9	4.21	0.77	0.00	0.00	0.00	7,738	256.0	2.27	0.42	0.00	0.00	0.00	8,355	616.0	8.36	1.53	0.00	0.00	0.00
UEIB-19	7,097	522.3	5.44	1.00	0.00	0.00	0.00	7,550	453.1	4.30	0.79	0.00	0.00	0.00	7,724	174.1	1.69	0.31	0.00	0.00	0.00	7,990	266.7	3.85	0.71	0.00	0.00	0.00
UEIB-20/UEIB-56 [14]	12,384	-	-	0.00	0.00	0.00	0.00	12,384	-	-	0.00	0.00	0.00	0.00	12,384	N/A	N/A	0.00	0.00	0.00	0.00	12,384	N/A	N/A	0.00	0.00	0.00	0.00
UEIB-21	12,218	935.4	8.50	1.56	0.00	0.00	0.00	12,837	619.7	6.79	1.25	0.00	0.00	0.00	13,407	569.7	5.53	1.01	0.00	0.00	0.00	13,889	482.2	6.52	1.20	0.00	0.00	0.00
UEIB-22	5,254	245.0	2.95	0.54	0.00	0.00	0.00	7,155	1,900.6	2.40	0.44	0.00	0.00	0.00	7,244	89.5	0.86	0.16	0.00	0.00	0.00	7,413	169.2	2.58	0.47	0.00	0.00	0.00
UEIB-23	6,562	294.1	3.76	0.69	0.00	0.00	0.00	6,789	227.0	1.42	0.26	0.00	0.00	0.00	6,819	29.4	0.34	0.06	0.00	0.00	0.00	6,855	36.7	0.48	0.09	0.00	0.00	0.00
UEIB-24	9,414	74.9	0.07	0.01	0.00	0.00	0.00	9,504	90.3	1.27	0.23	0.00	0.00	0.00	9,677	172.8	2.07	0.38	0.00	0.00	0.00	9,942	265.1	3.33	0.61	0.00	0.00	0.00
UEIB-25	6,815	236.2	2.54	0.47	0.00	0.00	0.00	7,078	263.7	2.64	0.48	0.00	0.00	0.00	7,263	184.2	2.12	0.39	0.00	0.00	0.00	7,441	178.3	2.29	0.42	0.00	0.00	0.00
UEIB-26	10,400	543.6	5.46	1.00	0.00	0.00	0.00	10,725	324.1	2.87	0.53	0.00	0.00	0.00	10,844	119.6	1.34	0.25	0.00	0.00	0.00	10,991	147.0	2.11	0.39	0.00	0.00	0.00
UEIB-27	8,451	226.1	2.69	0.49	0.00	0.00	0.00	9,086	635.5	8.85	1.62	0.00	0.00	0.00	9,660	574.1	6.72	1.23	0.00	0.00	0.00	11,202	1,541.7	26.03	4.78	0.00	0.00	0.00
UEIB-28	5,157	178.9	1.48	0.27	0.00	0.00	0.00	5,333	175.9	1.05	0.19	0.00	0.00	0.00	5,351	17.8	0.24	0.04	0.00	0.00	0.00	5,446	95.4	1.46	0.27	0.00	0.00	0.00
UEIB-29	11,376	764.6	5.47	1.00	0.00	0.00	0.00	11,636	259.5	3.41	0.63	0.00	0.00	0.00	11,662	25.6	0.29	0.05	0.00	0.00	0.00	11,987	325.3	3.06	0.56	0.00	0.00	0.00
UEIB-30	5,983	538.0	6.07	1.11	0.00	0.00	0.00	6,577	593.4	5.65	1.04	0.00	0.00	0.00	6,922	345.1	3.91	0.72	0.00	0.00	0.00	6,992	70.2	1.29	0.24	0.00	0.00	0.00
UEIB-31/UEIB-55 [14]	4,667	-	0.00	0.00	0.00	0.00	0.00	4,667	-	0.00	0.00	0.00	0.00	0.00	4,668	1.1	0.00	0.00	0.00	0.00	0.00	4,733	65.5	0.90	0.16	0.00	0.00	0.00
UEIB-32	4,160	80.6	0.75	0.14	44.62	0.00	0.00	4,281	120.5	1.10	0.20	44.62	0.00	0.00	4,358	77.0	0.95	0.17	44.62	0.00	0.00	4,423	65.2	0.83	0.15	44.62	0.00	0.00
UEIB-33	5,809	320.1	3.36	0.62	54.26	0.00	0.00	6,078	268.8	2.31	0.42	54.26	0.00	0.00	6,155	77.0	0.82	0.15	54.26	0.00	0.00	6,275	119.3	1.88	0.34	54.26	0.00	0.00
UEIB-34	5,646	28.4	0.38	0.07	40.07	0.00	0.00	5,694	48.3	0.48	0.09	40.07	0.00	0.00	5,761	66.7	0.81	0.15	40.07	0.00	0.00	7,599	1,838.0	1.12	0.21	40.07	0.00	0.00
UEIB-35	12,276	362.0	3.58	0.66	0.00	0.00	0.00	12,577	300.8	2.83	0.52	0.00	0.00	0.00	12,655	77.7	0.82	0.15	0.00	0.00	0.00	12,775	120.5	1.61	0.29	0.00	0.00	0.00
UEIB-36	4,807	117.8	1.02	0.19	33.16	0.00	0.00	4,937	130.0	1.04	0.19	33.16	0.00	0.00	5,055	117.8	1.38	0.25	33.16	0.00	0.00	5,163	108.9	1.30	0.24	33.16	0.00	0.00
UEIB-37 [6]	4,963	54.5	0.50	0.09	0.00	0.00	0.00	5,037	74.5	0.59	0.11	0.00	0.00	0.00	5,071	34.1	0.37	0.07	0.00	0.00	0.00	5,103	31.9	0.41	0.08	0.00	0.00	0.00
UEIB-38	1,067	28.8	0.19	0.04	0.00	0.00	0.00	1,093	26.2	0.37	0.07	0.00	0.00	0.00	1,127	34.4	0.40	0.07	0.00	0.00	0.00	1,168	40.5	0.52	0.10	0.00	0.00	0.00
UEIB-39 [6]	3,530	508.4	7.60	1.39	0.00	0.00	0.00	3,937	407.0	1.39	0.26	0.00	0.00	0.00	3,998	60.9	0.66	0.12	0.00	0.00	0.00	4,097	98.7	1.36	0.25	0.00	0.00	0.00
UEIB-40 [6]	3,953	139.8	1.34	0.25	0.00	0.00	0.00	4,087	133.8	1.30	0.24	0.00	0.00	0.00	4,166	79.0	0.89	0.16	0.00	0.00	0.00	4,227	61.1	0.75	0.14	0.00	0.00	0.00
UEIB-41 [6]	8,757	176.5	2.10	0.38	0.00	0.00	0.00	8,961	203.8	1.89	0.35	0.00	0.00	0.00	9,091	130.7	1.51	0.28	0.00	0.00	0.00	9,250	159.0	2.13	0.39	0.00	0.00	0.00
UEIB-42 [6]	11,470	356.1	2.92	0.53	0.00	0.00	0.00	11,932	461.4	4.73	0.87	0.00	0.00	0.00	12,181	249.0	2.96	0.54	0.00	0.00	0.00	12,637	456.1	6.16	1.13	0.00	0.00	0.00
UEIB-43	11,912	841.3	10.77	1.98	0.00	0.00	0.00	13,068	1,156.0	11.73	2.15	0.00	0.00	0.00	14,187	1,118.8	13.13	2.41	0.00	0.00	0.00	15,056	869.4	10.95	2.01	0.00	0.00	0.00
UEIB-44	2,242	75.9	0.51	0.09	42.98	0.00	0.00	2,317	74.7	0.71	0.13	42.98	0.00	0.00	2,356	38.8	0.45	0.08	42.98	0.00	0.00	2,390	34.5	0.43	0.08	42.98	0.00	0.00
UEIB-45 [8]	11,444	449.3	5.13	0.94	933.44	39.89	0.41	12,038	594.2	5.75	1.06	1,000.33	66.89	0.59	12,623	584.9	6.90	1.27	1,062.25	61.93	0.69	13,018	394.3	4.74	0.87	1,103.64	41.39	0.49
UEIB-46 [9]	1,891	117.5	1.32	0.24	16.23	0.00	0.00	2,013	121.7	1.17	0.21	16.23	0.00	0.00	2,073	59.7	0.60	0.11	16.23	0.00	0.00	2,109	36.4	0.52	0.10	16.23	0.00	0.00
CPR-1 [11]	4,439	75.6	1.13	0.21	203.60	0.00	0.00	4,507	68.9	0.54	0.10	203.60	0.00	0.00	4,508	0.1	0.00	0.00	203.60	0.00	0.00	4,710	202.8	2.91	0.53	203.60	0.00	0.00
CPR-2 [11]	1,260	210.3	2.21	0.41	40.17	0.00	0.00	1,480	220.4	2.20	0.40	40.17	0.00	0.00	1,480	0.0	0.00	0.00	40.17	0.00	0.00	1,514	33.6	0.48	0.09	40.17	0.00	0.00
EX-1 [11]	6,826	66.6	0.66	0.12	N/A	N/A	N/A	6,909	82.6	0.83	0.15	N/A	N/A	N/A	6,974	65.0	0.74	0.14	N/A	N/A	N/A	7,034	60.2	0.76	0.14	N/A	N/A	N/A
EX-2 [11]	826	53.8	0.58	0.11	N/A	N/A	N/A	868	42.4	0.42	0.08	N/A	N/A	N/A	883	15.0	0.18	0.03	N/A	N/A	N/A	924	41.2	0.56	0.10	N/A	N/A	N/A
EX-3 [11]	2,764	50.8	0.52	0.10	N/A	N/A	N/A	2,810	45.8	0.46	0.08	N/A	N/A	N/A	2,831	21.0	0.25	0.04	N/A	N/A	N/A	2,871	40.3	0.54	0.10	N/A	N/A	N/A
EX-4 [11]	588	5.2	0.06	0.01	N/A	N/A	N/A	593	5.2	0.05	0.01	N/A	N/A	N/A	596	3.0	0.03	0.01	N/A	N/A	N/A	599	3.3	0.04	0.01	N/A	N/A	N/A
U2-5 [11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	253469	10819	113	21	22970	40	0	265312	11844	99	18	23037	67	1	271354	6041	68	12	23099	62	1	281587	10233	119	22	23140	41	0

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
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AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	March 26-29, 2018							June 12-18, 2018							Sept 4-6, 2018							Nov 19-21, 2018						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)
UEIB-1 [1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2 [2]/UEIB-52 [14]	538	102.7	1.05	0.19	1,578	0.00	0.00	609	70.8	0.53	0.10	1,578	0.00	0.00	630	21.2	0.21	0.04	1,578	0.00	0.00	667	36.7	0.59	0.11	1,578	0.00	0.00
UEIB-3/UEIB-53 [14]	739	42.2	0.43	0.08	4,468	2.38	0.02	769	30.1	0.27	0.05	4,470	2.79	0.02	785	16.5	0.20	0.04	4,471	0.72	0.01	804	18.7	0.26	0.05	4,471	0.00	0.00
UEIB-4/UEIB-54 [14]	525	68.2	0.61	0.11	158	3.90	0.03	580	54.9	0.32	0.06	163	5.00	0.06	611	31.1	0.27	0.05	166	2.92	0.04	651	40.5	0.63	0.12	169	3.04	0.04
UEIB-5 [8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6 [9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47 [14]	355	14.5	0.15	0.03	5,644	0.00	0.00	362	7.3	0.06	0.01	5,644	0.00	0.00	362	0.2	0.00	0.00	5,644	0.00	0.00	366	4.3	0.06	0.01	5,644	0.00	0.00
UEIB-8/UEIB-48 [14]	2,238	140.4	1.43	0.26	6.80	0.00	0.00	2,386	147.8	2.01	0.37	6.80	0.00	0.00	2,466	80.3	0.74	0.14	6.80	0.00	0.00	2,785	318.5	6.78	1.24	6.80	0.00	0.00
UEIB-9/UEIB-49 [14]	2,862	101.8	1.04	0.19	0.00	0.00	0.00	3,390	528.4	0.83	0.15	0.00	0.00	0.00	3,460	70.4	0.71	0.13	0.00	0.00	0.00	3,525	64.3	0.81	0.15	0.00	0.00	0.00
UEIB-10 [4]/UEIB-50 [14]	1,035	109.7	1.13	0.21	0.00	0.00	0.00	1,129	94.1	0.90	0.17	0.00	0.00	0.00	1,184	55.8	0.54	0.10	0.00	0.00	0.00	1,238	53.9	0.67	0.12	0.00	0.00	0.00
UEIB-11 [3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14 [1,4]/UEIB-51 [14]	95	N/A	N/A	N/A	825	N/A	N/A	95	0.0	0.00	0.00	825	0.00	0.00	95	0.0	0.00	0.00	825	0.00	0.00	98	3.0	0.04	0.01	825	0.00	0.00
UEIB-15	11,000	420.9	4.38	0.80	0.00	0.00	0.00	11,320	320.6	2.55	0.47	0.00	0.00	0.00	11,399	78.3	0.59	0.11	0.00	0.00	0.00	11,582	183.6	2.66	0.49	0.00	0.00	0.00
UEIB-16	8,030	397.0	4.13	0.76	0.00	0.00	0.00	8,398	368.0	2.69	0.49	0.00	0.00	0.00	8,547	149.0	1.50	0.27	0.00	0.00	0.00	8,699	152.4	1.91	0.35	0.00	0.00	0.00
UEIB-17	6,222	375.4	3.91	0.72	0.00	0.00	0.00	6,300	77.9	0.67	0.12	0.00	0.00	0.00	6,317	16.7	0.23	0.04	0.00	0.00	0.00	6,483	166.6	2.62	0.48	0.00	0.00	0.00
UEIB-18	8,601	246.9	2.57	0.47	0.00	0.00	0.00	8,945	343.5	5.90	1.08	0.00	0.00	0.00	9,191	246.0	2.59	0.47	0.00	0.00	0.00	9,613	422.5	5.23	0.96	0.00	0.00	0.00
UEIB-19	8,501	510.4	5.32	0.98	0.00	0.00	0.00	8,897	396.5	3.04	0.56	0.00	0.00	0.00	9,122	224.6	5.92	1.09	0.00	0.00	0.00	9,777	655.3	7.57	1.39	0.00	0.00	0.00
UEIB-20/UEIB-56 [14]	12,384	N/A	N/A	0.00	0.00	0.00	0.00	12,439	55.7	1.28	0.24	0.00	0.00	0.00	12,585	145.4	1.58	0.29	0.00	0.00	0.00	13,047	462.2	7.03	1.29	0.00	0.00	0.00
UEIB-21	14,419	529.7	5.52	1.01	0.00	0.00	0.00	14,914	494.8	2.27	0.42	0.00	0.00	0.00	15,245	331.2	3.50	0.64	0.00	0.00	0.00	15,708	463.4	6.22	1.14	0.00	0.00	0.00
UEIB-22	7,759	345.8	3.60	0.66	0.00	0.00	0.00	8,012	252.5	0.95	0.17	0.00	0.00	0.00	8,049	37.8	0.47	0.09	0.00	0.00	0.00	8,215	165.7	2.54	0.47	0.00	0.00	0.00
UEIB-23	6,946	90.7	0.94	0.17	0.00	0.00	0.00	7,053	106.9	1.22	0.22	0.00	0.00	0.00	7,121	68.2	0.69	0.13	0.00	0.00	0.00	7,149	28.2	0.39	0.07	0.00	0.00	0.00
UEIB-24	10,343	400.6	4.17	0.77	0.00	0.00	0.00	10,941	597.7	7.16	1.31	0.00	0.00	0.00	11,232	291.1	3.17	0.58	0.00	0.00	0.00	11,525	293.6	3.84	0.70	0.00	0.00	0.00
UEIB-25	7,680	238.8	2.49	0.46	0.00	0.00	0.00	7,915	235.0	1.91	0.35	0.00	0.00	0.00	8,079	164.2	1.85	0.34	0.00	0.00	0.00	8,256	176.9	2.20	0.40	0.00	0.00	0.00
UEIB-26	11,321	330.3	3.44	0.63	0.00	0.00	0.00	11,491	169.5	1.07	0.20	0.00	0.00	0.00	11,605	114.1	1.36	0.25	0.00	0.00	0.00	11,868	263.3	4.12	0.76	0.00	0.00	0.00
UEIB-27	11,615	412.5	4.33	0.80	0.00	0.00	0.00	12,052	437.7	3.80	0.70	0.00	0.00	0.00	12,133	80.9	1.13	0.21	0.00	0.00	0.00	12,909	775.6	12.97	2.38	0.00	0.00	0.00
UEIB-28	5,770	323.7	3.40	0.62	0.00	0.00	0.00	6,026	256.5	1.64	0.30	0.00	0.00	0.00	6,134	108.0	1.08	0.20	0.00	0.00	0.00	6,326	191.8	3.14	0.58	0.00	0.00	0.00
UEIB-29	11,992	4.9	0.05	0.01	0.00	0.00	0.00	12,141	149.4	3.60	0.66	0.00	0.00	0.00	12,476	334.7	3.73	0.68	0.00	0.00	0.00	12,891	415.6	6.07	1.11	0.00	0.00	0.00
UEIB-30	7,329	336.6	3.00	0.55	0.00	0.00	0.00	7,576	247.9	0.42	0.08	0.00	0.00	0.00	7,580	3.0	0.00	0.00	0.00	0.00	0.00	7,664	84.7	1.78	0.33	0.00	0.00	0.00
UEIB-31/UEIB-55 [14]	4,842	108.9	0.97	0.18	0.00	0.00	0.00	4,953	111.1	0.70	0.13	0.00	0.00	0.00	5,001	48.3	0.74	0.14	0.00	0.00	0.00	5,108	106.9	1.70	0.31	0.00	0.00	0.00
UEIB-32	4,507	84.1	0.86	0.16	44.62	0.00	0.00	4,586	79.7	0.55	0.10	44.62	0.00	0.00	4,656	69.5	0.69	0.13	44.62	0.00	0.00	4,723	66.8	0.93	0.17	44.62	0.00	0.00
UEIB-33	6,584	309.6	3.16	0.58	54.26	0.00	0.00	6,784	200.0	1.25	0.23	54.26	0.00	0.00	6,848	63.9	0.68	0.12	54.26	0.00	0.00	6,963	114.5	1.88	0.34	54.26	0.00	0.00
UEIB-34	7,719	120.0	1.22	0.22	40.07	0.00	0.00	7,747	27.4	0.13	0.02	40.07	0.00	0.00	7,783	36.1	0.01	0.00	40.07	0.00	0.00	7,802	19.0	0.39	0.07	40.07	0.00	0.00
UEIB-35	12,980	204.4	2.08	0.38	0.00	0.00	0.00	13,300	320.3	2.92	0.54	0.00	0.00	0.00	13,548	248.2	2.67	0.49	0.00	0.00	0.00	13,756	207.5	2.66	0.49	0.00	0.00	0.00
UEIB-36	5,318	154.9	1.58	0.29	33.16	0.00	0.00	5,428	109.7	1.09	0.20	33.16	0.00	0.00	5,511	83.2	0.85	0.16	33.16	0.00	0.00	5,935	423.8	9.33	1.71	33.16	0.00	0.00
UEIB-37 [6]	5,163	60.1	0.61	0.11	0.00	0.00	0.00	5,207	43.8	0.38	0.07	0.00	0.00	0.00	5,244	37.2	0.42	0.08	0.00	0.00	0.00	5,266	21.7	0.21	0.04	0.00	0.00	0.00
UEIB-38	1,259	91.5	0.92	0.17	0.00	0.00	0.00	1,328	68.3	0.63	0.12	0.00	0.00	0.00	1,394	65.7	0.81	0.15	0.00	0.00	0.00	1,435	41.2	0.45	0.08	0.00	0.00	0.00
UEIB-39 [6]	4,310	213.3	2.15	0.40	0.00	0.00	0.00	4,452	141.6	1.03	0.19	0.00	0.00	0.00	4,461	9.6	0.00	0.00	0.00	0.00	0.00	4,514	52.2	1.01	0.19	0.00	0.00	0.00
UEIB-40 [6]	4,243	15.8	0.16	0.03	0.00	0.00	0.00	4,337	94.4	1.65	0.30	0.00	0.00	0.00	4,501	163.9	1.85	0.34	0.00	0.00	0.00	4,638	137.0	1.69	0.31	0.00	0.00	0.00
UEIB-41 [6]	9,585	334.9	3.38	0.62	0.00	0.00	0.00	9,862	276.4	2.66	0.49	0.00	0.00	0.00	10,026	164.1	1.70	0.31	0.00	0.00	0.00	10,171	145.3	1.88	0.35	0.00	0.00	0.00
UEIB-42 [6]	13,233	596.7	6.03	1.11	0.00	0.00	0.00	13,705	471.3	4.63	0.85	0.00	0.00	0.00	14,083	378.3	3.50	0.64	0.00	0.00	0.00	14,305	221.4	2.00	0.37	0.00	0.00	0.00
UEIB-43	15,949	892.2	9.17	1.68	0.00	0.00	0.00	16,779	829.9	11.08	2.03	0.00	0.00	0.00	17,560	781.7	8.59	1.58	0.00	0.00	0.00	18,469	909.1	12.19	2.24	0.00	0.00	0.00
UEIB-44	2,439	49.3	0.50	0.09	42.98	0.00	0.00	2,499	59.4	0.61	0.11	42.98	0.00	0.00	2,541	42.7	0.50	0.09	42.98	0.00	0.00	2,578	36.7	0.41	0.08	42.98	0.00	0.00
UEIB-45 [8]	13,489	471.0	4.81	0.88	1,157.13	53.50	0.48	13,834	345.7	3.95	0.72	1,188.43	31.30	0.38	14,207	372.6	3.81	0.70	1,222.16	33.73	0.43	14,439	231.7	2.75	0.50	1,245.63	23.47	0.31
UEIB-46 [9]	2,186	76.8	0.78	0.14	20.55	4.32	0.04	2,286	100.2	0.89	0.16	29.92	9.37	0.11	2,345	58.7	0.55	0.10	35.40	5.48	0.07	2,394	49.4	0.66	0.12	39.87	4.47	0.06
CPR-1 [11]	4,920	209.6	2.47	0.45	203.60	0.00	0.00	4,944	24.4	0.08	0.01	203.60	0.00	0.00	4,961	16.2	0.21	0.04	203.60	0.00	0.00	5,172	211.5	2.95	0.54	203.60	0.00	0.00
CPR-2 [11]	1,574	60.4	0.62	0.11	40.17	0.00	0.00	1,577	2.6	0.03	0.01	40.17	0.00	0.00	1,578	0.9	0.01	0.00	40.17	0.00	0.00	1,664	86.5	1.25	0.23	40.17	0.00	0.00
EX-1 [11]	7,109	75.2	0.76	0.14	N/A	N/A	N/A	7,127	18.0	0.74	0.14	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2 [11]	964	39.7	0.41	0.07	N/A	N/A	N/A	974	9.4	0.39	0.07	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3 [11]	2,923	52.6	0.52	0.10	N/A	N/A	N/A	2,937	13.6	0.52	0.10	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4 [11]	604	4.6	0.05	0.01	N/A	N/A	N/A	608	4.0	0.04	0.01	N/A	N/A	N/A	611	3.0	0.03	0.01	N/A	N/A	N/A	614	3.5	0.04	0.01	N/A	N/A	N/A
U2-5 [11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	291356	9769	100	18	23204	64	1	300150	8794	81	15	23253	48	1	305462	5312	60	11	23296	43	1	313989	8527	125	23	23327	31	0

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Feb 19-21, 2019							May 13-15, 2019							August 6-8, 2019							October 3 - January 7th, 2019/2020						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	724	57.1	0.90	0.17	1,578	0.00	0.00	784	60.0	0.73	0.13	1,578	0.00	0.00	897	113.4	0.81	0.15	1,578	0.00	0.00	957	59.3	0.64	0.12	1,578	0.00	0.00
UEIB-3/UEIB-53[14]	823	19.5	0.31	0.06	4,471	0.00	0.00	846	22.6	0.28	0.05	4,472	1.13	0.01	876	30.5	0.19	0.03	4,474	1.52	0.01	901	24.4	0.25	0.05	4,475	1.22	0.01
UEIB-4/UEIB-54[14]	707	55.7	0.87	0.16	176	7.26	0.08	765	58.4	0.73	0.13	182	5.84	0.07	1,050	284.6	2.49	0.46	210	28.46	0.24	1,166	116.4	1.18	0.22	222	11.64	0.12
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	373	6.8	0.10	0.02	5,644	0.00	0.00	381	7.7	0.10	0.02	5,644	0.00	0.00	386	5.2	0.02	0.00	5,644	0.00	0.00	394	8.2	0.08	0.01	5,644	0.00	0.00
UEIB-8/UEIB-48[14]	3,137	352.1	6.83	1.25	6.80	0.00	0.00	3,265	128.4	1.55	0.28	6.80	0.00	0.00	3,487	221.1	1.45	0.27	6.80	0.00	0.00	3,689	202.7	2.03	0.37	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	3,597	72.1	1.12	0.21	0.00	0.00	0.00	3,684	87.1	1.08	0.20	0.00	0.00	0.00	3,827	143.3	0.99	0.18	0.00	0.00	0.00	3,933	105.7	1.10	0.20	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	1,293	55.0	0.87	0.16	0.00	0.00	0.00	1,407	113.9	1.35	0.25	0.00	0.00	0.00	1,634	226.4	1.54	0.28	0.00	0.00	0.00	1,805	171.3	1.80	0.33	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	98	0.0	0.00	0.00	825	0.00	0.00	186	88.1	2.04	0.37	825	0.00	0.00	1,099	912.8	4.26	0.78	825	0.00	0.00	1,777	678.1	6.85	1.26	825	0.00	0.00
UEIB-15	11,796	214.3	3.41	0.63	0.00	0.00	0.00	12,008	211.8	2.43	0.45	0.00	0.00	0.00	12,259	251.0	1.37	0.25	0.00	0.00	0.00	12,588	328.2	1.84	0.34	0.00	0.00	0.00
UEIB-16	8,840	140.6	2.07	0.38	0.00	0.00	0.00	9,000	160.8	1.76	0.32	0.00	0.00	0.00	9,226	226.0	1.57	0.29	0.00	0.00	0.00	9,510	283.2	3.79	0.70	0.00	0.00	0.00
UEIB-17	6,747	263.5	4.23	0.78	0.00	0.00	0.00	6,963	215.8	1.85	0.34	0.00	0.00	0.00	7,106	143.0	0.69	0.13	0.00	0.00	0.00	7,549	443.4	5.63	1.03	0.00	0.00	0.00
UEIB-18	9,924	310.4	4.54	0.83	0.00	0.00	0.00	10,254	330.3	3.75	0.69	0.00	0.00	0.00	10,627	372.6	2.33	0.43	0.00	0.00	0.00	11,304	677.9	10.73	1.97	0.00	0.00	0.00
UEIB-19	9,880	103.1	1.52	0.28	0.00	0.00	0.00	9,949	68.0	0.88	0.16	0.00	0.00	0.00	10,103	154.5	0.74	0.14	0.00	0.00	0.00	10,467	363.8	5.02	0.92	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	14,119	1,072.3	19.27	3.54	0.00	0.00	0.00	15,641	1,521.3	18.93	3.47	0.00	0.00	0.00	16,473	832.3	4.35	0.80	0.00	0.00	0.00	16,860	387.0	4.01	0.74	0.00	0.00	0.00
UEIB-21	16,210	501.6	8.06	1.48	0.00	0.00	0.00	16,684	473.8	5.54	1.02	0.00	0.00	0.00	17,216	532.8	3.43	0.63	0.00	0.00	0.00	17,848	631.4	8.25	1.51	0.00	0.00	0.00
UEIB-22	8,423	207.7	3.26	0.60	0.00	0.00	0.00	8,535	112.6	0.99	0.18	0.00	0.00	0.00	8,608	73.0	0.31	0.06	0.00	0.00	0.00	8,840	231.6	3.21	0.59	0.00	0.00	0.00
UEIB-23	7,179	29.9	0.48	0.09	0.00	0.00	0.00	7,228	48.3	0.61	0.11	0.00	0.00	0.00	7,359	131.2	0.84	0.15	0.00	0.00	0.00	7,576	217.2	0.99	0.18	0.00	0.00	0.00
UEIB-24	11,876	350.4	5.60	1.03	0.00	0.00	0.00	12,390	514.2	6.05	1.11	0.00	0.00	0.00	13,132	742.3	5.33	0.98	0.00	0.00	0.00	13,632	499.4	6.94	1.27	0.00	0.00	0.00
UEIB-25	8,350	94.5	0.74	0.14	0.00	0.00	0.00	8,617	267.3	4.42	0.81	0.00	0.00	0.00	9,105	487.6	3.65	0.67	0.00	0.00	0.00	9,276	170.6	1.66	0.30	0.00	0.00	0.00
UEIB-26	12,163	294.8	4.31	0.79	0.00	0.00	0.00	12,351	187.6	2.66	0.49	0.00	0.00	0.00	12,773	422.2	2.80	0.51	0.00	0.00	0.00	13,264	490.8	6.31	1.16	0.00	0.00	0.00
UEIB-27	14,109	1,200.7	18.75	3.44	0.00	0.00	0.00	14,910	800.7	9.38	1.72	0.00	0.00	0.00	15,337	427.2	2.78	0.51	0.00	0.00	0.00	15,615	277.3	2.31	0.42	0.00	0.00	0.00
UEIB-28	6,576	249.8	3.60	0.66	0.00	0.00	0.00	6,732	156.5	1.96	0.36	0.00	0.00	0.00	6,907	174.4	1.26	0.23	0.00	0.00	0.00	7,115	208.9	3.09	0.57	0.00	0.00	0.00
UEIB-29	13,372	480.6	7.40	1.36	0.00	0.00	0.00	13,858	486.5	5.69	1.04	0.00	0.00	0.00	14,574	715.6	4.98	0.91	0.00	0.00	0.00	15,155	581.5	7.17	1.32	0.00	0.00	0.00
UEIB-30	7,845	181.1	2.66	0.49	0.00	0.00	0.00	7,956	110.8	1.35	0.25	0.00	0.00	0.00	8,009	52.8	0.30	0.05	0.00	0.00	0.00	8,116	106.8	1.70	0.31	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	5,228	120.0	1.75	0.32	0.00	0.00	0.00	5,349	120.4	1.72	0.32	0.00	0.00	0.00	5,620	270.9	1.80	0.33	0.00	0.00	0.00	5,620	0.6	0.11	0.02	0.00	0.00	0.00
UEIB-32	4,797	74.2	1.09	0.20	44.62	0.00	0.00	4,862	64.8	0.81	0.15	44.62	0.00	0.00	4,981	119.3	0.80	0.15	50.58	5.96	0.04	5,070	89.1	1.09	0.20	55.04	4.46	0.05
UEIB-33	7,116	153.4	2.19	0.40	54.26	0.00	0.00	7,258	141.5	1.76	0.32	54.26	0.00	0.00	7,398	139.9	0.85	0.16	54.26	0.00	0.00	7,567	169.1	2.42	0.44	54.26	0.00	0.00
UEIB-34	7,843	41.8	0.59	0.11	40.07	0.00	0.00	7,905	62.0	0.78	0.14	40.07	0.00	0.00	8,027	121.7	0.83	0.15	40.07	0.00	0.00	8,117	89.8	1.10	0.20	40.07	0.00	0.00
UEIB-35	13,971	215.8	3.20	0.59	0.00	0.00	0.00	14,197	225.6	2.55	0.47	0.00	0.00	0.00	14,556	358.9	2.77	0.51	0.00	0.00	0.00	14,798	242.3	3.15	0.58	0.00	0.00	0.00
UEIB-36	6,021	85.6	1.24	0.23	33.16	0.00	0.00	6,129	108.6	1.37	0.25	33.16	0.00	0.00	6,324	194.8	1.31	0.24	33.16	0.00	0.00	6,454	129.9	1.56	0.29	33.16	0.00	0.00
UEIB-37 [6]	5,287	21.2	0.31	0.06	0.00	0.00	0.00	5,318	31.0	0.38	0.07	0.00	0.00	0.00	5,405	87.3	0.63	0.12	0.00	0.00	0.00	5,456	50.9	0.52	0.10	0.00	0.00	0.00
UEIB-38	1,478	43.8	0.66	0.12	0.00	0.00	0.00	1,541	63.0	0.78	0.14	0.00	0.00	0.00	1,635	93.2	0.73	0.13	0.00	0.00	0.00	1,687	52.7	0.55	0.10	0.00	0.00	0.00
UEIB-39 [6]	4,603	89.6	1.31	0.24	0.00	0.00	0.00	4,715	111.9	1.53	0.28	0.00	0.00	0.00	5,024	309.0	2.31	0.42	0.00	0.00	0.00	5,136	111.8	1.30	0.24	0.00	0.00	0.00
UEIB-40 [6]	4,779	140.8	2.11	0.39	0.00	0.00	0.00	4,971	192.6	2.40	0.44	0.00	0.00	0.00	5,214	242.5	1.68	0.31	0.00	0.00	0.00	5,380	166.5	1.68	0.31	0.00	0.00	0.00
UEIB-41 [6]	10,331	160.5	2.46	0.45	0.00	0.00	0.00	10,578	246.2	3.07	0.56	0.00	0.00	0.00	10,903	325.0	1.99	0.37	0.00	0.00	0.00	10,987	84.3	0.94	0.17	0.00	0.00	0.00
UEIB-42 [6]	14,734	429.7	6.86	1.26	0.00	0.00	0.00	15,752	1,018.1	10.92	2.00	0.00	0.00	0.00	16,051	298.6	2.39	0.44	0.00	0.00	0.00	16,601	550.3	5.40	0.99	0.00	0.00	0.00
UEIB-43	19,518	1,048.9	15.25	2.80	0.00	0.00	0.00	19,589	70.4	0.00	0.00	0.00	0.00	0.00	20,349	760.6	4.45	0.82	0.00	0.00	0.00	20,928	578.7	6.01	1.10	0.00	0.00	0.00
UEIB-44	2,614	35.5	0.53	0.10	42.98	0.00	0.00	2,659	45.1	0.55	0.10	42.98	0.00	0.00	2,734	75.1	0.53	0.10	42.98	0.00	0.00	2,781	47.6	0.50	0.09	42.98	0.00	0.00
UEIB-45 [8]	14,625	186.4	2.99	0.55	1,258.20	12.57	0.14	14,900	274.7	3.08	0.57	1,303.51	45.31	0.17	15,332	432.1	1.73	0.32	1,315.15	11.64	0.37	15,602	269.7	2.64	0.48	1,342.13	26.97	0.28
UEIB-46 [9]	2,441	46.5	0.72	0.13	42.95	3.08	0.03	2,491	49.6	0.61	0.11	42.95	0.00	0.00	2,571	80.7	0.50	0.09	42.95	0.00	0.00	2,636	64.7	0.65	0.12	42.95	0.00	0.00
CPR-1 [11]	5,437	264.9	3.84	0.70	203.60	0.00	0.00	5,492	55.5	0.69	0.13	203.60	0.00	0.00	5,515	22.4	0.02	0.00	203.60	0.00	0.00	5,785	269.7	2.54	0.47	203.60	0.00	0.00
CPR-2 [11]	1,706	41.7	1.32	0.24	40.17	0.00	0.00	1,706	0.1	0.00	0.00	40.17	0.00	0.00	1,708	1.8	0.00	0.00	40.17	0.00	0.00	1,764	56.3	0.51	0.09	40.17	0.00	0.00
EX-1 [11]	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2 [11]	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3 [11]	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4 [11]	618	3.4	0.05	0.01	N/A	N/A	N/A	622	3.9	0.05	0.01	N/A	N/A	N/A	628	6.0	0.04	0.01	N/A	N/A	N/A	633	4.9	0.05	0.01	N/A	N/A	N/A
U2-5 [11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	323506	9517	149	27	23350	23	0	332624	9117	109	20	23402	52	0	344239	11616	74	14	23450	48	1	354533	10294	119	22	23494	44	0

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Jan 7 - March 30, 2020							March 30 -July 6, 2020							July 6 - Oct 1, 2020							Oct 1, 2020 - Jan 5, 2021						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	1,030	73.2	0.91	0.17	1,578	0.00	0.00	1,094	64.1	0.67	0.12	1,578	0.00	0.00	1,152	57.9	0.66	0.12	1,578	0.00	0.00	1,203	51.2	0.55	0.10	1,579	1.19	0.01
UEIB-3/UEIB-53[14]	926	25.4	0.31	0.06	4,477	1.89	0.02	954	27.4	0.28	0.05	4,479	2.11	0.02	973	18.9	0.23	0.04	4,480	0.95	0.01	995	22.3	0.22	0.04	4,482	1.73	0.02
UEIB-4/UEIB-54[14]	1,257	90.4	1.16	0.21	231	9.04	0.11	1,322	65.1	0.67	0.12	237	6.51	0.07	1,371	49.0	0.58	0.11	242	4.90	0.06	1,437	66.6	0.66	0.12	249	6.66	0.07
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	405	10.2	0.12	0.02	5,644	0.00	0.00	413	8.4	0.09	0.02	5,644	0.16	0.00	420	7.4	0.08	0.01	5,645	0.37	0.00	433	12.9	0.13	0.02	5,645	0.20	0.00
UEIB-8/UEIB-48[14]	3,953	263.7	3.13	0.57	6.80	0.00	0.00	4,177	224.3	2.37	0.43	6.80	0.00	0.00	4,316	138.3	1.64	0.30	6.80	0.00	0.00	4,497	181.6	1.82	0.33	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	4,025	92.1	1.15	0.21	0.00	0.00	0.00	4,093	68.4	0.71	0.13	0.00	0.00	0.00	4,144	50.7	0.59	0.11	0.00	0.00	0.00	4,220	76.2	0.74	0.14	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[14]	1,950	145.2	1.87	0.34	0.00	0.00	0.00	2,107	156.5	1.54	0.28	0.00	0.00	0.00	2,237	130.0	1.52	0.28	0.00	0.00	0.00	2,348	111.2	1.15	0.21	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	1,883	106.1	5.48	1.00	825	0.00	0.00	2,064	181.2	1.78	0.33	825	0.00	0.00	2,219	155.2	1.84	0.34	825	0.00	0.00	2,309	89.7	0.98	0.18	825	0.00	0.00
UEIB-15	12,702	114.2	1.47	0.27	0.00	0.00	0.00	12,876	174.4	1.68	0.31	0.00	0.00	0.00	12,960	84.1	1.03	0.19	0.00	0.00	0.00	13,190	229.9	2.39	0.44	0.00	0.00	0.00
UEIB-16	9,864	354.3	4.24	0.78	0.00	0.00	0.00	10,137	272.7	2.94	0.54	0.00	0.00	0.00	10,423	286.2	3.11	0.57	0.00	0.00	0.00	10,925	502.1	4.89	0.90	0.00	0.00	0.00
UEIB-17	8,092	542.9	6.49	1.19	0.00	0.00	0.00	8,323	230.7	2.64	0.48	0.00	0.00	0.00	8,426	102.9	1.23	0.23	0.00	0.00	0.00	8,740	314.1	2.97	0.55	0.00	0.00	0.00
UEIB-18	11,481	176.3	2.32	0.43	0.00	0.00	0.00	11,587	106.0	1.09	0.20	0.00	0.00	0.00	11,697	110.2	1.23	0.23	0.00	0.00	0.00	11,981	284.4	2.79	0.51	0.00	0.00	0.00
UEIB-19	10,776	309.1	4.11	0.75	0.00	0.00	0.00	11,481	705.6	7.70	1.41	0.00	0.00	0.00	11,762	280.4	3.53	0.65	0.00	0.00	0.00	12,025	262.7	2.79	0.51	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	17,764	904.0	9.23	1.69	0.00	0.00	0.00	17,923	158.7	1.66	0.30	0.00	0.00	0.00	18,038	115.8	1.45	0.27	0.00	0.00	0.00	18,404	365.6	3.48	0.64	0.00	0.00	0.00
UEIB-21	18,447	599.5	7.61	1.40	0.00	0.00	0.00	19,160	712.7	7.36	1.35	0.00	0.00	0.00	19,641	481.0	5.57	1.02	0.00	0.00	0.00	20,222	580.6	6.01	1.10	0.00	0.00	0.00
UEIB-22	9,130	290.5	3.94	0.72	0.00	0.00	0.00	9,309	178.8	2.05	0.38	0.00	0.00	0.00	9,481	171.7	1.90	0.35	0.00	0.00	0.00	9,885	403.6	4.12	0.76	0.00	0.00	0.00
UEIB-23	7,642	66.5	0.86	0.16	0.00	0.00	0.00	7,719	76.5	0.79	0.15	0.00	0.00	0.00	7,801	82.3	0.90	0.16	0.00	0.00	0.00	7,872	70.4	0.74	0.14	0.00	0.00	0.00
UEIB-24	NM	NM	NM	NM	NM	NM	NM	14,662	515.3	6.03	1.11	0.00	0.00	0.00	15,109	446.9	5.04	0.92	0.00	0.00	0.00	15,492	382.9	4.00	0.73	0.00	0.00	0.00
UEIB-25	NM	NM	NM	NM	NM	NM	NM	9,591	157.5	1.87	0.34	0.00	0.00	0.00	9,781	190.6	2.20	0.40	0.00	0.00	0.00	9,877	95.9	0.99	0.18	0.00	0.00	0.00
UEIB-26	NM	NM	NM	NM	NM	NM	NM	14,060	398.3	3.79	0.70	0.00	0.00	0.00	14,224	163.2	1.95	0.36	0.00	0.00	0.00	14,488	264.0	2.61	0.48	0.00	0.00	0.00
UEIB-27	NM	NM	NM	NM	NM	NM	NM	15,734	59.7	0.46	0.08	0.00	0.00	0.00	16,077	342.9	3.59	0.66	0.00	0.00	0.00	16,498	420.8	4.30	0.79	0.00	0.00	0.00
UEIB-28	NM	NM	NM	NM	NM	NM	NM	7,624	254.4	1.81	0.33	0.00	0.00	0.00	7,738	114.2	1.34	0.25	0.00	0.00	0.00	8,002	263.8	2.57	0.47	0.00	0.00	0.00
UEIB-29	NM	NM	NM	NM	NM	NM	NM	16,425	634.7	6.24	1.14	0.00	0.00	0.00	16,833	407.6	4.77	0.87	0.00	0.00	0.00	17,433	600.9	6.02	1.10	0.00	0.00	0.00
UEIB-30	NM	NM	NM	NM	NM	NM	NM	8,453	168.9	1.24	0.23	0.00	0.00	0.00	8,504	50.6	0.61	0.11	0.00	0.00	0.00	8,681	177.3	1.67	0.31	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	NM	NM	NM	NM	NM	NM	NM	5,628	3.7	0.04	0.01	0.00	0.00	0.00	5,629	1.0	0.01	0.00	0.00	0.00	0.00	6,239	610.1	5.50	1.01	0.00	0.00	0.00
UEIB-32	5,162	91.8	1.15	0.21	57.73	2.69	0.03	5,236	74.2	0.77	0.14	57.73	0.00	0.00	5,279	42.4	0.51	0.09	57.73	0.00	0.00	5,331	52.8	0.53	0.10	57.73	0.00	0.00
UEIB-33	7,780	213.2	2.64	0.48	54.26	0.00	0.00	7,919	139.6	1.47	0.27	56.95	2.70	0.03	7,995	75.7	0.91	0.17	60.74	3.79	0.04	8,170	174.9	1.69	0.31	69.48	8.74	0.09
UEIB-34	8,217	99.8	1.19	0.22	40.07	0.00	0.00	8,325	107.9	1.10	0.20	40.07	0.00	0.00	8,390	65.6	0.80	0.15	40.07	0.00	0.00	8,472	81.7	0.82	0.15	40.07	0.00	0.00
UEIB-35	15,038	240.3	3.08	0.56	0.00	0.00	0.00	15,180	141.6	1.26	0.23	0.00	0.00	0.00	15,547	366.6	4.05	0.74	0.00	0.00	0.00	16,720	1,173.0	11.30	2.07	0.00	0.00	0.00
UEIB-36	6,582	128.6	1.54	0.28	33.16	0.00	0.00	6,720	137.4	1.41	0.26	33.16	0.00	0.00	6,813	93.4	1.12	0.21	33.16	0.00	0.00	7,266	452.3	4.20	0.77	33.16	0.00	0.00
UEIB-37[6]	5,505	48.2	0.58	0.11	0.00	0.00	0.00	5,543	39.0	0.40	0.07	0.00	0.00	0.00	5,577	33.4	0.38	0.07	0.00	0.00	0.00	5,616	39.0	0.40	0.07	0.00	0.00	0.00
UEIB-38	1,749	62.1	0.72	0.13	0.00	0.00	0.00	1,813	63.1	0.65	0.12	0.00	0.00	0.00	1,878	65.5	0.73	0.13	0.00	0.00	0.00	1,928	49.9	0.60	0.11	0.00	0.00	0.00
UEIB-39[6]	5,257	121.1	1.46	0.27	0.00	0.00	0.00	5,413	155.6	1.53	0.28	0.00	0.00	0.00	5,561	148.3	1.73	0.32	0.00	0.00	0.00	5,667	106.5	1.16	0.21	0.00	0.00	0.00
UEIB-40[6]	5,573	192.4	2.28	0.42	0.00	0.00	0.00	5,891	318.5	3.10	0.57	0.00	0.00	0.00	6,243	351.3	4.16	0.76	0.00	0.00	0.00	6,792	549.5	5.47	1.00	0.00	0.00	0.00
UEIB-41[6]	11,075	88.1	1.04	0.19	0.00	0.00	0.00	11,163	87.5	0.90	0.16	0.00	0.00	0.00	11,241	78.1	0.83	0.15	0.00	0.00	0.00	11,445	204.5	1.98	0.36	0.00	0.00	0.00
UEIB-42[6]	17,130	529.1	6.77	1.24	0.00	0.00	0.00	17,823	692.9	6.96	1.28	0.00	0.00	0.00	18,016	192.5	2.49	0.46	0.00	0.00	0.00	18,347	330.9	3.25	0.60	0.00	0.00	0.00
UEIB-43	21,001	73.4	1.77	0.32	0.00	0.00	0.00	21,029	27.8	0.28	0.05	0.00	0.00	0.00	21,526	496.4	4.94	0.91	0.00	0.00	0.00	21,690	164.8	1.74	0.32	0.00	0.00	0.00
UEIB-44	2,837	55.4	0.66	0.12	42.98	0.00	0.00	2,897	60.3	0.62	0.11	44.32	1.34	0.01	2,943	45.5	0.53	0.10	46.59	2.27	0.03	3,099	156.9	1.48	0.27	53.22	6.62	0.07
UEIB-45[8]	15,977	375.3	4.39	0.81	1,379.65	37.53	0.45	16,403	426.0	4.40	0.81	1,422.26	42.60	0.44	16,653	250.2	3.05	0.56	1,447.27	25.02	0.29	16,971	317.7	3.43	0.63	1,479.05	31.77	0.33
UEIB-46[9]	2,709	72.9	0.88	0.16	42.95	0.00	0.00	2,780	71.4	0.74	0.14	44.57	1.61	0.02	2,831	51.3	0.60	0.11	48.58	4.02	0.05	2,901	69.6	0.70	0.13	53.48	4.90	0.05
CPR-1[11]	6,087	302.8	4.13	0.76	203.60	0.00	0.00	6,113	25.7	0.41	0.08	203.60	0.00	0.00	6,131	18.2	0.19	0.03	203.60	0.00	0.00	6,542	410.4	3.86	0.71	203.60	0.00	0.00
CPR-2[11]	1,784	20.4	0.43	0.08	40.17	0.00	0.00	1,784	0.0	0.00	0.00	40.17	0.00	0.00	1,786	1.4	0.01	0.00	40.17	0.00	0.00	1,796	10.1	0.10	0.02	40.17	0.00	0.00
EX-1[11]	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2[11]	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3[11]	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4[11]	637	4.73	0.06	0.01	N/A	N/A	N/A	642	5.11	0.05	0.01	N/A	N/A	N/A	646	3.7	0.04	0.01	N/A	N/A	N/A	651	4.9	0.05	0.01	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	273624	6883	89	16	23545	51	1	371786	8177	84	15	23602	57	1	378205	6418	74	14	23643	41	0	388995	10790	107	20	23705	62	1

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Jan 5 - Apr 8, 2021							Apr 8 - Jul 5, 2021							Jul 6 - Oct 6, 2021							Oct 7 - Jan 4, 2022						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	1,269	66.0	0.73	0.13	1,583	3.30	0.03	1,287	18.0	0.30	0.05	1,583	0.65	0.01	1,604	317.1	2.81	0.52	1,583	0.00	0.00	1,906	302.1	0.71	0.13	1,585	1.39	0.02
UEIB-3/UEIB-53[14]	1,017	22.2	0.24	0.04	4,484	2.22	0.02	1,036	18.7	0.22	0.04	4,485	1.37	0.02	1,052	16.2	0.18	0.03	4,486	0.28	0.00	1,066	13.9	0.15	0.03	4,486	0.38	0.00
UEIB-4/UEIB-54[14]	1,520	82.8	0.90	0.17	255	5.48	0.05	1,591	71.0	0.82	0.15	258	3.55	0.04	1,636	45.1	0.51	0.09	260	2.26	0.02	1,705	68.3	0.64	0.12	264	3.41	0.04
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	446	13.0	0.16	0.03	5,645	0.37	0.00	452	5.8	0.08	0.02	5,646	0.41	0.00	458	5.8	0.06	0.01	5,646	0.35	0.00	478	20.3	0.18	0.03	5,646	0.32	0.00
UEIB-8/UEIB-48[14]	4,750	252.7	2.77	0.51	6.80	0.00	0.00	4,909	159.1	1.98	0.36	6.80	0.00	0.00	5,021	112.4	1.24	0.23	6.80	0.00	0.00	5,230	208.6	1.89	0.35	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	4,343	123.2	1.34	0.25	4.19	4.19	0.05	4,446	102.9	1.19	0.22	9.34	5.15	0.06	4,606	160.0	1.62	0.30	11.03	1.69	0.02	4,726	119.9	1.15	0.21	11.03	0.00	0.00
UEIB-10[4]/UEIB-50[14]	2,427	79.5	0.95	0.17	0.00	0.00	0.00	2,507	79.4	0.72	0.13	0.00	0.00	0.00	2,562	54.9	0.67	0.12	0.00	0.00	0.00	2,686	124.5	1.17	0.21	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	2,432	123.1	1.36	0.25	825	0.00	0.00	2,535	102.8	1.17	0.22	827	2.70	0.03	2,635	100.1	1.08	0.20	832	5.00	0.05	2,758	122.7	1.24	0.23	836	3.49	0.04
UEIB-15	13,529	339.2	3.57	0.65	0.00	0.00	0.00	13,711	181.8	2.45	0.45	0.00	0.00	0.00	13,872	161.0	1.75	0.32	0.00	0.00	0.00	14,137	265.0	2.60	0.48	0.00	0.00	0.00
UEIB-16	11,291	366.1	4.27	0.78	0.00	0.00	0.00	11,491	199.8	2.25	0.41	0.00	0.00	0.00	11,605	114.1	1.35	0.25	0.00	0.00	0.00	11,894	289.3	2.13	0.39	0.00	0.00	0.00
UEIB-17	9,237	497.1	5.29	0.97	0.00	0.00	0.00	9,388	150.8	2.54	0.47	0.00	0.00	0.00	9,437	49.4	0.64	0.12	0.00	0.00	0.00	9,437	0.2	0.01	0.00	0.00	0.00	0.00
UEIB-18	12,419	437.4	4.68	0.86	0.00	0.00	0.00	12,702	283.5	3.47	0.64	0.00	0.00	0.00	12,984	282.2	3.07	0.56	0.00	0.00	0.00	13,431	446.1	3.96	0.73	0.00	0.00	0.00
UEIB-19	12,136	111.4	1.23	0.23	0.00	0.00	0.00	12,439	303.3	2.94	0.54	0.00	0.00	0.00	12,633	193.5	2.33	0.43	0.00	0.00	0.00	12,841	208.5	1.92	0.35	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	18,922	517.8	4.13	0.76	0.00	0.00	0.00	19,028	106.2	2.01	0.37	0.00	0.00	0.00	19,374	345.8	3.72	0.68	0.00	0.00	0.00	20,518	1,144.1	8.43	1.55	0.00	0.00	0.00
UEIB-21	21,011	789.2	8.34	1.53	0.00	0.00	0.00	21,546	535.7	6.61	1.21	0.00	0.00	0.00	21,815	268.1	3.32	0.61	0.00	0.00	0.00	22,506	691.9	5.52	1.01	0.00	0.00	0.00
UEIB-22	10,203	318.3	3.83	0.70	0.00	0.00	0.00	10,369	165.9	2.22	0.41	0.00	0.00	0.00	10,492	122.9	1.41	0.26	0.00	0.00	0.00	10,675	182.9	1.55	0.28	0.00	0.00	0.00
UEIB-23	7,974	102.3	1.07	0.20	0.00	0.00	0.00	8,068	93.7	1.10	0.20	0.00	0.00	0.00	8,248	180.5	1.76	0.32	0.00	0.00	0.00	8,474	225.4	2.55	0.47	0.00	0.00	0.00
UEIB-24	15,886	393.9	4.30	0.79	0.00	0.00	0.00	16,291	405.1	4.49	0.82	0.00	0.00	0.00	16,673	381.9	4.33	0.79	0.00	0.00	0.00	17,296	623.3	5.40	0.99	0.00	0.00	0.00
UEIB-25	9,967	90.2	1.37	0.25	0.00	0.00	0.00	10,362	394.4	3.89	0.71	0.00	0.00	0.00	10,642	279.8	3.43	0.63	0.00	0.00	0.00	10,721	79.4	1.01	0.19	0.00	0.00	0.00
UEIB-26	14,888	400.8	4.38	0.80	0.00	0.00	0.00	15,082	193.1	2.41	0.44	0.00	0.00	0.00	15,245	163.2	1.79	0.33	0.00	0.00	0.00	15,580	334.9	2.86	0.53	0.00	0.00	0.00
UEIB-27	16,699	201.4	2.27	0.42	0.00	0.00	0.00	17,075	376.4	3.39	0.62	0.00	0.00	0.00	17,318	243.0	2.73	0.50	0.00	0.00	0.00	18,012	693.4	6.82	1.25	0.00	0.00	0.00
UEIB-28	8,316	313.8	3.68	0.68	0.00	0.00	0.00	8,462	145.7	1.75	0.32	0.00	0.00	0.00	8,589	127.1	1.37	0.25	0.00	0.00	0.00	9,108	518.9	4.07	0.75	0.00	0.00	0.00
UEIB-29	18,113	679.1	7.51	1.38	0.00	0.00	0.00	18,630	517.2	6.27	1.15	0.00	0.00	0.00	19,038	408.0	4.39	0.80	0.00	0.00	0.00	19,897	859.4	6.88	1.26	0.00	0.00	0.00
UEIB-30	8,960	279.2	2.53	0.46	0.00	0.00	0.00	9,070	109.9	0.71	0.13	0.00	0.00	0.00	9,099	28.2	0.31	0.06	0.00	0.00	0.00	9,425	326.2	2.35	0.43	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00
UEIB-32	5,398	66.9	0.73	0.13	57.73	0.00	0.00	5,448	49.5	0.58	0.11	57.73	0.00	0.00	5,483	35.1	0.42	0.08	58.65	0.93	0.01	5,552	68.6	0.67	0.12	64.95	6.29	0.07
UEIB-33	8,394	224.3	2.53	0.46	80.70	11.22	0.12	8,503	108.6	1.41	0.26	83.63	2.93	0.03	8,592	89.3	0.97	0.18	83.63	0.00	0.00	8,811	218.5	2.01	0.37	89.33	5.70	0.06
UEIB-34	8,585	112.7	1.22	0.22	40.07	0.00	0.00	8,651	66.5	0.68	0.12	40.07	0.00	0.00	8,701	50.0	0.57	0.10	40.07	0.00	0.00	8,819	118.3	0.99	0.18	40.07	0.00	0.00
UEIB-35	16,761	40.9	4.49	0.82	0.00	0.00	0.00	16,903	143.0	1.54	0.28	0.00	0.00	0.00	17,108	205.0	1.90	0.35	0.00	0.00	0.00	17,752	643.9	6.33	1.16	0.00	0.00	0.00
UEIB-36	7,660	394.0	4.21	0.77	33.16	0.00	0.00	7,750	90.7	1.08	0.20	33.16	0.00	0.00	7,842	91.7	0.99	0.18	33.16	0.00	0.00	7,948	106.2	1.16	0.21	33.16	0.00	0.00
UEIB-37[6]	5,667	51.2	0.55	0.10	0.00	0.00	0.00	5,708	40.5	0.47	0.09	0.00	0.00	0.00	5,740	32.9	0.37	0.07	0.00	0.00	0.00	5,791	50.6	0.47	0.09	0.00	0.00	0.00
UEIB-38	1,987	58.8	0.62	0.11	0.00	0.00	0.00	2,040	53.5	0.59	0.11	0.00	0.00	0.00	2,089	49.0	0.53	0.10	0.00	0.00	0.00	2,170	80.7	0.75	0.14	0.00	0.00	0.00
UEIB-39[6]	6,335	667.7	6.17	1.13	0.00	0.00	0.00	6,462	127.4	1.41	0.26	0.00	0.00	0.00	6,612	149.9	1.62	0.30	0.00	0.00	0.00	6,730	117.7	1.26	0.23	0.00	0.00	0.00
UEIB-40[6]	7,708	916.3	9.89	1.81	0.00	0.00	0.00	7,806	98.0	1.16	0.21	0.00	0.00	0.00	7,916	109.9	1.15	0.21	0.00	0.00	0.00	8,130	213.6	1.95	0.36	0.00	0.00	0.00
UEIB-41[6]	12,825	1,379.7	12.66	2.32	0.00	0.00	0.00	12,977	152.3	2.23	0.41	0.00	0.00	0.00	13,127	150.1	1.64	0.30	0.00	0.00	0.00	13,406	279.2	2.66	0.49	0.00	0.00	0.00
UEIB-42[6]	18,812	465.3	4.95	0.91	0.00	0.00	0.00	19,083	271.1	2.48	0.46	0.00	0.00	0.00	19,481	397.6	4.07	0.75	0.00	0.00	0.00	20,068	587.8	5.49	1.01	0.00	0.00	0.00
UEIB-43	21,835	144.4	1.28	0.23	0.00	0.00	0.00	22,175	340.4	4.10	0.75	0.00	0.00	0.00	22,362	187.1	2.77	0.51	0.00	0.00	0.00	22,396	33.7	0.30	0.05	0.00	0.00	0.00
UEIB-44	3,158	58.3	0.63	0.12	53.22	0.00	0.00	3,204	45.9	0.53	0.10	53.22	0.00	0.00	3,236	32.8	0.38	0.07	53.22	0.00	0.00	3,331	94.8	0.92	0.17	53.22	0.00	0.00
UEIB-45[8]	17,311	340.0	3.69	0.68	1,513.05	34.00	0.36	17,531	220.3	2.65	0.49	1,535.08	22.03	0.25	17,910	378.3	3.73	0.68	1,572.92	37.83	0.41	18,097	187.8	3.46	0.63	1,591.70	18.78	0.21
UEIB-46[9]	2,978	76.9	0.87	0.16	57.32	3.85	0.04	3,033	55.4	0.67	0.12	61.40	4.08	0.05	3,075	41.4	0.46	0.08	65.54	4.14	0.04	3,137	62.0	0.58	0.11	69.71	4.18	0.05
CPR-1[11]	6,770	228.0	3.41	0.63	203.60	0.00	0.00	6,772	2.7	0.32	0.06	203.60	0.00	0.00	6,797	24.7	0.22	0.04	203.60	0.00	0.00	7,156	359.5	3.05	0.56	203.60	0.00	0.00
CPR-2[11]	1,796	0.4	0.01	0.00	40.17	0.00	0.00	1,796	0.0	0.00	0.00	40.17	0.00	0.00	1,804	7.3	0.06	0.01	40.17	0.00	0.00	2,387	583.3	4.69	0.86	40.17	0.00	0.00
EX-1[11]	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2[11]	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3[11]	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4[11]	656	5.3	0.06	0.01	N/A	N/A	N/A	667	10.3	0.10	0.02	N/A	N/A	N/A	670	3.6	0.09	0.02	N/A	N/A	N/A	690	19.3	0.16	0.03	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	400825	11831	129	24	23770	65	1	407422	6597	77	14	23813	43	0	413618	6196	68	12	23865	52	1	425313	11695	102	19	23909	44	0

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Jan 5 - Apr 4, 2022							Apr 5 - Jul 5, 2022							Jul 6 - Oct 3, 2022							Oct 3 - Jan 3, 2023						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [13] (m^3/day)	Fluid Extraction Rate [13] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate [5] (L/day)
UEIB-1 [1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2 [2]/UEIB-52 [14]	1,963	57.0	0.59	0.11	1,587	2.85	0.03	2,039	75.7	0.81	0.15	1,591	3.79	0.04	2,093	54.5	0.63	0.12	1,594	2.72	0.03	2,124	31.1	0.38	0.07	1,596	1.55	0.02
UEIB-3/UEIB-53 [14]	1,082	16.6	0.18	0.03	4,487	0.83	0.01	1,146	63.0	0.60	0.11	4,487	0.32	0.00	1,203	57.2	0.68	0.12	4,487	0.00	0.00	1,265	62.6	0.66	0.12	4,487	0.00	0.00
UEIB-4/UEIB-54 [14]	1,786	81.5	0.89	0.16	270	6.47	0.07	1,868	81.7	0.92	0.17	278	8.17	0.09	1,921	52.9	0.62	0.11	284	5.29	0.06	1,964	43.4	0.47	0.09	288	4.34	0.05
UEIB-5 [8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6 [9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47 [14]	506	27.4	0.28	0.05	5,646	0.00	0.00	540	34.1	0.36	0.07	5,646	0.00	0.00	552	12.4	0.24	0.04	5,646	0.00	0.00	605	52.5	0.49	0.09	5,646	0.00	0.00
UEIB-8/UEIB-48 [14]	5,448	217.8	2.47	0.45	6.80	0.00	0.00	5,594	146.4	1.72	0.32	6.80	0.00	0.00	5,696	102.1	0.94	0.17	6.80	0.00	0.00	5,788	91.8	0.97	0.18	6.80	0.00	0.00
UEIB-9/UEIB-49 [14]	4,851	125.3	1.39	0.26	11.03	0.00	0.00	4,972	120.8	1.33	0.24	11.03	0.00	0.00	5,067	94.3	1.11	0.20	11.03	0.00	0.00	5,178	111.3	1.16	0.21	11.03	0.00	0.00
UEIB-10 [4]/UEIB-50 [14]	2,806	119.7	1.35	0.25	0.00	0.00	0.00	2,906	99.9	1.11	0.20	0.00	0.00	0.00	2,978	72.2	0.85	0.16	0.00	0.00	0.00	3,133	155.3	1.52	0.28	0.00	0.00	0.00
UEIB-11 [3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14 [1,4]/UEIB-51 [14]	2,862	104.0	1.11	0.20	836	0.00	0.00	2,973	111.4	1.19	0.22	836	0.00	0.00	3,055	81.6	0.94	0.17	836	0.00	0.00	3,125	70.8	0.77	0.14	836	0.00	0.00
UEIB-15	14,415	278.0	2.88	0.53	0.00	0.00	0.00	14,649	233.8	2.61	0.48	0.00	0.00	0.00	14,767	118.4	1.48	0.27	0.00	0.00	0.00	14,768	1.2	0.38	0.07	0.00	0.00	0.00
UEIB-16	12,061	167.0	2.05	0.38	0.00	0.00	0.00	12,252	190.3	2.05	0.38	0.00	0.00	0.00	12,446	194.8	2.15	0.39	0.00	0.00	0.00	12,448	2.1	0.77	0.14	0.00	0.00	0.00
UEIB-17	9,438	0.4	0.00	0.00	0.00	0.00	0.00	9,646	208.6	1.86	0.34	0.00	0.00	0.00	9,707	60.8	0.80	0.15	0.00	0.00	0.00	9,923	215.6	2.03	0.37	0.00	0.00	0.00
UEIB-18	13,732	301.9	3.32	0.61	0.00	0.00	0.00	14,040	307.3	3.27	0.60	0.00	0.00	0.00	14,291	251.6	2.98	0.55	0.00	0.00	0.00	14,500	209.0	2.20	0.40	0.00	0.00	0.00
UEIB-19	13,444	603.0	5.48	1.01	0.00	0.00	0.00	13,935	490.5	5.75	1.06	0.00	0.00	0.00	13,961	26.3	0.24	0.04	0.00	0.00	0.00	14,159	198.2	1.92	0.35	0.00	0.00	0.00
UEIB-20/UEIB-56 [14]	21,117	599.0	7.36	1.35	0.00	0.00	0.00	21,996	879.1	8.35	1.53	0.00	0.00	0.00	24,254	2,257.6	21.30	3.91	0.00	0.00	0.00	24,612	358.1	12.39	2.27	0.00	0.00	0.00
UEIB-21	23,187	680.4	8.12	1.49	0.00	0.00	0.00	23,215	27.6	0.25	0.05	0.00	0.00	0.00	23,466	251.3	2.41	0.44	0.00	0.00	0.00	23,793	327.6	4.06	0.75	0.00	0.00	0.00
UEIB-22	10,881	206.1	2.02	0.37	0.00	0.00	0.00	11,211	329.9	3.65	0.67	0.00	0.00	0.00	11,382	171.2	2.08	0.38	0.00	0.00	0.00	11,566	183.8	1.92	0.35	0.00	0.00	0.00
UEIB-23	8,619	145.7	1.57	0.29	0.00	0.00	0.00	8,767	147.6	1.57	0.29	0.00	0.00	0.00	8,912	145.5	1.63	0.30	0.00	0.00	0.00	8,944	31.9	0.57	0.10	0.00	0.00	0.00
UEIB-24	17,440	143.9	2.83	0.52	0.00	0.00	0.00	17,629	189.2	2.19	0.40	0.00	0.00	0.00	17,908	278.6	2.86	0.53	0.00	0.00	0.00	18,200	292.3	3.17	0.58	0.00	0.00	0.00
UEIB-25	10,945	223.9	2.04	0.37	0.00	0.00	0.00	11,175	230.6	2.53	0.47	0.00	0.00	0.00	11,366	190.2	2.21	0.41	0.00	0.00	0.00	11,558	192.5	2.04	0.38	0.00	0.00	0.00
UEIB-26	15,730	150.4	1.77	0.32	0.00	0.00	0.00	15,842	112.0	1.21	0.22	0.00	0.00	0.00	15,936	94.4	1.05	0.19	0.00	0.00	0.00	16,108	171.2	1.61	0.30	0.00	0.00	0.00
UEIB-27	18,433	420.8	4.89	0.90	0.00	0.00	0.00	18,768	335.7	3.70	0.68	0.00	0.00	0.00	18,804	36.1	0.33	0.06	0.00	0.00	0.00	18,927	122.3	1.11	0.20	0.00	0.00	0.00
UEIB-28	9,464	356.8	3.25	0.60	0.00	0.00	0.00	9,686	221.1	2.55	0.47	0.00	0.00	0.00	9,751	65.4	0.93	0.17	0.00	0.00	0.00	9,903	151.8	1.38	0.25	0.00	0.00	0.00
UEIB-29	20,522	624.6	7.65	1.40	0.00	0.00	0.00	21,483	960.8	10.36	1.90	0.00	0.00	0.00	21,836	353.0	5.15	0.94	0.00	0.00	0.00	24,277	2,441.2	18.88	3.46	0.00	0.00	0.00
UEIB-30	9,517	92.3	1.14	0.21	0.00	0.00	0.00	9,664	146.9	1.69	0.31	0.00	0.00	0.00	9,802	137.5	1.51	0.28	0.00	0.00	0.00	10,044	242.2	2.21	0.40	0.00	0.00	0.00
UEIB-31/UEIB-55 [14]	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00
UEIB-32	5,619	67.7	0.85	0.16	71.71	6.77	0.08	5,693	73.6	0.81	0.15	79.08	7.36	0.08	5,744	50.9	0.62	0.11	84.17	5.09	0.06	5,785	41.2	0.46	0.08	88.28	4.12	0.04
UEIB-33	9,005	194.7	2.19	0.40	99.07	9.73	0.11	9,194	188.6	2.16	0.40	108.50	9.43	0.10	9,308	114.0	1.38	0.25	114.20	5.70	0.06	9,826	517.9	4.88	0.90	140.09	25.89	0.28
UEIB-34	9,028	208.6	2.29	0.42	40.07	0.00	0.00	9,126	98.2	1.24	0.23	40.07	0.00	0.00	9,184	58.1	0.65	0.12	40.07	0.00	0.00	9,206	21.6	0.30	0.05	40.07	0.00	0.00
UEIB-35	18,326	574.0	6.17	1.13	0.00	0.00	0.00	18,796	470.0	5.42	1.00	0.00	0.00	0.00	19,161	365.0	4.43	0.81	0.00	0.00	0.00	19,328	166.5	1.89	0.35	0.00	0.00	0.00
UEIB-36	8,048	99.3	1.12	0.21	33.16	0.00	0.00	8,250	202.7	1.95	0.36	33.16	0.00	0.00	8,367	117.0	1.54	0.28	33.16	0.00	0.00	8,424	56.3	0.43	0.08	33.16	0.00	0.00
UEIB-37 [6]	5,873	81.5	0.88	0.16	0.00	0.00	0.00	5,927	54.8	0.67	0.12	0.00	0.00	0.00	5,965	37.7	0.43	0.08	0.00	0.00	0.00	5,996	31.0	0.34	0.06	0.00	0.00	0.00
UEIB-38	2,262	92.1	1.03	0.19	0.00	0.00	0.00	2,316	54.0	0.72	0.13	0.00	0.00	0.00	2,361	44.8	0.51	0.09	0.00	0.00	0.00	2,407	46.0	0.49	0.09	0.00	0.00	0.00
UEIB-39 [6]	6,843	113.1	1.30	0.24	0.00	0.00	0.00	7,004	160.7	1.79	0.33	0.00	0.00	0.00	7,085	81.6	0.96	0.18	0.00	0.00	0.00	7,165	79.6	0.85	0.16	0.00	0.00	0.00
UEIB-40 [6]	8,393	262.7	2.95	0.54	0.00	0.00	0.00	8,597	204.4	1.89	0.35	0.00	0.00	0.00	8,737	139.9	1.62	0.30	0.00	0.00	0.00	8,838	101.2	1.12	0.21	0.00	0.00	0.00
UEIB-41 [6]	13,727	321.0	3.90	0.71	0.00	0.00	0.00	14,351	623.1	6.59	1.21	0.00	0.00	0.00	14,744	393.8	4.60	0.84	0.00	0.00	0.00	14,938	194.0	2.08	0.38	0.00	0.00	0.00
UEIB-42 [6]	20,527	459.2	5.10	0.94	0.00	0.00	0.00	20,964	436.7	4.85	0.89	0.00	0.00	0.00	21,359	394.4	4.42	0.81	0.00	0.00	0.00	21,741	382.7	3.86	0.71	0.00	0.00	0.00
UEIB-43	22,484	88.0	0.80	0.15	0.00	0.00	0.00	22,484	0.0	0.00	0.00	0.00	0.00	0.00	22,484	-	-	0.00	0.00	0.00	0.00	22,572	87.8	0.80	0.15	0.00	0.00	0.00
UEIB-44	3,397	66.2	0.72	0.13	53.22	0.00	0.00	3,455	57.6	0.67	0.12	53.22	0.00	0.00	3,490	35.5	0.42	0.08	53.22	0.00	0.00	3,539	48.2	0.49	0.09	53.22	0.00	0.00
UEIB-45 [8]	18,339	241.4	2.64	0.48	1,615.84	24.14	0.27	18,529	190.5	2.17	0.40	1,634.89	19.05	0.21	18,782	252.3	2.80	0.51	1,660.12	25.23	0.28	19,254	472.5	4.58	0.84	1,707.37	47.25	0.51
UEIB-46 [9]	3,204	66.9	0.75	0.14	71.31	1.59	0.02	3,319	115.5	1.17	0.21	71.31	0.00	0.00	3,379	59.5	0.71	0.13	71.31	0.00	0.00	3,456	77.3	0.79	0.14	71.31	0.00	0.00
CPR-1 [11]	7,509	352.4	4.19	0.77	203.60	0.00	0.00	7,612	102.8	1.86	0.34	0.00	0.00	0.00	7,645	33.3	0.37	0.07	0.00	0.00	0.00	7,645	0.4	0.06	0.01	0.00	0.00	0.00
CPR-2 [11]	2,663	276.2	7.09	1.30	40.17	0.00	0.00	2,664	0.6	0.01	0.00	0.00	0.00	0.00	2,664	-	0.00	0.00	0.00	0.00	0.00	2,664	-	-	0.00	0.00	0.00	0.00
EX-1 [11]	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2 [11]	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3 [11]	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4 [11]	696	6.3	0.09	0.02	N/A	N/A	N/A	705	8.9	-	0.00	N/A	N/A	N/A	719	14.2	0.15	0.03	N/A	N/A	N/A	720	0.9	0.05	0.01	N/A	N/A	N/A
U2-5 [11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	434628	9315	109	20	23961	52	1	443414	8787	96	18	23766	48	1	450766	7352	81	15	23810	44	0	458851	8085	87	16	23893	83	1

Notes:

1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

AECOM

TABLE 2-5
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM
PARKLAND BURNABY REFINERY

Extraction Well	Jan 3 - Apr 4, 2023							Apr 4 - Jul 4, 2023							Jul 4 - Oct 3, 2023							Oct 3 - Jan 3, 2024						
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[13] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A
UEIB-2[2]/UEIB-52[14]	2,138	13.6	0.21	0.04	1,596	0.68	0.01	2,151	13.1	0.10	0.02	1,597	0.65	0.01	2,172	21.4	0.24	0.04	1,598	1.07	0.01	2,182	9.6	0.14	0.03	1,598	0.48	0.01
UEIB-3/UEIB-53[14]	1,313	48.0	0.58	0.11	4,487	0.00	0.00	1,330	16.8	0.19	0.03	4,487	0.00	0.00	1,344	13.5	0.15	0.03	4,487	0.00	0.00	1,364	20.5	0.22	0.04	4,487	0.00	0.00
UEIB-4/UEIB-54[14]	1,993	28.5	0.32	0.06	291	2.85	0.03	2,028	35.6	0.42	0.08	294	3.56	0.04	2,063	35.0	0.38	0.07	298	3.50	0.04	2,107	44.1	0.44	0.08	302	4.41	0.05
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A
UEIB-7/UEIB-47[14]	1,024	419.7	3.37	0.62	5,646	0.00	0.00	1,102	77.4	1.78	0.33	5,646	0.00	0.00	1,117	15.0	0.20	0.04	5,646	0.00	0.00	1,136	18.9	0.21	0.04	5,646	0.00	0.00
UEIB-8/UEIB-48[14]	5,955	167.4	1.73	0.32	6.80	0.00	0.00	6,096	140.2	1.62	0.30	6.80	0.00	0.00	6,193	97.6	1.21	0.22	6.80	0.00	0.00	6,394	200.4	1.71	0.31	6.80	0.00	0.00
UEIB-9/UEIB-49[14]	5,311	132.9	1.36	0.25	11.03	0.00	0.00	5,454	143.3	1.50	0.27	11.03	0.00	0.00	5,610	155.6	1.75	0.32	11.03	0.00	0.00	5,745	135.7	1.58	0.29	11.03	0.00	0.00
UEIB-10[4]/UEIB-50[14]	3,303	169.8	1.99	0.36	0.00	0.00	0.00	3,419	116.1	1.18	0.22	0.00	0.00	0.00	3,489	69.9	0.84	0.15	0.00	0.00	0.00	3,582	92.5	0.91	0.17	0.00	0.00	0.00
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[14]	3,195	69.9	0.93	0.17	836	0.00	0.00	3,284	88.8	0.81	0.15	836	0.00	0.00	3,354	69.9	0.78	0.14	836	0.00	0.00	3,443	89.0	0.89	0.16	836	0.00	0.00
UEIB-15	14,996	227.8	2.07	0.38	0.00	0.00	0.00	15,186	189.9	2.76	0.51	0.00	0.00	0.00	15,254	67.6	0.98	0.18	0.00	0.00	0.00	15,382	127.9	1.14	0.21	0.00	0.00	0.00
UEIB-16	12,546	97.3	0.69	0.13	0.00	0.00	0.00	12,901	355.2	3.41	0.62	0.00	0.00	0.00	13,077	175.7	2.15	0.39	0.00	0.00	0.00	13,453	376.9	3.35	0.61	0.00	0.00	0.00
UEIB-17	10,342	419.2	4.13	0.76	0.00	0.00	0.00	10,623	280.7	3.67	0.67	0.00	0.00	0.00	10,671	48.7	0.75	0.14	0.00	0.00	0.00	10,939	267.4	2.09	0.38	0.00	0.00	0.00
UEIB-18	15,060	559.8	5.15	0.94	0.00	0.00	0.00	15,486	425.7	5.06	0.93	0.00	0.00	0.00	15,680	193.6	3.00	0.55	0.00	0.00	0.00	16,202	522.6	4.28	0.79	0.00	0.00	0.00
UEIB-19	14,623	463.7	4.36	0.80	0.00	0.00	0.00	15,134	511.5	5.86	1.08	0.00	0.00	0.00	15,345	210.7	3.00	0.55	0.00	0.00	0.00	16,725	1,380.1	10.68	1.96	0.00	0.00	0.00
UEIB-20/UEIB-56[14]	24,612	0.4	0.01	0.00	0.00	0.00	0.00	24,612	0.1	0.00	0.00	0.00	0.00	0.00	24,612	0.1	0.00	0.00	0.00	0.00	0.00	24,613	0.1	0.00	0.00	0.00	0.00	0.00
UEIB-21	24,509	715.8	7.38	1.35	0.00	0.00	0.00	24,829	319.5	3.21	0.59	0.00	0.00	0.00	25,319	490.3	5.21	0.96	0.00	0.00	0.00	25,853	533.5	4.98	0.91	0.00	0.00	0.00
UEIB-22	11,903	337.9	3.11	0.57	0.00	0.00	0.00	12,287	383.8	3.91	0.72	0.00	0.00	0.00	12,536	248.9	3.23	0.59	0.00	0.00	0.00	12,762	225.6	2.39	0.44	0.00	0.00	0.00
UEIB-23	8,985	40.2	0.43	0.08	0.00	0.00	0.00	9,022	37.9	0.43	0.08	0.00	0.00	0.00	9,054	31.7	0.38	0.07	0.00	0.00	0.00	9,092	38.1	0.39	0.07	0.00	0.00	0.00
UEIB-24	18,588	387.3	3.92	0.72	0.00	0.00	0.00	18,971	382.9	4.12	0.76	0.00	0.00	0.00	19,407	436.4	4.56	0.84	0.00	0.00	0.00	20,135	728.3	6.98	1.28	0.00	0.00	0.00
UEIB-25	11,859	300.9	2.93	0.54	0.00	0.00	0.00	12,165	305.6	3.39	0.62	0.00	0.00	0.00	12,394	229.2	2.68	0.49	0.00	0.00	0.00	12,550	156.3	1.98	0.36	0.00	0.00	0.00
UEIB-26	16,468	360.0	3.45	0.63	0.00	0.00	0.00	16,660	192.7	3.04	0.56	0.00	0.00	0.00	16,804	143.9	1.85	0.34	0.00	0.00	0.00	17,077	273.2	2.38	0.44	0.00	0.00	0.00
UEIB-27	19,028	101.7	1.59	0.29	0.00	0.00	0.00	19,401	372.3	2.52	0.46	0.00	0.00	0.00	19,658	257.3	3.46	0.64	0.00	0.00	0.00	20,128	470.3	4.51	0.83	0.00	0.00	0.00
UEIB-28	10,259	356.2	3.60	0.66	0.00	0.00	0.00	10,424	165.0	2.43	0.45	0.00	0.00	0.00	10,571	146.6	1.57	0.29	0.00	0.00	0.00	10,816	245.1	2.35	0.43	0.00	0.00	0.00
UEIB-29	25,120	843.2	12.40	2.27	0.00	0.00	0.00	27,504	2,384.2	20.13	3.69	0.00	0.00	0.00	28,471	966.8	15.94	2.92	0.00	0.00	0.00	29,010	539.5	5.35	0.98	0.00	0.00	0.00
UEIB-30	10,251	207.0	2.54	0.47	0.00	0.00	0.00	10,335	84.2	1.69	0.31	0.00	0.00	0.00	10,348	13.1	0.38	0.07	0.00	0.00	0.00	10,585	236.6	1.76	0.32	0.00	0.00	0.00
UEIB-31/UEIB-55[14]	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00	6,239	-	-	0.00	0.00	0.00	0.00
UEIB-32	5,846	61.4	0.62	0.11	94.43	6.14	0.06	5,911	64.4	0.69	0.13	100.87	6.44	0.07	5,958	47.1	0.56	0.10	105.58	4.71	0.06	6,008	50.3	0.52	0.10	110.61	5.03	0.05
UEIB-33	10,543	717.4	7.82	1.43	175.96	35.87	0.39	11,096	552.6	6.27	1.15	203.59	27.63	0.31	11,252	156.2	2.12	0.39	211.40	7.81	0.11	11,309	56.7	0.53	0.10	214.23	2.84	0.03
UEIB-34	9,227	21.4	0.18	0.03	40.07	0.00	0.00	9,328	101.1	0.87	0.16	40.07	0.00	0.00	9,410	81.3	1.04	0.19	40.07	0.00	0.00	9,446	36.8	0.56	0.10	40.07	0.00	0.00
UEIB-35	19,596	268.7	2.61	0.48	0.00	0.00	0.00	19,917	320.0	3.23	0.59	0.00	0.00	0.00	20,054	137.2	2.00	0.37	0.00	0.00	0.00	20,267	212.7	2.16	0.40	0.00	0.00	0.00
UEIB-36	8,516	91.9	1.06	0.19	33.16	0.00	0.00	8,672	156.5	1.37	0.25	33.16	0.00	0.00	8,811	139.2	1.76	0.32	33.16	0.00	0.00	8,856	45.0	0.78	0.14	33.16	0.00	0.00
UEIB-37[6]	6,041	44.8	0.44	0.08	0.00	0.00	0.00	6,085	43.7	0.49	0.09	0.00	0.00	0.00	6,119	34.1	0.41	0.07	0.00	0.00	0.00	6,153	34.6	0.37	0.07	0.00	0.00	0.00
UEIB-38	2,474	67.2	0.74	0.14	0.00	0.00	0.00	2,542	68.1	0.74	0.14	0.00	0.00	0.00	2,599	56.8	0.66	0.12	0.00	0.00	0.00	2,671	72.8	0.73	0.13	0.00	0.00	0.00
UEIB-39[6]	7,274	108.6	1.15	0.21	0.00	0.00	0.00	7,399	125.8	1.33	0.24	0.00	0.00	0.00	7,495	95.4	1.20	0.22	0.00	0.00	0.00	7,600	104.9	1.10	0.20	0.00	0.00	0.00
UEIB-40[6]	8,989	151.1	1.57	0.29	0.00	0.00	0.00	9,114	124.7	1.39	0.25	0.00	0.00	0.00	9,203	89.0	1.07	0.20	0.00	0.00	0.00	9,324	120.6	1.16	0.21	0.00	0.00	0.00
UEIB-41[6]	15,076	138.0	1.49	0.27	0.00	0.00	0.00	15,225	148.7	1.61	0.30	0.00	0.00	0.00	15,418	193.0	1.96	0.36	0.00	0.00	0.00	15,607	188.5	2.03	0.37	0.00	0.00	0.00
UEIB-42[6]	22,255	513.6	5.79	1.06	0.00	0.00	0.00	22,777	522.3	5.59	1.02	0.00	0.00	0.00	23,147	369.7	4.49	0.82	0.00	0.00	0.00	23,377	229.9	2.18	0.40	0.00	0.00	0.00
UEIB-43	22,975	403.2	4.46	0.82	0.00	0.00	0.00	23,306	331.5	3.67	0.67	0.00	0.00	0.00	23,913	606.7	6.16	1.13	0.00	0.00	0.00	24,213	299.7	3.19	0.59	0.00	0.00	0.00
UEIB-44	3,618	79.6	0.72	0.13	53.22	0.00	0.00	3,702	83.6	0.96	0.18	53.22	0.00	0.00	3,770	68.4	0.84	0.15	53.22	0.00	0.00	3,840	69.9	0.71	0.13	53.22	0.00	0.00
UEIB-45[8]	19,601	346.6	5.80	1.06	1,742.03	34.66	0.63	19,946	345.3	4.08	0.75	1,776.56	34.53	0.41	20,013	67.4	1.54	0.28	1,783.30	6.74	0.09	20,386	372.8	2.68	0.49	1,820.58	37.28	0.31
UEIB-46[9]	3,534	78.4	0.81	0.15	71.31	0.00	0.00	3,600	65.2	0.74	0.13	71.31	0.00	0.00	3,644	44.8	0.54	0.10	71.31	0.00	0.00	3,695	51.0	0.52	0.10	71.31	0.00	0.00
CPR-1[11]	7,779	133.1	1.46	0.27	0.00	0.00	0.00	7,957	178.9	1.97	0.36	0.00	0.00	0.00	7,957	-	-	0.00	0.00	0.00	0.00	7,957	-	-	0.00	0.00	0.00	0.00
CPR-2[11]	495	(2,168.7)	(23.82)	-4.37	0.00	0.00	0.00	508	12.8	0.14	0.03	0.00	0.00	0.00	508	-	-	0.00	0.00	0.00	0.00	508	-	-	0.00	0.00	0.00	0.00
EX-1[11]	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A	7,127	N/A	N/A	N/A	N/A	N/A	N/A
EX-2[11]	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A	974	N/A	N/A	N/A	N/A	N/A	N/A
EX-3[11]	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A	2,937	N/A	N/A	N/A	N/A	N/A	N/A
EX-4[11]	720	-	-	0.00	N/A	N/A	N/A	720	-	-	0.00	N/A	N/A	N/A	720	-	-	0.00	N/A	N/A	N/A	720	-	-	0.00	N/A	N/A	N/A
U2-5[11]	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A	503	N/A	N/A	N/A	N/A	N/A	N/A
Total	466376	7525	81	15	23973	80	1	476643	10268	108	20	24046	73	1	482968	6325	81	15	24070	24	0	491647	8679	80	15	24120	50	0

Notes:

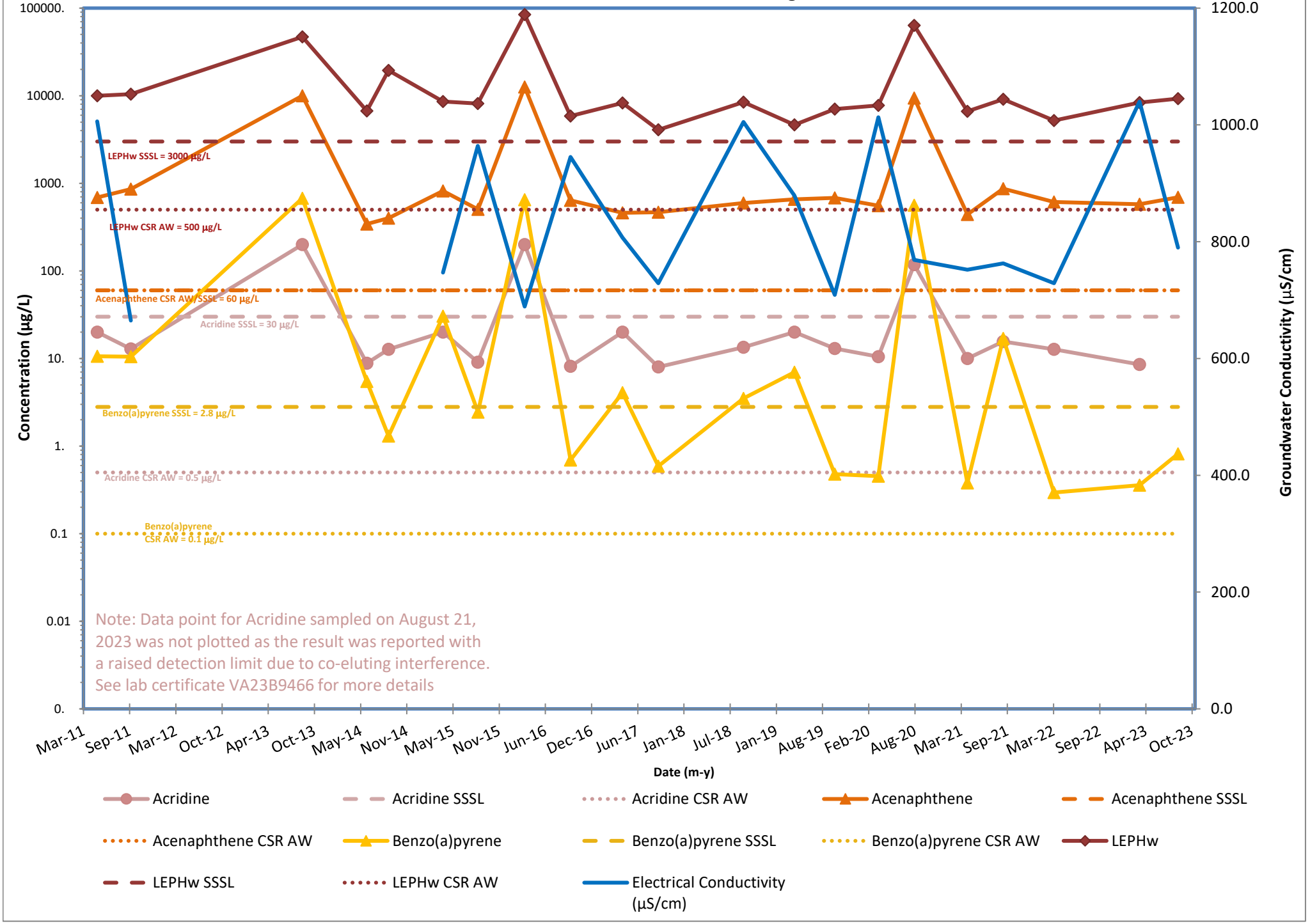
1. UEIB-1 operated from August 5, 2010 to March 17, 2011. On March 17, UEIB-1 was replaced with UEIB-14.
2. UEIB-2 operated from August 5 to 25, 2010 and continuously since February 1, 2011.
3. UEIB-11 operated from August 25, 2010 to February 1, 2011.
4. UEIB-10 operated from December 2010 to July 2012. In July 2012, UEIB-10 was replaced with UEIB-32. On December 17, 2015, pump in UEIB-14 was moved to UEIB-10.
5. NAPL extraction rate measured as total NAPL extracted since previous measuring event.
6. No pump tests done before July 2012. Assumed rate of 0.90 L/count.
7. Pumps UEIB-32 to UEIB-44 not started until September 27, 2011. Rates listed for those pumps are taken from measurements completed from September 27 to October 24, 2011. Due to this exception, cummulative extracted fluids and NAPL were not calculated.
8. Pump operated in UEIB-5 until June 2012, then it was moved into UEIB-45.
9. Pump operated in UEIB-6 until June 2012, then it was moved into UEIB-46.
10. Extraction rate values calculated from change in counter readings between June 21 to June 27.
11. For November 22, 2012 Summary Table results, CPR-(1,2), EX-(1,2,3,4) and U2-5 data was collected on Oct.22,24, 2012.
12. Transducer Data - during rebound testing, all pumps were shut off from Oct.11-12, 2011 to Mar.14-22, 2012 with the exception of test pumps (UEIB-5,6,22,23,35 and 36).
13. Fluid extraction rate based on the average of the last five measurements.
14. A replaced well was installed to replace the shallow extraction well. The AP4 pump was swapped from the shallow well to the deep well and installed in the week of October 2, 2017

Abbreviations:

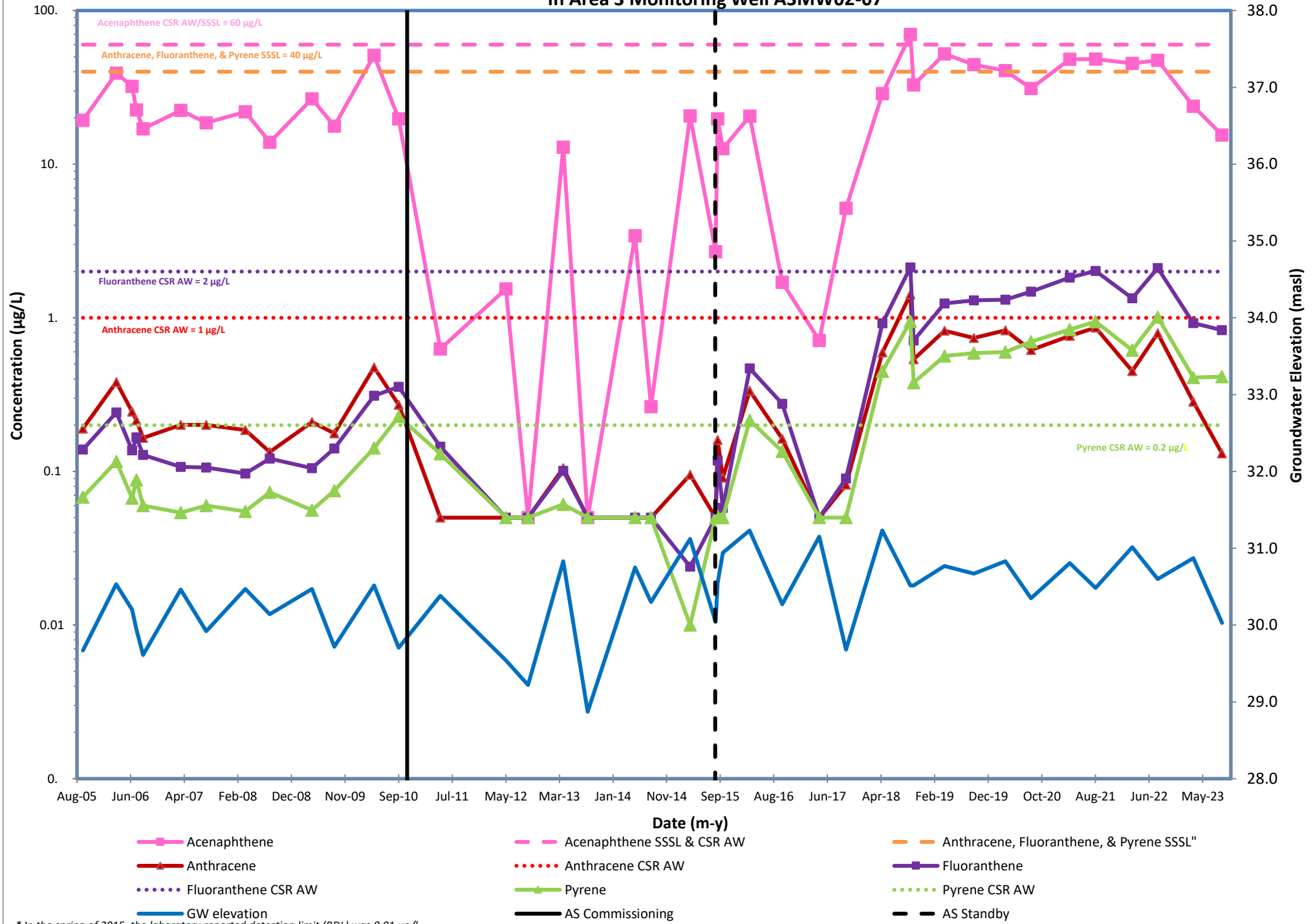
N/A - Not available (pump not installed/running at this time.
UK - Unknown (not enough data).
NAPL - Non-Aqueous Phase Liquids
PHC - Petroleum Hydrocarbons
m - Metres
L - Litres
Kg - Kilograms
gpm - Gallons per minute

GRAPHS

Graph 1: Concentrations of Acridine, Acenaphthene, Benzo(a)pyrene, and LEPHw in Area 3 Monitoring Well U07-10S

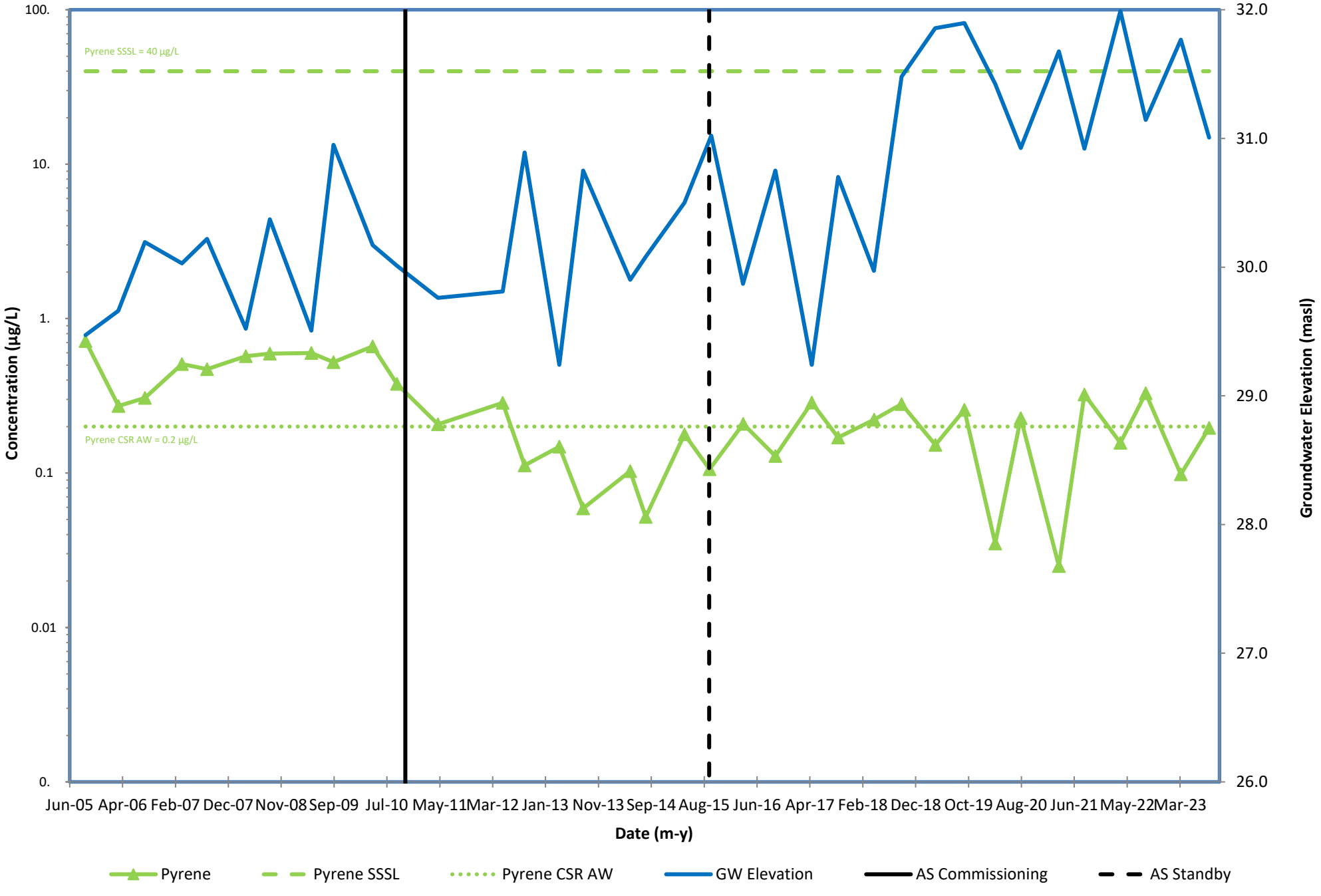


Graph 2: Concentrations of Acenaphthene, Anthracene, Fluoranthene, and Pyrene In Area 3 Monitoring Well A3MW02-07



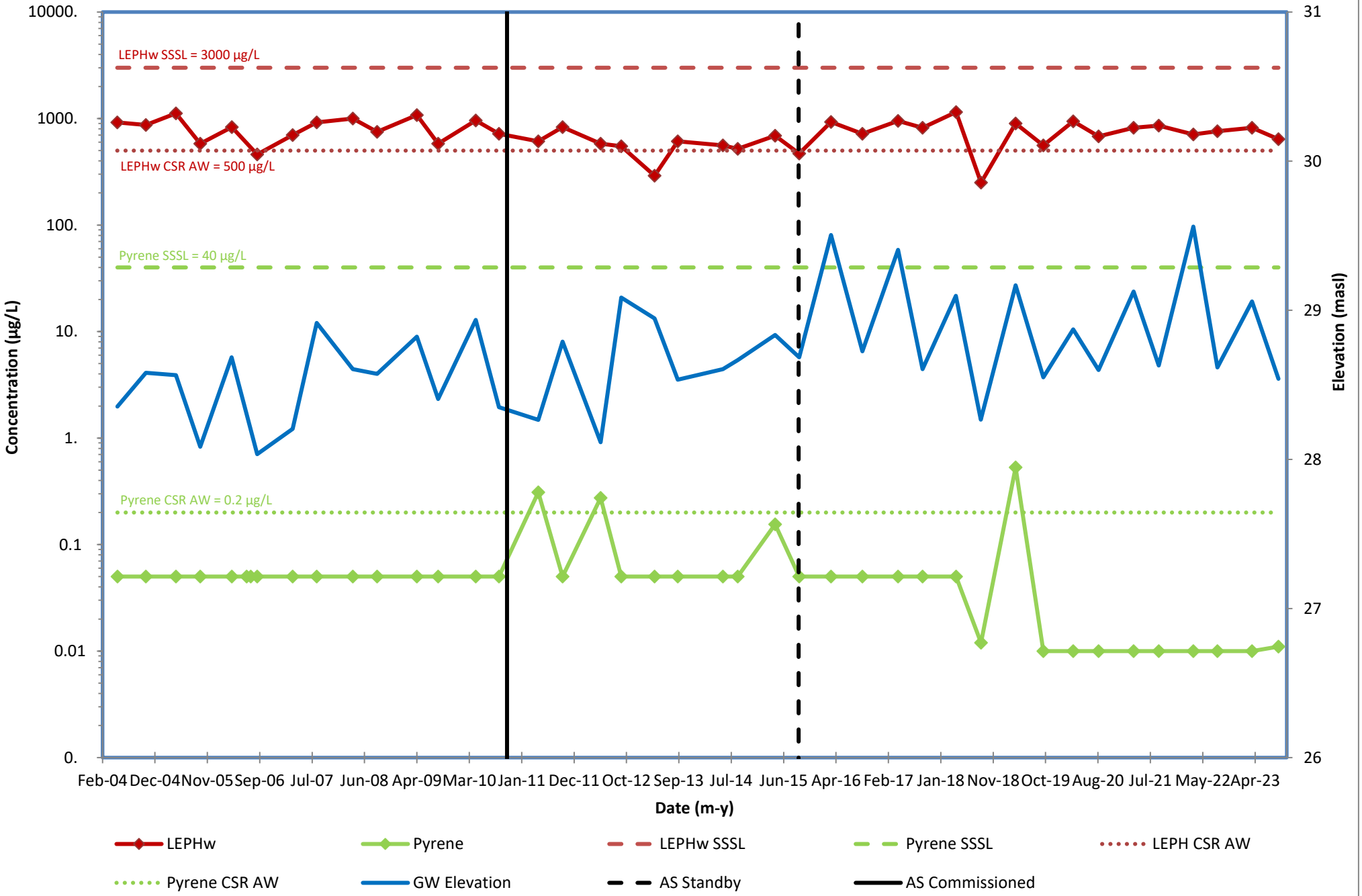
** In the spring of 2015, the laboratory reported detection limit (RDL) was 0.01 µg/l*

Graph 3: Concentrations of Pyrene
In Area 3 Monitoring Well A3MW02-08



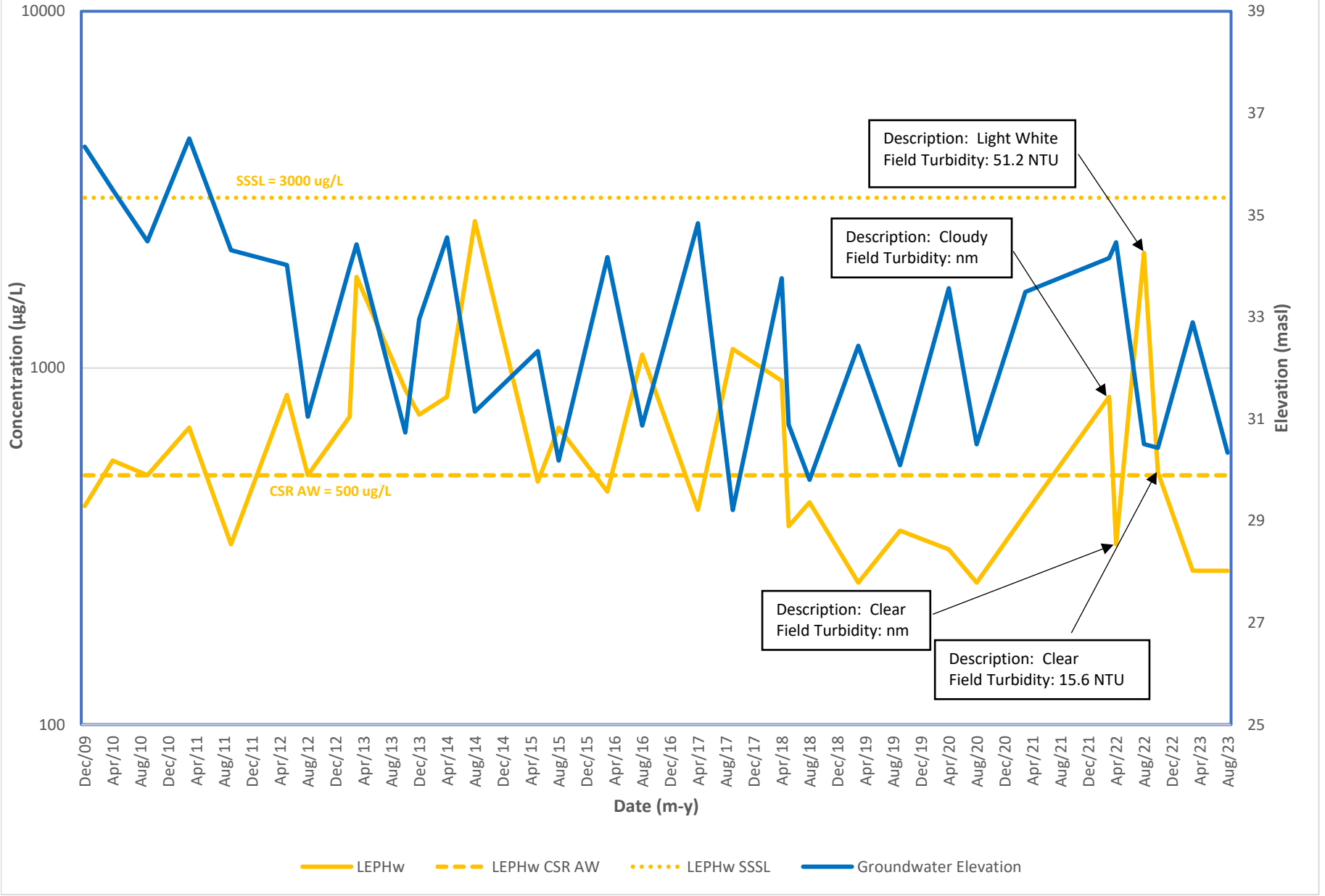
** In the spring of 2015, the laboratory reported detection limit (RDL) was 0.01 µg/l*

Graph 4: Concentrations of LEPHw, and Pyrene in Area 3 Monitoring Well A3MW03-02

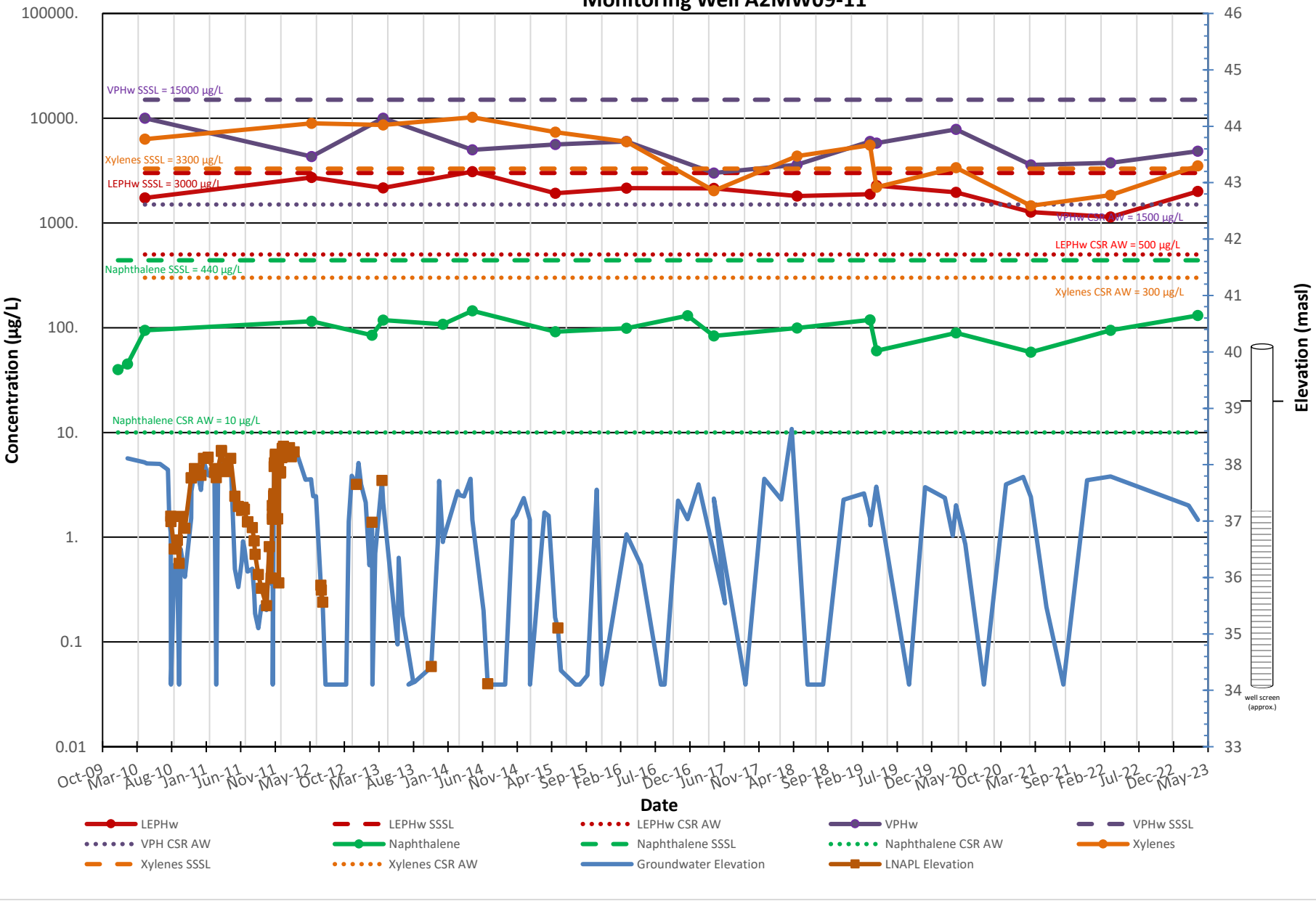


** As of September 2018, the laboratory reported detection limit (RDL) was 0.01 µg/l*

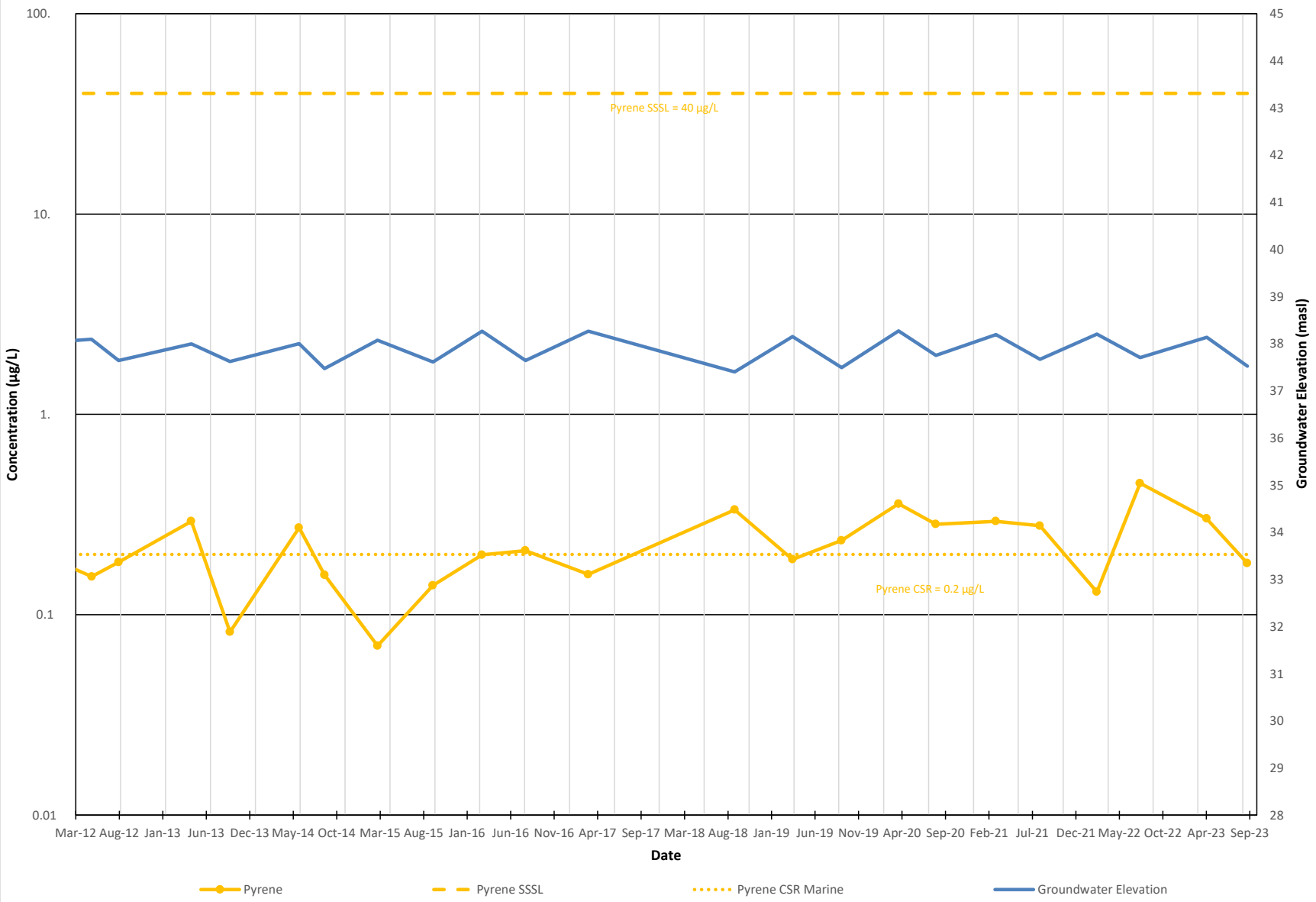
Graph 5: Concentrations of LEPHw in Area 2 Monitoring Well A2MW09-05I



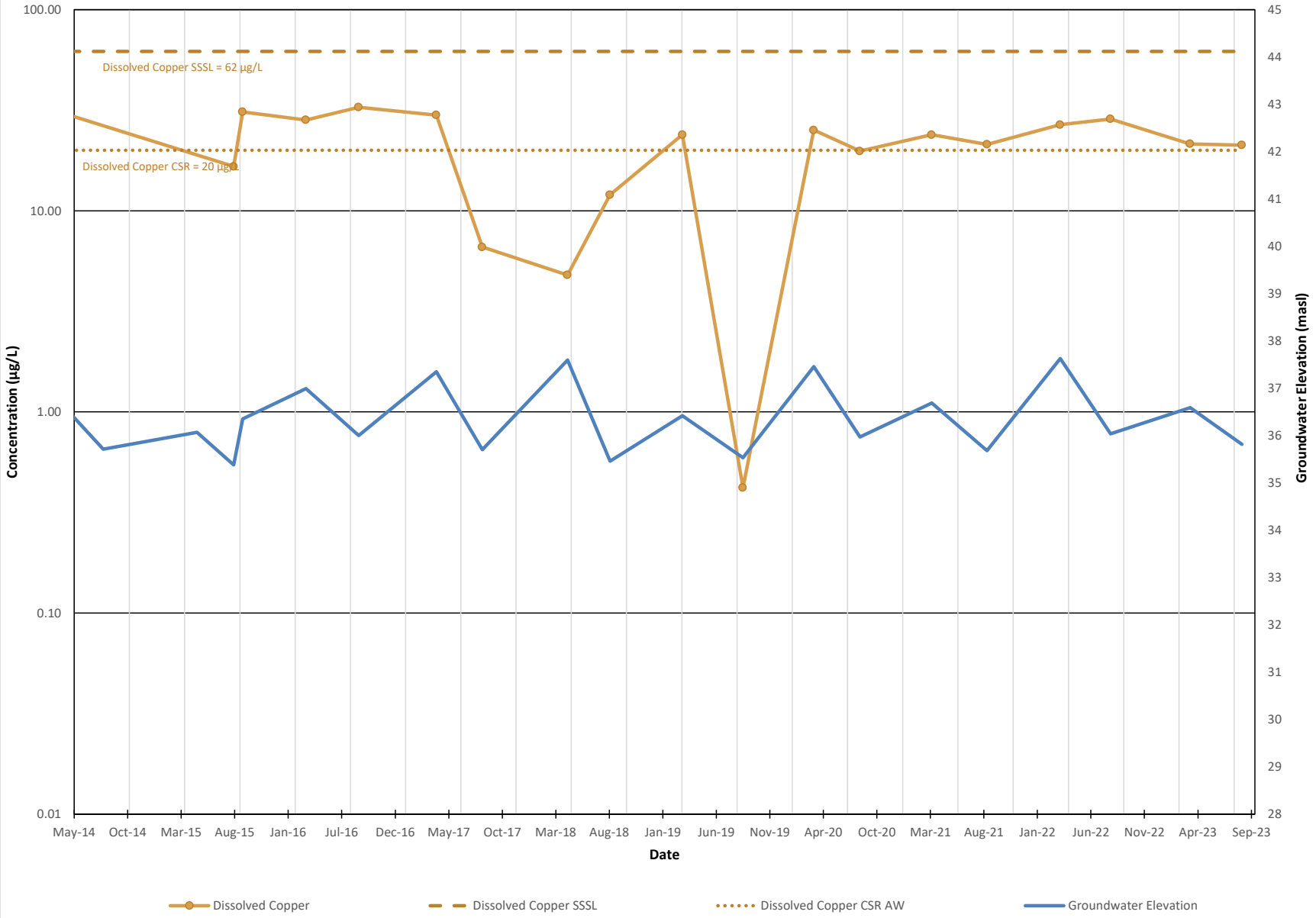
Graph 6: Concentrations of LEPHw, VPHw, Xylenes, and Naphthalene in Area 2 Monitoring Well A2MW09-11



Graph 7: Concentrations of Pyrene in Area 2 Monitoring Well G2-3B



Graph 8: Concentrations of Dissolved Copper in Area 2 Monitoring Well MW11-4S



Appendix A Regulatory Context and SSSLs

1 REGULATORY CONTEXT FOR PERIMETER GROUNDWATER MONITORING PROGRAM

The British Columbia Provincial *Environmental Management Act* (EMA) was brought into force on July 8, 2004. The applicable regulations under the EMA are the Contaminated Sites Regulation (CSR) and the Hazardous Waste Regulation (HWR). Federal environmental legislation applicable to Burrard Inlet adjacent to the Site includes the *Fisheries Act*.

1.1 Fisheries Act

The Fisheries Act, administered by the Fisheries and Oceans Canada (DFO), prohibits the discharge of a deleterious substance into an aquatic environment and is enforced by Environment and Climate Change Canada, DFO, and the British Columbia Ministry of the Environment and Climate Change Strategy (ENV). Deleterious substances are defined as any substance that, if added to any water, would degrade or alter its quality such that it could be harmful to fish, fish habitat, or the use of fish by people and therefore includes contaminants regulated by the CSR.

1.2 Contaminated Sites Regulation

ENV has established standards for evaluating contamination and associated remediation requirements in the CSR. The CSR came into effect on April 1, 1997 and provides a framework to investigate, assess, and remediate contaminated sites in BC. Fourteen amendments to the CSR have been completed since 1997, with the most recent being Stage 14, effective March 1, 2023. Ministerial Order No. M164 also took effect which included amendments to select sections of the CSR.

The CSR contains schedules of standards for environmental protection:

- 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 Standards;
- Schedule 3.3 – Generic Numerical Vapour Standards; and
- Schedule 3.4 – Generic Numerical Sediment Standards.

1.3 Soil

Under the CSR, there are three types of numerical remediation soil standards.

1. The Generic Numerical Soil Standards refer to concentrations of specific substances in soil, for a particular land or water use.
2. Matrix Numerical Standards are applied for some substances in soil, taking into account site-specific factors such as proximity to a watercourse, likelihood of human ingestion, and use of land for livestock rearing.
3. Site-Specific Numerical Standards involve the generation of a soil standard for a specific site, in accordance with ENV protocols. Site-Specific Numerical Standards may require ENV approval before being applied at a site.

Sites are considered contaminated if any parameter exceeds the numerical standard for the applicable use at the property.

1.4 Groundwater

The Site is zoned for heavy industrial use. The following is a discussion of the applicable groundwater standards at the Site. Water quality standards are classified into four levels, based on the use of the water:

- AW - Aquatic life (freshwater and/or marine/estuarine);
- IW - Irrigation;
- LW - Livestock watering; and
- DW - Drinking water.

Based on the surrounding site use neither irrigation nor livestock watering standards apply at the Site.

Additionally, numeric water standards for the generic petroleum hydrocarbon (PHC) parameters “volatile hydrocarbon in water” ($VH_{WC6-C10}$) and “extractable petroleum hydrocarbons in water” ($EPHw_{C10-C19}$) are applicable at all sites regardless of water use.

ENV requires specific analysis for light extractable petroleum hydrocarbons in water (LEPHw) in support of Certificates and Determinations and will not consider $EPHw_{C10-C19}$ analyses appropriate for assessing LEPHw contamination. At low concentrations, EPHw is used as an indicator test for LEPHw. LEPHw concentrations are based on $EPHw_{C10-C19}$ concentrations minus the six polycyclic aromatic hydrocarbons (PAH) compounds (acenaphthene, acridine, anthracene, fluorene, naphthalene, and phenanthrene). The six PAH compounds are reported separately.

1.4.1 Applicability of Drinking Water Standards

Under ENV guidance, drinking water standards are applicable at all sites unless they are determined to be not applicable using Protocol 21 (ENV 2017), or an exemption is granted by the ENV.

A letter requesting a drinking water standards exemption for Area 2 of the Refinery was submitted to ENV on December 19, 2011 and re-submitted on November 9, 2012. The drinking water exemption was provided by the ENV on May 15, 2017.

To determine whether drinking water applies to Areas 1 and 3, the drinking water flowcharts at the end of Protocol 21 (Figures 1 and 4 in the Protocol) were reviewed in which Area 3 was assessed separately from Area 1. This approach was implemented in the 2015 and 2016 PMP and PES Monitoring Report which determined that drinking water does not apply to any of the areas of the Parkland Burnaby Refinery (AECOM, 2017).

A copy of the drinking water exemption response letter prepared by ENV for Area 2, as well as the Area 1 and Area 3 assessments, have been included at the end of this Appendix.

1.4.2 Applicability of Aquatic Life Standards

The nearest surface water downgradient of the Site is Burrard Inlet, located approximately 10 m to the north of Areas 1 and 3, and 40 m north of Area 2. Assessment of the Site’s hydrogeology and potential pathways for groundwater contamination, using the available data from numerous soil and groundwater investigations, indicated that CSR standards for the protection of marine aquatic life (AW) are applicable at the Site[3]. Rainbow Creek, a freshwater waterbody, is located within close vicinity to MW17-04, as a result, this well was also compared against freshwater (FW) aquatic life standards. This is the only well in the PMP required to be screened against FW AW standards.

[3] https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol_21.pdf

1.4.3 Groundwater Site-Specific Screening Levels

The Site-Specific Screening Levels (SSSLs) were first introduced in the Report on the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System, Chevron Burnaby Refinery, Burnaby British Columbia (AECOM 2017). SSSLs for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of Parkland and AECOM, to evaluate potential risks resulting from impacted Site groundwater to Burrard Inlet. The SSSLs were based on the CSR Stage 10 Omnibus Amendments in addition to the Updated Screening Levels (USLs) and Risk-Based Management Targets (RBMTs) developed for application along the Foreshore downslope of Area 2 of the Refinery. Upon the release of the Stage 11 and 12 Housekeeping Amendment, the SSSLs were reviewed by AECOM. The CSR AW standards for parameters which have SSSLs did not change between Stage 10, Stage 11, Stage 12, and Stage 13 Amendments. In December 2020, ENV provided comments by e-mail that recognized that Parkland had prepared SSSLs as “threshold” concentration for evaluation but re-enforced that they do not replace the CSR standards unless formally approved by ENV. Parkland is using the SSSLs as an extra layer of assessment to identify areas of greater environmental concern. The SSSLs are being used to target investigation and monitoring activities on the site. They are used in conjunction with the applicable CSR standards. All delineation at the site will be to the applicable CSR standards.

The groundwater SSSLs for the Parkland Refinery monitoring wells located in Areas 1, 2, and 3 are summarized in Table 1 below. The supporting rationale is presented in Section 2.

Table 1: Groundwater Site-Specific Screening Levels (SSSLs)

PCOC Group	PCOC	SSSL (µg/L)	Source
PHCs	LEPHw	3000	RBMT x 10
	VPHw	15000	RBMT x 10
	Benzene	21000	RBMT x 10
	Ethylbenzene	3200	RBMT x 10
	Toluene	7700	RBMT x 10
	Xylenes	3300	RBMT x 10
PAHs	Acridine	30	USL x 10
	Anthracene	40	USL x 10
	Benzo[a]pyrene	2.8	RBMT x 10
	Fluoranthene	40	USL x 10
	Naphthalene	440	RBMT x 10
	Pyrene	40	USL x 10
Metals	Cadmium	90	USL x 10
	Chromium	500	USL x 10
	Cobalt	1100	USL x 10
	Copper	62	RBMT x 10
	Lead	1400	USL x 10
	Nickel	750	USL x 10
	Uranium	1000	USL x 10
	Zinc	900	RBMT x 10

Definitions:
PCOC – Potential Contaminant of Concern
PAH – Polycyclic Aromatic Hydrocarbon
LEPHw – Light Extractible Petroleum Hydrocarbon in Water
VPHw – Volatile Petroleum Hydrocarbon in Water
RBMT – Risk-Based Management Targets
USL – Updated Screening Levels
SSSL – Site Specific Screening Limits

2 SITE-SPECIFIC SCREENING LEVEL RATIONALE

This section outlines the rationale for the selection of the SSSLs for groundwater for the Perimeter Monitoring Program for Areas 1, 2, and 3 of the Refinery. The sources of values used to derive the SSSLs are presented in Section 2.1 and the approach followed to obtain the SSSLs is described in Section 2.2.

2.1 Sources of SSSLs

The sources of SSSLs included:

- USLs for Foreshore Monitoring (SLR 2013a and 2013b);
- RBMTs for the Seep Area along the Foreshore Downslope of East Impounding Basin (SLR 2014a and 2014b); and
- The BC CSR, Stage 10 (Omnibus) Amendments, Schedule 3.2 – AW Standard for the Protection of Aquatic Life.

2.2 Updated Screening Levels

The USLs were used as part of the Foreshore Monitoring Plan to evaluate porewater and surface water samples collected in the foreshore downslope of Area 2 of the Refinery. The USLs were presented to BC ENV in two memoranda prepared by SLR: Updated Screening Levels for Foreshore Monitoring and Updated Screening Levels for Foreshore Monitoring - Addendum, dated May 9, 2013, and June 6, 2013, respectively. The USLs were based on the BC Approved Water Quality Guidelines (AWQG) for the protection of marine aquatic life, the Burrard Inlet Water Quality Objectives (BIWQOs), the Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life, and the Federal Interim Groundwater Quality Guidelines (FIGQG) for Federal Contaminated Sites (Meridian 2012). The rationale supporting each proposed USL was provided in the SLR memoranda (2013a and 2013b). Upon review, BC ENV confirmed that the selected screening levels were satisfactory to the Ministry (BC MoE 2013).

The USLs were used to evaluate potential contaminants of concern (PCOCs) in the porewater and seawater along the foreshore in the vicinity of the seeps and at a reference location, to assess the performance of the Interim Remedial Action (IRA), and, to support the selection of PCOCs for the Human Health and Ecological Risk Assessments completed for the foreshore downslope of Area 2 (SLR 2016).

2.2.1 Risk-Based Management Targets

RBMTs were derived by SLR for PCOCs associated with the seeps observed in the foreshore area downslope of the East Impounding Basin (EIB) in Area 2 at the Parkland Refinery in Burnaby, BC. The PCOCs for which RBMTS were derived were selected based on the final pore water and surface water PCOCs retained in the Human Health and Ecological Risk Assessment (HHERA) for the protection of marine aquatic life (SLR 2014a). PCOCs for which RBMTs were proposed included LEPHw, VPHw, BTEX, benzo(a)pyrene, naphthalene, copper, and zinc. RBMTs were developed to be protective of aquatic plants and invertebrates at the community level and fish at the population level and were defined as the concentrations of PCOC in porewater below which the ecological function of aquatic plants and invertebrates and the viability of local fish population can be maintained. Literature sources reviewed in the derivation of the RBMTs for aquatic receptors included:

- Technical supporting documents published by BC MoE as part of the BC AWQG.
- Technical supporting documents published by CCME as part of the Canadian Environmental Quality Guidelines for the protection of aquatic life.
- Technical supporting document published by the US EPA to support the Ambient Water Quality Guidelines.
- Toxicity values developed by other jurisdictions such as the Atlantic Risk Based Corrective Action (RBCA) and the European Union.
- Scientific peer review articles such as McGrath and DiToro (2009).
- Grey literature including ecological risk assessment reports prepared by environmental consultants focusing on projects completed in British Columbia.

Preferences were given to chronic sublethal toxicity data (e.g., EC20) for reproduction and growth, if available when selecting the RBMTs. The rationale supporting the RBMTs is provided by SLR (2014a and 2014b).

The RBMTs were proposed in the context of the final remedy for the seeps, as a risk management tool, to determine whether porewater PCOCs can adversely impact aquatic life upon discharge in the foreshore (i.e., downgradient of the remedial measure) and to assess the performance of the final remedy in the foreshore cross-gradient and downgradient of the seeps. The RBMTs were deemed adequate by BC MoE (MoE, 2014).

2.2.2 Regulatory Context for the RBMTs

The CSR under the EMA is the principal regulatory document defining requirements for contaminated site management in British Columbia. The CSR came into effect on April 1, 1997, and has been amended several times, most recently on July 7, 2021, with the Stage 14 Amendment. The EMA and CSR have provisions for both numerical standards and risk-based standards approaches to managing site contamination.

CSR standards are not available for porewater/groundwater quality assessment for monitoring wells located within 10 m of the high water mark of the aquatic receiving environment. The CSR AW standards apply to porewater/groundwater wells at distances greater or equal to 10 m from the high water mark of the receiving environment, based on the assumption that groundwater will be diluted at least 10-fold from its initial concentration in the remaining 10 m before entering the aquatic receiving environment (BC MoE 2017). The BC Water Quality Guidelines (WGQs) apply to the high water mark of the aquatic receiving environment.

As part of the Foreshore Monitoring Program implemented by URS (2012a, 2012b, and 2012c) (now AECOM), porewater results for samples collected from monitoring wells installed within the intertidal area have been compared to USLs for the protection of marine aquatic life. As indicated in Section 2.2, these benchmarks were presented to ENV in two memoranda prepared by SLR (2013a and 2013b), and upon review; ENV confirmed that the selected screening levels were satisfactory to the Ministry.

If the CSR AW standards cannot be met at distances greater or equal to 10 m from the high water mark of the receiving environment and the BC WQGs (i.e., USLs for foreshore monitoring in this case) cannot be met for monitoring wells located within 10 m of the high water mark of the aquatic receiving environment, ENV, the Technical Guidance 15 – Concentration Limits for the Protection of Aquatic Receiving Environments (ENV 2017) allows an alternative risk-based approach which shows that:

- The 10-fold dilution of substance concentrations in groundwater occurs before the water enters the aquatic receiving environment;
- Groundwater quality meets a site-specific risk-based standard with a protection level appropriate for aquatic receiving environments (i.e., EC_{20}); or
- Substance concentrations in groundwater do not represent an unacceptable risk to aquatic life as revealed by a detailed ecological risk assessment.

According to the above, the RBMTs were used to determine whether porewater PCOCs presented an unacceptable risk to aquatic life upon discharge to the foreshore.

2.3 Derivation of SSSLs for Monitoring Wells in Areas 1, 2 and 3

The following approach was used to select the SSSLs for monitoring wells located in Areas 1, 2, and 3 of the Parkland Burnaby Refinery:

- The RBMT values were multiplied by 10 to obtain SSSLs to screen groundwater monitoring wells located greater than 10 m from the foreshore high water mark. This approach was followed for LEPHw, VPHw, BTEX, styrene, benzo(a)pyrene, naphthalene, copper, and zinc.
- In the absence of RBMTs, the USL values were multiplied by 10 to obtain SSSLs to screen groundwater monitoring wells located greater than 10 m from the foreshore high water mark. This approach was followed for acenaphthene, acridine, anthracene, benz(a)anthracene, fluoranthene, fluorene, phenanthrene, pyrene, quinoline, barium, beryllium, cadmium, chromium, cobalt, lead, molybdenum, nickel, selenium, thallium, titanium, and uranium. Note that several of the SSSLs derived using this approach are equal to the BC CSR Schedule 3.2 – Generic Numerical Water Standards for the Protection of Aquatic Life. In these instances, the CSR Schedule 3.2 AW Standards were applied. PCOCs for which the USL multiplied by 10 was equal to the CSR AW

standard included: VHw (C6-C10), acenaphthene, benz(a)anthracene, chrysene, fluorene, phenanthrene, quinoline, barium, beryllium, molybdenum, selenium, and thallium.

- The BC CSR, Schedule 3.2 – AW Standard for the Protection of Aquatic Life was selected when it was higher than the RBMT x 10 and/or USL x 10. This approach was followed for antimony, arsenic, and boron.

2.4 Additional SSSLs Development Considerations

The USLs and RBMTs were originally derived for porewater and surface water in the Seep Area along the Foreshore downslope of the East Impounding Basin in Area 2 of the Refinery. These USLs and RBMTs are the basis for SSSLs which are currently applied to Areas 1, 2, and 3. The justification for the application of the SSSLs for Areas 1 and 3 is based on the following:

- The USLs and RBMTs were derived for PHCs, PAHs, and metals. These represent the same PCOCs for the entire Refinery. Additionally, the PHC sources are similar for the three areas.
- A sensitive site designation was attributed to the foreshore downslope of Area 2 to derive the USLs and RBMTs. The receptors of concern considered as part of the selection of USLs and RBMTs included aquatic plants, benthic invertebrates, and fish (including federally or provincially listed fish). The sensitive site designation and aquatic receptors of concern selected for the foreshore downslope of Area 2 are considered to be protective of the aquatic species residing in the aquatic habitat downslope of Area 1 and Area 3. The foreshore down gradient of Area 1 and Area 3 includes a wharf and the slope to Burrard Inlet is stabilized with riprap, which extends into the foreshore and intertidal environments (URS 2007). Aquatic plants, benthic invertebrates, and fish considered receptors of concern in the area of the foreshore downslope of Areas 1 and 3 were also considered receptors of concern for the foreshore downslope of Area 2.

3 DRINKING WATER EXEMPTION ASSESSMENT

A drinking water exemption was obtained from ENV in 2017 for Area 2. A letter requesting a drinking water standards exemption for Area 2 of the Refinery was submitted to the ENV on December 19, 2011, and re-submitted on November 9, 2012. The drinking water exemption was provided by the ENV on May 15, 2017. A copy of the ENV response letter is included at the end of this Appendix.

To assess the applicability of the CSR drinking water standards for Areas 1 and 3, the drinking water flowcharts at the end of Protocol 21 (Figures 1 and 4) were completed for each area. The assessment is shown in **Table 2** for Area 3 and **Tables 3** and **4** for Area 1.

Based on the Protocol 21 Assessment, drinking water does not apply to Areas 1 and 3 of the Parkland Burnaby Refinery.

Table 2: Drinking Water Use Application in Area 3

Protocol 21 Flowchart Question	**Answer:**
Current Drinking Water Use	
Q1. Is the water at or near the site currently used for drinking water?	No. There are no drinking water wells located within 500m of the Site. Drinking water in Burnaby, BC is supplied by the municipality.
Future Drinking Water Use	
Q1. Is the site located within a filled former marine or estuarine foreshore?	Yes.
Conclusion	Future DW use does not apply to Area 3.

Table 3: Drinking Water Use Application in Area 1

Protocol 21 Flowchart Question	Answer:
Current Drinking Water Use	
Q1. Is the water at or near the site currently used for drinking water?	No. There are no wells located within 500m of the Site. Drinking water in Burnaby, BC is supplied by the municipality from GVRD surface water reservoirs (Seymour, Capilano, and Coquitlam watersheds) far removed from the Site.
Future Drinking Water Use	
Q1. Is the site located within a filled former marine or estuarine foreshore?	No.
Q2. Is the aquifer confined and protected by a natural confining barrier?	No.
Q3. Does drinking water use apply to an underlying aquifer?	No. See the bedrock aquifer table below.
Q4. Does the unconfined aquifer have a bulk hydraulic conductivity > 10-6 m/s or a yield ≥1.3 L/min or is the aquifer mapped in the BC Water Resource Atlas?	No. The unconfined aquifer has a bulk hydraulic conductivity < 10^{-6} m/s based on a pumping test in Area 2. Yes. The yield in Area 2 till is ≥1.3 L/min (URS, 2012). No. The site is not an aquifer mapped in the BC Water Resource Atlas.
Q5. Is the unconfined aquifer comprised only of imported fill or present only seasonally or is the average saturated thickness ≤2m?	Yes, the average saturated thickness in the unconsolidated material (i.e., non-bedrock) is less than 2 meters. To evaluate this, 10 borehole logs and well monitoring data across Area 1 were reviewed. The depth to bedrock ranged from 0.8 to 5 meters below grade. The average depth to water (measured seasonally over more than 10 years) ranged from 0.9 to 4.9 meters below grade. The average saturated thickness in the unconsolidated material ranged from 0 to 3.2 meters with an average saturated thickness over the 10 locations of 1.1 meters[4].
Conclusion	Future DW use does not apply to the unconsolidated non-bedrock groundwater in Area 1.

[4] Borehole logs/monitoring wells used in assessment: A1-9S/D, A1-12S/D, A1-11A/B, A1-7S/D, A1MW02-03, NDP97-1, A1-6, A1-5, A1-3S/D and A1-4S/D. Depth to bedrock based on borehole logs. Average depth to water based on regular monitoring (over multiple seasons) completed since 2004.

Table 4: Drinking Water Use Application in Area 1 Bedrock

Protocol 21	Answer:
Current Drinking Water Use	
Q1. Is the water in the bedrock at or near your site currently being used for drinking purposes?	No. There are no wells located within 500m of the Site. Drinking water in Burnaby, BC is supplied by the municipality. See above
Future Drinking Water Use	
Q1. Is a bedrock aquifer mapped in the BC Water Resource Atlas?	No.
Q2. Do soil or groundwater containing substances at concentrations above standards protective of drinking water extend to the bedrock surface?	Yes.
Do in-situ bedrock investigations on the site or within 500 m show a bulk hydraulic conductivity >10-6 m/s and a yield ≥1.3 L/min?	No. Well, yield is less than 1.3 L/min. To evaluate this, well yield was calculated at 3 locations screened in the sand and siltstone in Area 1. Well yield ranged from 0.1 to 0.8 L/min
Conclusion	Future DW use does not apply to Area 1.

4 REFERENCES

AECOM. 2017. Report on the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System, Chevron Burnaby Refinery, Burnaby, BC. Report Prepared on August 29, 2017.

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BC Ministry of Environment. 2014. Letter from Lizzy Mos Re: Chevron Burnaby Refinery. (Review of RBMTs). Dated August 28, 2014.

MacGrath, J.A. and D.M. DiToro. 2009. Validation of the Target Lipid Model for Toxicity Assessment of Residual Petroleum Constituents: Monocyclic and Polycyclic Aromatic Hydrocarbons. Environmental Toxicity and Chemistry: 28(6): 1130-1148. 2009.

Meridian Environmental Inc. (Meridian). 2012. CCME Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites (FIGQG).

SLR Consulting Canada Ltd (SLR). 2013a. Updated Screening levels for foreshore monitoring. Memorandum prepared for Chevron Canada Limited. May 9, 2013.

SLR Consulting Canada Ltd (SLR). 2013b. Updated Screening levels for foreshore monitoring – Addendum. Memorandum prepared for Chevron Canada Limited. June 6, 2013.

SLR Consulting Canada Ltd (SLR). 2014a. Risk-Based Management Targets, Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby, BC. Report prepared for Chevron Canada Limited. February 28, 2014.

SLR Consulting Canada Ltd (SLR). 2014b. Response to BC MoE's Review of SLR Risk-Based Management Targets, Seep Area Foreshore Down Slop of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby, BC. Letter prepared for Chevron Canada Limited. August 26, 2014.

SLR Consulting Canada Ltd (SLR). 2016. Human Health and Ecological Risk Assessment of Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby, BC. Final Report prepared for Chevron Canada Limited.

URS (2012). Refinery Seep Upland Detailed Site Investigation Report Chevron Burnaby Refinery, Burnaby, British Columbia. Reported prepared for Chevron Canada Limited. January 31, 2012.

BRITISH COLUMBIA

File: 26250-20/6726
Site: 6726

May 15, 2017

Mr. Chris Boys
Chevron Canada Limited
355 Willingdon Avenue
Burnaby, BC V5C 1X4

Dear Mr Boys:

Re: Drinking Water Exemption Request, Area 2, Chevron Burnaby Refinery, 5201 Penzance Drive, Burnaby, BC

The Ministry of Environment (Ministry) has reviewed the following technical report prepared by SLR Consulting (Canada) and additional correspondence from AECOM Canada Consulting submitted in support of your application for a determination of no drinking water use at Area 2 Chevron Refinery in Burnaby, British Columbia (the Site):

- *Drinking Water Standards Exemption Request, Chevron Burnaby Refinery, Area 2, 5201 Penzance Drive, Burnaby BC dated November 20, 2012 prepared by SLR Consulting (Canada)*
- *Additional information contained in an email from AECOM Canada dated Sept 1, 2016*
- *Additional information contained in a letter to the ministry from AECOM Canada dated March 17, 2017*

The legal description of the Site to which this water use determination applies is:

- Block F, Plan 13496, District Lot 188/189, Group 1 Land District, Except Plan RP13504 (PCL 3) & RP13238 (PCL 1) & B/L A37751 & 49497, 6238-0691, 5804-0588, 9999-5286, 0250-5620)

The Site is depicted in attached Figure 1 for reference.

Ministry of Environment Land Remediation Section
Environmental Emergencies and Land Remediation
Environmental Protection Division
Mailing Address:
PO Box 9342 Stn Prov Govt
Victoria BC V8W 9M1
Telephone: 250 387-6479
Facsimile: 250 387-8897
Website: www.gov.bc.ca/env

Section 12(5) of the Contaminated Sites Regulation (CSR) specifies the water uses that may apply at sites in BC, including aquatic life, drinking, irrigation and livestock watering water uses, as well as the factors a Director must consider in determining current and reasonable potential future water uses at a site. Protocol 21 provides criteria for determining current and reasonable potential future water uses at specific sites.

Where drinking water use has been determined to apply at a site under Protocol 21 and site circumstances indicate that it is unlikely or unreasonable to anticipate that water would be used for drinking, a site-specific water use determination may be sought from the Director. Protocol 21, Appendix 1 "Director's Decision Framework for Site-Specific Determinations of Water Use" outlines a multiple-lines-of-evidence approach for seeking a Director's determination of no drinking water use at a specific site.

The letter request and additional documentation provided by SLR and AECOM for a Water Use Determination provides the following rationale to support that drinking water use should not apply to the groundwater at the Site:

- *The geometric mean hydraulic conductivity for the native till based on the pumping tests is 3 x 10^{-7} m/s within this unit.*
- *The geometric mean hydraulic conductivity for the native till based on slug tests is: 9 x 10^{-7} m/s.*
- *Based on the nearest* [~700 m to 1 km away; Area 1 of the Chevron Refinery] *available bedrock hydrogeological data ... has bulk hydraulic conductivity less than 1 x 10^{-6} m/s, and a yield less than 1.3 L/min* [yield calculations ranged from 0.1 L/min to 0.8 L/min]*...the bedrock below Area 2 of the Refinery is not a viable aquifer.*
- There are no mapped aquifers at the Site, according to the Water Resources Atlas.
- *The site and down gradient Canadian Pacific Railway (CPR) property have been subject to heavy industrial usage since the mid 1900s and will continue to be so into the foreseeable future. Chevron has operated a refinery on the site since approximately 1954;*
- *The Burrard Inlet shoreline is approximately 30 m northwest (downgradient) of the site boundary and forms the northern boundary of the CPR lands;*
- *Because of the close proximity of marine waters to the site and the long past and continued use of the site for heavy industrial purposes into the future, it is unlikely that groundwater beneath the site or the CPR lands containing their main rail line into Vancouver would be used for drinking water;*
- *The land use for those lands abutting the site to the east, south, and west are park or green space, residential areas, or roadway rights-of-way;*
- *All residential areas are south of the site and are significantly higher in elevation (upgradient);*
- *The residential areas are serviced by Municipal water supply and the aquifer below these areas is not classified as a drinking water aquifer;*

- *There are no current drinking water wells, points of diversion, or mapped aquifers within 500 m of the site;*
- *There is no indication of contaminant migration to the south from contaminated areas at the site; and*
- This exemption would be similar to *the DW exemptions granted by the MoE for Site 8071 in New Westminster and Site 8467 in Port Alberni.*

On the basis of the arguments and supporting information provided by SLR and AECOM, I concur with the conclusion that potential future use of the groundwater underlying the Site for drinking water is unlikely for the following reasons:

- Hydraulic response and pumping tests indicate that the bulk hydraulic conductivity of the alluvium, glacial till formation is less than $1x10^{-6}$ m/s.
- Hydraulic response tests conducted in wells within 1 km of the site indicate that the bulk hydraulic conductivity of the native bedrock is less than $1x10^{-6}$ m/s and a maximum calculated yield of 0.8 L/min.
- There are no mapped aquifers below the Site according to the Water Resource Atlas.
- There are no current drinking water uses within 500 m of the Site and Site drinking water is serviced by a municipality that is not sourced from groundwater.
- The Site is located approximately 30 m from the marine foreshore and Site groundwater discharges to the marine environment.
- The Site has a long history of heavy industrial use. The Site will continue for heavy industrial purposes into the future.

Therefore, I hereby determine that drinking water use does not apply at the Site. I also confirm that aquatic life water use (marine) does apply.

This decision is based on the most recent information available to the ministry regarding the above referenced site. The ministry, however, makes no representation or warranty as to the accuracy or completeness of this information.

Please contact Lavinia Zanini at 604-582-5348 (lavinia.zanini@gov.bc.ca) if you require clarification regarding this letter.

Sincerely,

Amy Sloma, P. Eng.
For Director, *Environmental Management Act*

Attachment: Figure 1

cc: Mike Gill, AECOM Canada Consulting
Lucy Hewlett, Ministry of Environment, Victoria
Catherine Schachtel, CSAP Society

Figure 1. Chevron Burnaby Refinery, Area 2 (blue)

Appendix B Field Program and Methods

FIELD PROGRAM AND METHODS

The majority of monitoring wells included in the Perimeter Monitoring Program (PMP) are completed in low permeability, fine-grained formation material (e.g., sandy silt). Due to this material, groundwater recharge is typically slow, and samples are more likely to be turbid in comparison with monitoring wells constructed in coarse-grained materials. Excess suspended solids in groundwater samples may result in false-positive detections of dissolved polycyclic aromatic hydrocarbons (PAHs), light and heavy extractable petroleum hydrocarbons in water (LEPHw/HEPHw), or extractable petroleum hydrocarbons in water (EPHwC10-C19/EPHwC19-C32). As a result, a selection of purging and sampling techniques is critical for the collection of high-quality, reliable groundwater analytical data. AECOM Canada Ltd. (AECOM) has developed site-specific field procedures and documentation requirements for the Parkland Refining (B.C.) Limited (Parkland) Burnaby Refinery PMP. The selected field methods are similar to the Ministry of Environment & Climate Change Strategy (BC ENV), British Columbia Field Sampling Manual (2013) and are consistent with AECOM protocols described in the following subsections.

MONITORING WELL PURGING METHOD

The method of groundwater purging and sampling is dependent upon the depth of the groundwater table below the ground surface. For depths of groundwater less than 8 meters (m), purging and sampling were conducted using a peristaltic pump. For depths to groundwater greater than 8 m, purging was conducted using a dedicated bailer or Waterra™ tubing and foot valve. Before purging, the time of day and tide condition (for Area 3), monitoring well headspace vapour concentration levels, depth to water, and total depth of the monitoring well were recorded at each location. Field observations, field measurements, and other details related to monitoring, well purging, and sampling were recorded by AECOM field staff. If sufficient water was present, the following parameters were measured in the field:

- Dissolved Oxygen,
- pH and temperature,
- Electrical conductivity, salinity,
- Total dissolved solids (TDS), and,
- Oxidation-reduction potential (ORP).

Monitoring well headspace vapour concentration levels were measured using a photoionization detector (RKI Eagle) operated in methane elimination mode immediately after removing the cap from the monitoring well. Depth to water was measured using an oil/water interface meter, which was decontaminated with amended water[5] between monitoring wells to prevent cross-contamination.

For monitoring wells where the groundwater table is within 8 m of the ground surface, water was pumped from the monitoring well at a low flow rate (i.e., up to 0.5 litres per minute [L/min]) using a peristaltic pump connected to a well-dedicated length of ¼-inch high/low-density polyethylene tubing. The intake of the tubing was placed in the middle of the screened section of the monitoring well to obtain representative samples and to minimize the disturbance and subsequent entrainment of silt located at the bottom of the monitoring well. During purging, field parameters including pH, temperature, electrical conductivity, total dissolved solids, salinity, oxidation redox potential, and dissolved oxygen were measured. Purging continued until field parameters stabilized and at least one well volume had been removed[6], or until the well was purged dry.

For monitoring wells where the groundwater table is greater than 8 m from the ground surface, purging was conducted using a dedicated bailer, or Waterra™ tubing equipped with a foot valve. While purging with a bailer/Waterra™, water is removed from near the top of the water column to minimize disturbance

[5] Amended water is a 0.5% solution of Liquinox and distilled water.

[6] Studies have demonstrated that when purging at low flow rates, formation water is accessed in less than three (3) well volumes, and frequently between one to two (1 to 2) well volumes (Puls, R.W. and Michael J. Barcelona 1996. Ground Water Issue: Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures, USEPA, Washington, DC).

of potential sediment located at the bottom of the monitoring well; purging was conducted until at least three well volumes had been removed, or until the monitoring well was dry.

Regardless of the purging method, if the monitoring well was purged dry, it was left to recharge overnight and sampled directly thereafter without additional purging.

All purge water was disposed of as prescribed by current environmental regulations and Parkland Refinery protocols.

MONITORING WELL SAMPLING METHOD

When groundwater recharge was sufficient to purge and sample using a peristaltic pump, a lower flow rate (i.e., up to 0.5 L/min) was used to minimize entrainment of silt and losses of volatile constituents in the sample. When using a bailer, WaterraTM tubing, or when the well was purged/sampled dry, groundwater levels were allowed to recover enough to collect the remaining sample set.

Sample containers and preservatives are listed by chemical constituent to be analyzed, below:

1. $EPHw_{C10-C19}$/$EPHw_{C19-C32}$, LEPHw/HEPHw, and/or PAHs: two 100 millilitres (mL) amber glass bottles, no filtering, sodium bisulphate [$NaH(SO_4)$] preservative;
2. BTEX, VPHw, and/or MTBE: two 40 mL clear glass purge and trap vials, no filtering, and NaH(SO4) preservative; and
3. Dissolved metals: one 60mL plastic container, field filtering, and nitric acid (HNO3) preservative.

Sample containers were filled completely to minimize headspace within the sample bottles. When sampling for volatile petroleum hydrocarbons, the sampler was used to purge and trap vials to reduce the potential of having headspace present in the sample containers. All bottles were placed immediately in coolers containing icepacks and transported at the end of the day using Chain of Custody (COC) protocols to ALS Environmental (ALS) of Burnaby, BC. All samples were submitted, extracted, and analyzed within the required holding time for each parameter. Groundwater samples from Areas 1 and 3 monitoring wells and Area 2 monitoring wells were submitted under separate COC forms.

POTENTIAL TIDAL EFFECTS

To minimize potential biases in groundwater data quality due to tidal effects, AECOM sampled the monitoring wells in Area 3 during an out-going or ebb tide cycle. Based on the locations of the remaining perimeter monitoring wells and Site hydrogeology, the tidal effect on the remaining monitoring wells is understood to be negligible. Thus, tide conditions were not considered when monitoring and sampling wells outside Area 3.

ANALYTICAL TESTING PROGRAM

Based on the letter entitled, Chevron Refinery Well Monitoring Program, submitted to the MoE (now BC ENV) on October 31, 2003, samples are analyzed for EPHw, rather than LEPHw/HEPHw, for samples where historically reported EPHw concentrations are below the Contaminated Sites Regulation (CSR) standards for the protection of marine life aquatic life (AW). This allows for the collection of groundwater quality data necessary for the assessment of key contaminants of concern while minimizing unnecessary data collection and budget expenditure. LEPHw/HEPHw analysis was performed where the potential contaminants of concern include PAHs or where historical EPHw concentrations approached or exceeded the CSR AW standards.

QUALITY ASSURANCE

To evaluate the accuracy and reproducibility of the groundwater sampling results, AECOM collected approximately one field duplicate per every ten samples. Each data set included at least one duplicate for every constituent analyzed, or where one constituent is analyzed repeatedly, a number equal to approximately 10% of the total number of analyses.

Appendix C 2023 Laboratory Analytical Data

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5952**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: ----	Issue Date	: 27-Mar-2023 11:52
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-6	A1-12S	A1-12D	A1-12C	MW17-4
					Client sampling date / time	20-Mar-2023 11:32	20-Mar-2023 15:35	20-Mar-2023 14:58	20-Mar-2023 15:28	20-Mar-2023 14:21
						VA23A5952-001	VA23A5952-002	VA23A5952-003	VA23A5952-004	VA23A5952-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		8.48	<0.50	2.10	3.29	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	110	<100	<100
VPHw	----	EC580A	100	µg/L		<100	<100	110	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		93.4	93.2	85.6	98.9	91.5
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		100	107	97.2	112	118
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		91.4	90.8	93.1	92.0	91.7
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		105	105	105	104	105

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

					Client sample ID	DUP-05	TRAVEL BLANK-3	----	----	----
					Client sampling date / time	20-Mar-2023 14:58	20-Mar-2023 16:17	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5952-006	VA23A5952-007	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		2.09	<0.50	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		110	<100	----	----	----
VPHw	----	EC580A	100	µg/L		110	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		93.6	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		107	115	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		92.4	90.8	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		104	105	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5952**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Issue Date	: 27-Mar-2023 11:52
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12C	E601A	20-Mar-2023	25-Mar-2023	14 days	4 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12S	E601A	20-Mar-2023	25-Mar-2023	14 days	4 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12D	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-05	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-6	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW17-4	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12C	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12D	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12S	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-05	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW17-4	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRAVEL BLANK-3	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-6	E581.VH+F1	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-12C	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-12D	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-12S	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-05	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW17-4	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) TRAVEL BLANK-3	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-6	E611A	20-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	875903	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	875902	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	875905	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	875903	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	875902	1	13	7.6	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	875905	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	875903	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	875902	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	875903	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	875902	1	13	7.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5952**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: ----	Issue Date	: 27-Mar-2023 11:52
Sampler	: RS & AGE 604-444-6400		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 875903)											
VA23A5952-001	G1-6	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	8.48	8.38	1.17%	30%	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 875902)											
VA23A5952-001	G1-6	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 875903)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 875902)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 875905)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 875903)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.3	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	109	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	107	70.0	130	----
Hydrocarbons (QCLot: 875902)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	84.8	70.0	130	----
Hydrocarbons (QCLot: 875905)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 875903)										
VA23A5952-001	G1-6	Benzene	71-43-2	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
		Ethylbenzene	100-41-4	E611A	92.6 µg/L	100 µg/L	92.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	96.6 µg/L	100 µg/L	96.6	60.0	140	----
		Toluene	108-88-3	E611A	92.3 µg/L	100 µg/L	92.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	201 µg/L	200 µg/L	100	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
Hydrocarbons (QCLot: 875902)										
VA23A5952-002	A1-12S	VHw (C6-C10)	----	E581.VH+F1	4040 µg/L	6310 µg/L	63.9	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): A5952 | ALS Contact: Dean Watt | Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-6	20-Mar-23	11:32	GW	4	X	X						
	A1-12S	20-Mar-23	15:35		4	X	X						
	A1-12D		14:68		4	X	X						
	A1-12C		15:28		4	X	X						
	MW17-4		14:21		4	X	X						
	DUP-05		14:58		4	X	X						
	TRAVEL BLANK-3		16:17		1	X							

Environmental Division
Vancouver
Work Order Reference
VA23A5952

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8°			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 20, 2023	17:13

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DN	Mar 20	5:15pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A4906**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 15-Mar-2023 13:42
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-07	G1-2A	G1-2B	NDM97-2	TRAVEL BLANK
					Client sampling date / time	07-Mar-2023 16:11	07-Mar-2023 14:25	07-Mar-2023 13:40	07-Mar-2023 15:31	07-Mar-2023 17:00
						VA23A4906-001	VA23A4906-002	VA23A4906-003	VA23A4906-004	VA23A4906-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		4.04	<0.50	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		260	<250	<250	<250	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	----	----	----	----
LEPHw	----	EC600A	250	µg/L		260	----	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		97.0	97.6	97.6	99.3	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		86.8	83.6	90.6	80.5	87.9
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		70.2	70.3	70.8	70.5	70.1
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		91.3	91.9	91.5	91.2	91.1
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		0.046	----	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	----	----	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.015 DLCI	----	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-07	G1-2A	G1-2B	NDM97-2	TRAVEL BLANK
					Client sampling date / time	07-Mar-2023 16:11	07-Mar-2023 14:25	07-Mar-2023 13:40	07-Mar-2023 15:31	07-Mar-2023 17:00
						VA23A4906-001	VA23A4906-002	VA23A4906-003	VA23A4906-004	VA23A4906-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	----	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		0.114	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.011	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	----	----	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	----	----	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	----	----	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	----	----	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	----	----	----	----
PAHs, total (CCME sewer 18)	n/a	E641A	0.070	µg/L		0.171	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.160	----	----	----	----
PAHs, total (P2MMP)	n/a	E641A	0.040	µg/L		0.114	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		73.7	----	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		89.4	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		97.5	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A4906**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
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C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-2A	E601A	07-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-07	E601A	07-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NDM97-2	E601A	07-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-2B	E601A	07-Mar-2023	14-Mar-2023	14 days	7 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-2A	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-2B	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-07	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NDM97-2	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRAVEL BLANK	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-07	E641A	07-Mar-2023	14-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-2A	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-2B	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03-07	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) NDM97-2	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) TRAVEL BLANK	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	862135	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	862136	1	4	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	862135	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	862136	1	4	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A4906**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 15-Mar-2023 13:42
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 860380)											
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 860381)											
VA23A4906-001	MW03-07	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 860380)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 860381)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 862135)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 862136)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 862136) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 860380)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	78.6	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	86.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	91.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	83.8	70.0	130	----
Hydrocarbons (QCLot: 860381)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	124	70.0	130	----
Hydrocarbons (QCLot: 862135)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	118	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	117	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 862136)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	83.2	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	110	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	93.1	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	94.3	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	90.1	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	106	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	104	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	118	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 862136) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	119	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 860380)										
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	94.6 µg/L	100 µg/L	94.6	60.0	140	----
		Ethylbenzene	100-41-4	E611A	74.3 µg/L	100 µg/L	74.3	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Styrene	100-42-5	E611A	81.5 µg/L	100 µg/L	81.5	60.0	140	----
		Toluene	108-88-3	E611A	86.5 µg/L	100 µg/L	86.5	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	202 µg/L	200 µg/L	101	60.0	140	----
		Xylene, o-	95-47-6	E611A	80.0 µg/L	100 µg/L	80.0	60.0	140	----
Hydrocarbons (QCLot: 860381)										
VA23A4906-002	G1-2A	VHw (C6-C10)	----	E581.VH+F1	4900 µg/L	6310 µg/L	77.6	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Environmental Division Vancouver

Work Order Reference VA23A4906

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients		Turnaround Time (TAT) Requested
Company:	AECOM Canada Ltd.	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Stephen Sumsion	Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	604-444-6400	☑ Compare Results to Criteria on Report - provide details below if box checked		☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	3292 Production Way	Email 1 or Fax	stephen.sumsion@aecom.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Burnaby, BC	Email 2	johnny.au@aecom.com	Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Postal Code:	V5A 4R4	Email 3	raymund.sampaga@aecom.com	Date and Time Required for all E&P TATs:
Invoice To	Same as Report To ☐ YES ☑ NO	Invoice Recipients		For all tests with rush TATs requested, please contact y
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Analysis Request
Company:	Parkland Refinery (B.C.) Ltd.	Email 1 or Fax	christopher.boys@parkland.ca	
Contact:	Christopher Boys	Email 2	stephen.sumsion@aecom.com	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #: ~~60704333-0078042~~ / 15402	60704333	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): L4906 ALS Contact: Dean Watt Sampler: RS & AGE

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F,P)												SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
						P	P	P	P	F										
						BTEX/Styrene/VPH/MTBE	EPH	PAHs (including total PAHs)	LEPH/HEPH	Dissolved Metals(including hardness)										
	MW03-07	07-Mar-23	16:11	GW	4	X		X	X											
	G1-2A	↓	14:25	↓	4	X	X													
	G1-2B		13:40		4	X	X													
	NDM97-2		15:31		4	X	X													

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							8

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 7, 2023	Time: 18:38	Received by:	Date:	Time:	Received by: FIA	Date: 3/7	Time: 6:35

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A4907**	Page	: 1 of 7
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
PO	: 573161	Date Analysis Commenced	: 09-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:02
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample IDs adjusted.

Qualifiers

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. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A1MW02-01	A1MW02-02	A1MW02-03	G1-4B	DUP-02
					Client sampling date / time	06-Mar-2023 15:49	06-Mar-2023 16:45	07-Mar-2023 10:30	07-Mar-2023 12:20	07-Mar-2023 12:20
						VA23A4907-001	VA23A4907-002	VA23A4907-003	VA23A4907-004	VA23A4907-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		266	1100	85.8	<1.00 DLQ	<1.00 DLQ
Ethylbenzene	100-41-4	E611A	0.50	µg/L		1.71	173	9.48	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		11.4	23.7	36.0	158	160
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		3.55	20.5	8.00	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		5.66	46.1	7.81	0.91	0.92
Xylene, o-	95-47-6	E611A	0.30	µg/L		0.50	0.92	1.20	<0.30	0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		6.16	47.0	9.01	0.91	1.22
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		1510	3250	7660	250	270
EPH (C19-C32)	----	E601A	250	µg/L		400	<250	1630	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		1160	5430	3710	380	320
HEPHw	----	EC600A	250	µg/L		400	<250	1630	----	----
LEPHw	----	EC600A	250	µg/L		1500	3120	7660	----	----
VPHw	----	EC580A	100	µg/L		880	4090	3600	380	320
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		95.2	104	102	90.0	89.6
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		79.4	93.6	83.7	99.5	94.4
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		78.1	87.3	91.3	83.0	80.2
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		82.8	98.5	91.8	90.1	90.0
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		1.47	2.82	1.49	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.220 DLQ	<0.440 DLQ	<0.180 DLCI	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.750 DLCI	<0.500 DLCI	<2.69 DLCI	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.140 DLQ	<0.160 DLQ	<0.270 DLCI	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		0.041	<0.010	<0.040 DLCI	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		0.0166	<0.0050	0.0285	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		0.032	<0.010	0.038	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A1MW02-01	A1MW02-02	A1MW02-03	G1-4B	DUP-02
					Client sampling date / time	06-Mar-2023 15:49	06-Mar-2023 16:45	07-Mar-2023 10:30	07-Mar-2023 12:20	07-Mar-2023 12:20
						VA23A4907-001	VA23A4907-002	VA23A4907-003	VA23A4907-004	VA23A4907-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		0.042	<0.015	0.050	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		0.010	<0.010	0.053	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		0.010	<0.010	0.012	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.050 DLCI	<0.010	<0.070 DLCI	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0080 DLQ	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.269	0.084	0.155	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		2.19	3.96	1.28	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	0.032	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		27.8	106	21.0	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		36.3	171	1.54	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<1.29 DLCI	123	<2.22 DLCI	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		1.99	2.95	<0.760 DLQ	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.228	0.100	0.290	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<2.50 DLCI	<6.22 DLCI	<4.64 DLCI	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		0.028	<0.010	0.044	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.607	0.184	0.608	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		5.65	133	2.77	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		6.26	133	3.38	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		94.7	96.7	80.4	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		96.0	95.0	116	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		98.5	100	96.4	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-05	MW03-08	MW03-09	G1-2A	G1-2B
					Client sampling date / time	07-Mar-2023 11:48	07-Mar-2023 15:47	07-Mar-2023 16:20	07-Mar-2023 14:25	07-Mar-2023 13:40
						VA23A4907-006	VA23A4907-007	VA23A4907-008	VA23A4907-009	VA23A4907-010
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		430000	----	----	34500	805000
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.050	µg/L		<0.250 DLA	----	----	<0.050	<0.500 DLA
Dissolved metals filtration location	----	EP421	-	-		Field	----	----	Field	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		5.82	<0.50	1.07	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		350	<250	<250	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	400	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		200	<100	<100	----	----
HEPHw	----	EC600A	250	µg/L		<250	<250	400	----	----
LEPHw	----	EC600A	250	µg/L		340	<250	<250	----	----
VPHw	----	EC580A	100	µg/L		200	<100	<100	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		96.0	89.8	95.0	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		91.4	105	107	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		76.5	73.6	75.4	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		91.0	92.0	92.2	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		2.20	<0.010	<0.020 DLQ	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.180 DLQ	<0.010	<0.010	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.130 DLCI	<0.010	<0.030 DLCI	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-05	MW03-08	MW03-09	G1-2A	G1-2B
					Client sampling date / time	07-Mar-2023 11:48	07-Mar-2023 15:47	07-Mar-2023 16:20	07-Mar-2023 14:25	07-Mar-2023 13:40
						VA23A4907-006	VA23A4907-007	VA23A4907-008	VA23A4907-009	VA23A4907-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Anthracene	120-12-7	E641A	0.010	µg/L		<0.090 DLQ	<0.010	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.094	<0.010	0.020	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		1.36	<0.010	0.027	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		16.7	0.011	0.037	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.923	0.017	0.014	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.430 DLCI	<0.050	<0.060 DLCI	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		0.618	<0.020	<0.020	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.065	<0.010	0.027	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<1.33 DLCI	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.159	<0.030	0.047	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		4.18	<0.060	<0.068	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		4.34	<0.065	<0.074	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		83.9	69.6	78.6	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		105	98.3	105	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		113	100	106	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)									
				Client sample ID	NDM97-2	----	----	----	----
				Client sampling date / time	07-Mar-2023 15:31	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A4907-011	--------	--------	--------	--------
					Result	----	----	----	----
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L	123000	----	----	----	----
Dissolved Metals									
Lead, dissolved	7439-92-1	E421	0.050	µg/L	<0.050	----	----	----	----
Dissolved metals filtration location	----	EP421	-	-	Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A4907**	Page	: 1 of 10
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
PO	: 573161	Issue Date	: 20-Apr-2023 13:02
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-2A	E421	07-Mar-2023	09-Mar-2023	----	----		11-Mar-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-2B	E421	07-Mar-2023	09-Mar-2023	----	----		11-Mar-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW03-05	E421	07-Mar-2023	09-Mar-2023	----	----		11-Mar-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) NDM97-2	E421	07-Mar-2023	09-Mar-2023	----	----		11-Mar-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-01	E601A	06-Mar-2023	12-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-02	E601A	06-Mar-2023	12-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-03	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-02	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-4B	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-05	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-08	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-09	E601A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1MW02-03	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-02	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-4B	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-05	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-08	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-09	E581.VH+F1	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1MW02-01	E581.VH+F1	06-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1MW02-02	E581.VH+F1	06-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-03	E641A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-05	E641A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-08	E641A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-09	E641A	07-Mar-2023	13-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-01	E641A	06-Mar-2023	12-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-02	E641A	06-Mar-2023	12-Mar-2023	14 days	6 days	✓	13-Mar-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1MW02-03	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-02	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-4B	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03-05	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03-08	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03-09	E611A	07-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1MW02-01	E611A	06-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1MW02-02	E611A	06-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	860110	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	856472	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860111	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	860880	2	23	8.7	5.0	✓
BTEX by Headspace GC-MS	E611A	860110	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	856472	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	860879	2	23	8.7	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860111	1	18	5.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	860880	2	23	8.7	5.0	✓
BTEX by Headspace GC-MS	E611A	860110	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	856472	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	860879	2	23	8.7	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860111	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	860110	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	856472	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860111	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **VA23A4907**	Page	: 1 of 8
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 07-Mar-2023 18:35
PO	: 573161	Date Analysis Commenced	: 09-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:02
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 856472)											
VA23A4907-006	MW03-05	Lead, dissolved	7439-92-1	E421	0.000250	mg/L	<0.250 µg/L	<0.000250	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 860110)											
VA23A4864-006	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 860111)											
VA23A4864-006	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 856472)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 860110)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 860111)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 860772)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 860880)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 860773)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 860773) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 860879)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.6	80.0	120	----
Volatile Organic Compounds (QCLot: 860110)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	94.7	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	77.5	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	95.4	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	84.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	89.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	99.5	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	81.4	70.0	130	----
Hydrocarbons (QCLot: 860111)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	121	70.0	130	----
Hydrocarbons (QCLot: 860772)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	106	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 860880)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	114	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	110	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 860773)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	96.6	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	85.1	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	108	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	91.8	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	104	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 860773) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	107	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	106	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 860879)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	80.7	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	118	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	99.3	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	91.7	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	116	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	116	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	114	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	125	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 856472)										
VA23A4907-009	G1-2A	Lead, dissolved	7439-92-1	E421	0.0177 mg/L	0.02 mg/L	88.4	70.0	130	----
Volatile Organic Compounds (QCLot: 860110)										
VA23A4864-006	Anonymous	Benzene	71-43-2	E611A	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Ethylbenzene	100-41-4	E611A	82.6 µg/L	100 µg/L	82.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Styrene	100-42-5	E611A	89.9 µg/L	100 µg/L	89.9	60.0	140	----
		Toluene	108-88-3	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	206 µg/L	200 µg/L	103	60.0	140	----
		Xylene, o-	95-47-6	E611A	86.4 µg/L	100 µg/L	86.4	60.0	140	----
Hydrocarbons (QCLot: 860111)										
VA23A4864-007	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4990 µg/L	6310 µg/L	79.1	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Project Information

ALS Account # / Quote #:	
Job #: 60704336 / 15402	
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	Dissolved Lead (F)	PLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	AIMW02-01	06-Mar-23	15:49	GW	4	X		X	X					
	AIMW02-02	↓	16:45	↓	4	X		X	X					
	AIMW02-03	07-Mar-23	10:30		4	X		X	X					
	GI-4B		12:20		4	X	X							
	DUP-02		12:20		4	X	X							
	MW03-05		11:48		5	X		X	X		X			
	MW03-08		15:47		4	X		X	X					
	MW03-09		16:20		4	X		X	X					
	GI-2A		14:25		1						X			
	GI-2B		13:40		1						X			
	NDM97-2		15:31		1						X			

Environmental Division
Vancouver
Work Order Reference
VA23A4907

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							6

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 7, 2023	18:38

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
FNA	3/7	6:35

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A4997**	Page	: 1 of 3
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:18
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample IDs adjusted.

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: A1-3S	G1-8	DUP-03	G1-7A	----
Client sampling date / time					08-Mar-2023 10:20	08-Mar-2023 14:10	08-Mar-2023 14:10	08-Mar-2023 12:52	----
					VA23A4997-001	VA23A4997-002	VA23A4997-003	VA23A4997-004	--------
					Result	Result	Result	Result	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	2.01	2.03	<0.50	----
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	----
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	<250	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	<100	<100	----
VPHw	----	EC580A	100	µg/L	<100	<100	<100	<100	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%	98.2	104	101	98.7	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	84.9	80.3	92.5	85.3	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	70.8	71.0	70.1	70.1	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	86.4	85.8	90.4	90.1	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A4997**	Page	: 1 of 6
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Issue Date	: 20-Apr-2023 13:18
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-3S	E601A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-03	E601A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-7A	E601A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-8	E601A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-3S	E581.VH+F1	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-03	E581.VH+F1	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-7A	E581.VH+F1	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-8	E581.VH+F1	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-3S	E611A	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-03	E611A	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-7A	E611A	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-8	E611A	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	862162	1	6	16.6	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	862162	1	6	16.6	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **VA23A4997**	Page	: 1 of 5
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:18
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 860380)											
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 860381)											
VA23A4906-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 860380)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 860381)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 862162)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 860380)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	78.6	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	86.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	91.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	83.8	70.0	130	----
Hydrocarbons (QCLot: 860381)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	124	70.0	130	----
Hydrocarbons (QCLot: 862162)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	104	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	103	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 860380)										
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	94.6 µg/L	100 µg/L	94.6	60.0	140	----
		Ethylbenzene	100-41-4	E611A	74.3 µg/L	100 µg/L	74.3	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Styrene	100-42-5	E611A	81.5 µg/L	100 µg/L	81.5	60.0	140	----
		Toluene	108-88-3	E611A	86.5 µg/L	100 µg/L	86.5	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	202 µg/L	200 µg/L	101	60.0	140	----
		Xylene, o-	95-47-6	E611A	80.0 µg/L	100 µg/L	80.0	60.0	140	----
Hydrocarbons (QCLot: 860381)										
VA23A4906-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4900 µg/L	6310 µg/L	77.6	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:
Job #: ~~G70423 0007984~~ / 15402
PO / AFE: 573161
LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SUSPECTED HAZARD (see notes)
	A1-3S	08-Mar-23	10:20	GW	4	X	X				
	G1-8	↓	14:10	↓	4	X	X				
	DUP-03		14:10		4	X	X				
	G1-7A		12:52		4	X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A4997

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C					FINAL COOLER TEMPERATURES °C				

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 8, 2023	16:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
JH	March 8/23	16:33

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A4998**	Page	: 1 of 5
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Date Analysis Commenced	: 10-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:22
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample IDs updated.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A1-3S	G1-8	DUP-03	G1-7A	MW03-06
					Client sampling date / time	08-Mar-2023 10:20	08-Mar-2023 14:10	08-Mar-2023 14:10	08-Mar-2023 12:52	08-Mar-2023 14:20
						VA23A4998-001	VA23A4998-002	VA23A4998-003	VA23A4998-004	VA23A4998-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		358000	15200	15300	982000	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.050	µg/L		<0.050	0.199	0.180	<0.500 DLA	----
Dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		----	----	----	----	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		----	----	----	----	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		----	----	----	----	15.6
Styrene	100-42-5	E611A	0.50	µg/L		----	----	----	----	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		----	----	----	----	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		----	----	----	----	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		----	----	----	----	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		----	----	----	----	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		----	----	----	----	<250
EPH (C19-C32)	----	E601A	250	µg/L		----	----	----	----	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		----	----	----	----	<100
HEPHw	----	EC600A	250	µg/L		----	----	----	----	<250
LEPHw	----	EC600A	250	µg/L		----	----	----	----	<250
VPHw	----	EC580A	100	µg/L		----	----	----	----	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		----	----	----	----	99.9
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		----	----	----	----	89.4
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		----	----	----	----	70.1
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		----	----	----	----	89.9
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		----	----	----	----	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		----	----	----	----	<0.010

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A1-3S	G1-8	DUP-03	G1-7A	MW03-06
					Client sampling date / time	08-Mar-2023 10:20	08-Mar-2023 14:10	08-Mar-2023 14:10	08-Mar-2023 12:52	08-Mar-2023 14:20
						VA23A4998-001	VA23A4998-002	VA23A4998-003	VA23A4998-004	VA23A4998-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Acridine	260-94-6	E641A	0.010	µg/L		----	----	----	----	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		----	----	----	----	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		----	----	----	----	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		----	----	----	----	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		----	----	----	----	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		----	----	----	----	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		----	----	----	----	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		----	----	----	----	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		----	----	----	----	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		----	----	----	----	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		----	----	----	----	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		----	----	----	----	0.026
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		----	----	----	----	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		----	----	----	----	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		----	----	----	----	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		----	----	----	----	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		----	----	----	----	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		----	----	----	----	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		----	----	----	----	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		----	----	----	----	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		----	----	----	----	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		----	----	----	----	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		----	----	----	----	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		----	----	----	----	79.5
Naphthalene-d8	1146-65-2	E641A	0.1	%		----	----	----	----	99.3
Phenanthrene-d10	1517-22-2	E641A	0.1	%		----	----	----	----	106

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A4998**	Page	: 1 of 7
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Issue Date	: 20-Apr-2023 13:23
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) A1-3S	E421	08-Mar-2023	10-Mar-2023	----	----		10-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUP-03	E421	08-Mar-2023	10-Mar-2023	----	----		10-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-7A	E421	08-Mar-2023	10-Mar-2023	----	----		10-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-8	E421	08-Mar-2023	10-Mar-2023	----	----		10-Mar-2023	180 days	3 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-06	E601A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	15-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-06	E581.VH+F1	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-06	E641A	08-Mar-2023	14-Mar-2023	14 days	6 days	✓	14-Mar-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-06	E611A	08-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	14 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	857581	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	862162	1	6	16.6	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	857581	1	16	6.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	862161	1	8	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	862162	1	6	16.6	5.0	✓
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	857581	1	16	6.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	862161	1	8	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	860380	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	857581	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	860381	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **VA23A4998**	Page	: 1 of 7
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 08-Mar-2023 16:33
PO	: 573161	Date Analysis Commenced	: 10-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 13:23
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 857581)											
KS2300672-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 860380)											
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 860381)											
VA23A4906-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 857581)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 860380)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 860381)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 862162)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 862161)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 862161) - continued						
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.7	80.0	120	----
Volatile Organic Compounds (QCLot: 860380)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	78.6	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	86.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	91.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	83.8	70.0	130	----
Hydrocarbons (QCLot: 860381)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	124	70.0	130	----
Hydrocarbons (QCLot: 862162)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	104	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	103	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 862161)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	97.8	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	78.2	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	107	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	95.1	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	123	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	95.4	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	87.9	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	103	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 862161) - continued									
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	104	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	115	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	110	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 857581)										
KS2300672-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0181 mg/L	0.02 mg/L	90.6	70.0	130	----
Volatile Organic Compounds (QCLot: 860380)										
VA23A4893-001	Anonymous	Benzene	71-43-2	E611A	94.6 µg/L	100 µg/L	94.6	60.0	140	----
		Ethylbenzene	100-41-4	E611A	74.3 µg/L	100 µg/L	74.3	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Styrene	100-42-5	E611A	81.5 µg/L	100 µg/L	81.5	60.0	140	----
		Toluene	108-88-3	E611A	86.5 µg/L	100 µg/L	86.5	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	202 µg/L	200 µg/L	101	60.0	140	----
		Xylene, o-	95-47-6	E611A	80.0 µg/L	100 µg/L	80.0	60.0	140	----
Hydrocarbons (QCLot: 860381)										
VA23A4906-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4900 µg/L	6310 µg/L	77.6	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax stephen.sumsion@aecom.com

Email 2 johnny.au@aecom.com

Email 3 raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax christopher.boys@parkland.ca

Email 2 stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:

Job #: 60704333 ~~60679612~~ / 15402

PO / AFE: 573161

LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	Dissolved Lead (F)	...ES ON HOLD	...D STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A1-35	08-Mar-23	10:20	GW	1						X			
	G1-8	↓	14:10	↓	1						X			
	DUP-03	↓	14:10	↓	1						X			
	G1-7A	↓	12:52	↓	1						X			
	MW03-06	↓	14:20	↓	4	X		X	X					

Environmental Division
Vancouver
Work Order Reference
VA23A4998

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C: 2

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 8, 2023	Time: 16:30	Received by:	Date:	Time:	Received by: JH	Date: March 8/23	Time: 16:33

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5127**	Page	: 1 of 3
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 10-Apr-2023 16:33
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-5	G1-7B	----	----	----
					Client sampling date / time	09-Mar-2023 09:10	09-Mar-2023 09:48	----	----	----
						VA23A5127-001	VA23A5127-002	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		98000	43800	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000050	<0.000100 DLA	----	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5127**	Page	: 1 of 5
Amendment	: 1		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Issue Date	: 10-Apr-2023 16:33
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
G1-5	E421	09-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
G1-7B	E421	09-Mar-2023	11-Mar-2023	----	----		12-Mar-2023	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	859081	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	859081	1	14	7.1	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	859081	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	859081	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

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QUALITY CONTROL REPORT

Work Order	: **VA23A5127**	Page	: 1 of 3
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Date Analysis Commenced	: 11-Mar-2023
C-O-C number	: ----	Issue Date	: 10-Apr-2023 16:33
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 859081)											
VA23A5126-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 859081)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 859081)										
VA23A5126-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0358 mg/L	0.04 mg/L	89.6	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

ALS www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax stephen.sumsion@aecom.com

Email 2 johnny.au@aecom.com

Email 3 raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax christopher.boys@parkland.ca

Email 2 stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:

Job #: 60704333 ~~60679612~~ / 15402

PO / AFE: 573161

LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only): A5127

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	Dissolved Lead (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-5	09-Mar-23	9:10	GW	1						X			
	G1-7B	↓	9:48	GW	1						X			

Environmental Division
Vancouver
Work Order Reference
VA23A5127

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments Identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INIITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C: 9°C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 9, 2023	Time: 15:52	Received by:	Date:	Time:	Received by: DJS	Date: Mar 9	Time: 1555

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5134**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: ----	Issue Date	: 17-Mar-2023 14:31
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-5	G1-7B	A1-3D	U7	U6
					Client sampling date / time	09-Mar-2023 09:10	09-Mar-2023 09:48	09-Mar-2023 09:36	09-Mar-2023 11:32	09-Mar-2023 11:45
						VA23A5134-001	VA23A5134-002	VA23A5134-003	VA23A5134-004	VA23A5134-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		39.8	7.71	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		----	----	----	<250	<250
LEPHw	----	EC600A	250	µg/L		----	----	----	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		100	91.0	88.8	89.6	85.4
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		76.9	87.3	83.6	88.4	84.5
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		94.6	94.2	92.9	95.9	95.3
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.7	98.1	98.1	98.3	97.8
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		----	----	----	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		----	----	----	<0.010	<0.010

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-5	G1-7B	A1-3D	U7	U6
					Client sampling date / time	09-Mar-2023 09:10	09-Mar-2023 09:48	09-Mar-2023 09:36	09-Mar-2023 11:32	09-Mar-2023 11:45
						VA23A5134-001	VA23A5134-002	VA23A5134-003	VA23A5134-004	VA23A5134-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		----	----	----	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		----	----	----	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		----	----	----	0.014	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		----	----	----	0.020	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		----	----	----	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		----	----	----	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		----	----	----	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		----	----	----	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		----	----	----	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		----	----	----	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		----	----	----	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		----	----	----	81.7	79.0
Naphthalene-d8	1146-65-2	E641A	0.1	%		----	----	----	104	91.1
Phenanthrene-d10	1517-22-2	E641A	0.1	%		----	----	----	117	103

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A3MW02-08	DUP-04	A3MW02-07	A3MW02-06	----
					Client sampling date / time	09-Mar-2023 12:17	09-Mar-2023 12:17	09-Mar-2023 12:34	09-Mar-2023 13:23	----
						VA23A5134-006	VA23A5134-007	VA23A5134-008	VA23A5134-009	--------
						Result	Result	Result	Result	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	1.02	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	270	----
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	----
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	270	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		93.4	88.9	93.3	91.6	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		82.6	82.3	80.6	82.0	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		95.8	93.7	95.5	92.5	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.7	98.1	98.3	95.8	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		1.53	1.53	23.8	2.88	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	0.078	<0.046 DLQ	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.018 DLCI	<0.015 DLCI	<0.045 DLCI	<0.061 DLCI	----
Anthracene	120-12-7	E641A	0.010	µg/L		0.057	0.057	0.284	<0.049 DLQ	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A3MW02-08	DUP-04	A3MW02-07	A3MW02-06	----
					Client sampling date / time	09-Mar-2023 12:17	09-Mar-2023 12:17	09-Mar-2023 12:34	09-Mar-2023 13:23	----
						VA23A5134-006	VA23A5134-007	VA23A5134-008	VA23A5134-009	--------
						Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.158	0.154	0.924	0.121	----
Fluorene	86-73-7	E641A	0.010	µg/L		0.695	0.695	11.9	1.00	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.094	0.093	0.550	1.10	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.049	0.050	0.018	0.024	----
Naphthalene	91-20-3	E641A	0.050	µg/L		0.591	0.589	0.758	<0.587 DLQ	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		0.047	0.048	0.324	0.172	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.098	0.098	0.408	0.071	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.342 DLQ	<1.05 DLQ	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.256	0.252	1.33	0.192	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		2.92	2.92	37.1	4.05	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		3.18	3.17	38.5	4.24	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		73.8	73.8	86.2	77.8	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		97.3	92.0	102	89.8	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		104	99.6	115	105	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5134**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Issue Date	: 17-Mar-2023 14:31
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-3D	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-06	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-07	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-08	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-04	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-5	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-7B	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U6	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U7	E601A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	17-Mar-2023	40 days	2 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-3D	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-06	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-07	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-08	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-04	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-5	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-7B	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U6	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U7	E581.VH+F1	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-06	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-07	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-08	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-04	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U6	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U7	E641A	09-Mar-2023	15-Mar-2023	14 days	6 days	✓	16-Mar-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-3D	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A3MW02-06	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A3MW02-07	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A3MW02-08	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-04	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-5	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-7B	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U6	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U7	E611A	09-Mar-2023	15-Mar-2023	----	----		15-Mar-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	864333	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	864331	1	16	6.2	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	863680	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	864333	1	10	10.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	863677	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	864331	1	16	6.2	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	863680	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	864333	1	10	10.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	863677	1	14	7.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	864331	1	16	6.2	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	864333	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	864331	1	16	6.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5134**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 09-Mar-2023 15:55
PO	: 573161	Date Analysis Commenced	: 15-Mar-2023
C-O-C number	: ----	Issue Date	: 17-Mar-2023 14:31
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 864333)											
VA23A5134-002	G1-7B	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	7.71	7.89	2.28%	30%	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 864331)											
VA23A5076-006	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 864333)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 863680)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 864331)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 863677)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 863677) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 864333)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	94.2	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	102	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 863680)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	119	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	115	70.0	130	----
Hydrocarbons (QCLot: 864331)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	99.8	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 863677)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	91.4	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	98.8	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	83.3	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	89.7	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	123	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	96.0	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	116	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 863677) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	111	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 864333)										
VA23A5134-003	A1-3D	Benzene	71-43-2	E611A	90.6 µg/L	100 µg/L	90.6	60.0	140	----
		Ethylbenzene	100-41-4	E611A	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	97.6 µg/L	100 µg/L	97.6	60.0	140	----
		Styrene	100-42-5	E611A	93.5 µg/L	100 µg/L	93.5	60.0	140	----
		Toluene	108-88-3	E611A	96.3 µg/L	100 µg/L	96.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	97.9	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.1 µg/L	100 µg/L	96.1	60.0	140	----
Hydrocarbons (QCLot: 864331)										
VA23A5134-001	G1-5	VHw (C6-C10)	----	E581.VH+F1	5080 µg/L	6310 µg/L	80.6	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information	
ALS Account # / Quote #:	
Job #: ~~66704335680079612~~ / 15402	
PO / AFE:	573161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	

Oil and Gas Required Fields (client use)		
AFE/Cost Center:		PO#
Major/Minor Code:		Routing Code:
Requisitioner:		
Location:		
ALS Contact:	Dean Watt	Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	BOTTLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
1	G1-5	09-Mar-23	9:10	GW	4	X	X						
2	G1-7B		9:48		4	X	X						
3	A1-3D		9:36		4	X	X						
4	U7		11:32		4	X		X	X				
5	U6		11:45		4	X		X	X				
6	~~A3MO~~ A3MW02-08		12:17		4	X		X	X				
7	DUP-04		12:17		4	X		X	X				
8	A3MW02-07		12:34		4	X		X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A5134

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
					5c		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 9, 2023	Time: 15:52	Received by:	Date:	Time:	Received by:	Date: Mar 9	Time: 1555

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5434**	Page	: 1 of 10
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 07:44
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Brieanna Allen	Production/Validation Manager	Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*
SMI	*Surrogate recovery could not be measured due to sample matrix interference.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1A	MW03-04	A3MW02-05	A3MW03-03	U07-10S
					Client sampling date / time	14-Mar-2023 09:17	14-Mar-2023 11:14	14-Mar-2023 12:01	14-Mar-2023 11:38	14-Mar-2023 13:13
						VA23A5434-001	VA23A5434-002	VA23A5434-003	VA23A5434-004	VA23A5434-005
						Result	Result	Result	Result	Result
Physical Tests										
pH	----	E108	0.10	pH units		----	----	----	----	6.10
Volatile Organic Compounds										
Butylbenzene, n-	104-51-8	E611H	1.0	µg/L		----	----	----	----	<1.4 DLCI
Butylbenzene, sec-	135-98-8	E611H	1.0	µg/L		----	----	----	----	<1.0
Butylbenzene, tert-	98-06-6	E611H	1.0	µg/L		----	----	----	----	<1.0
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	23.6
Butadiene, 1,3-	106-99-0	E611H	0.20	µg/L		----	----	----	----	<0.20
Decane, n-	124-18-5	E611H	1.0	µg/L		----	----	----	----	<1.0
Dibromoethane, 1,2-	106-93-4	E611H	0.20	µg/L		----	----	----	----	<0.20
Dichloroethane, 1,2-	107-06-2	E611H	1.0	µg/L		----	----	----	----	<1.0
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	25.1
Hexane, n-	110-54-3	E611H	1.0	µg/L		----	----	----	----	<1.0
Isopropylbenzene	98-82-8	E611H	1.0	µg/L		----	----	----	----	2.1
Methylcyclohexane	108-87-2	E611H	1.0	µg/L		----	----	----	----	<1.0
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	2.01	<0.50	178	941
Nonane, n-	111-84-2	E611H	1.0	µg/L		----	----	----	----	<1.0
Propylbenzene, n-	103-65-1	E611H	1.0	µg/L		----	----	----	----	1.9
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	8.14
Trimethylbenzene, 1,2,4-	95-63-6	E611H	1.0	µg/L		----	----	----	----	24.3
Trimethylbenzene, 1,3,5-	108-67-8	E611H	1.0	µg/L		----	----	----	----	7.0
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	21.0
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	11.2
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	32.2
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	15600
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	320
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	170

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1A	MW03-04	A3MW02-05	A3MW03-03	U07-10S
					Client sampling date / time	14-Mar-2023 09:17	14-Mar-2023 11:14	14-Mar-2023 12:01	14-Mar-2023 11:38	14-Mar-2023 13:13
						VA23A5434-001	VA23A5434-002	VA23A5434-003	VA23A5434-004	VA23A5434-005
						Result	Result	Result	Result	Result
Hydrocarbons										
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	280
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	8380
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		87.0	91.0	96.2	86.9	93.2
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		89.1	75.8	82.2	91.2	116
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		100	98.1	99.0	98.8	95.4
Bromofluorobenzene, 4-	460-00-4	E611H	1.0	%		----	----	----	----	95.4
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.3	99.4	99.4	98.3	97.9
Difluorobenzene, 1,4-	540-36-3	E611H	1.0	%		----	----	----	----	97.9
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	0.342	<0.010	576
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	5.85
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.040 DLCI	<0.010	8.56
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	14.1
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	1.09
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	0.357
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.536
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	0.776
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.065
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.240
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.460 DLCI
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	0.0215
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	0.031	<0.010	23.5
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	0.012	0.024	204
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.087
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	0.016	0.012	286
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	0.013	0.014	0.018	517
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	6200

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1A	MW03-04	A3MW02-05	A3MW03-03	U07-10S
					Client sampling date / time	14-Mar-2023 09:17	14-Mar-2023 11:14	14-Mar-2023 12:01	14-Mar-2023 11:38	14-Mar-2023 13:13
						VA23A5434-001	VA23A5434-002	VA23A5434-003	VA23A5434-004	VA23A5434-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	212
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	0.032	<0.010	15.0
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.900 DLCI
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.577
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	0.063	<0.030	40.9
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	0.354	<0.060	7210
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	0.417	<0.065	7250
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		98.2	103	105	86.0	83.6
Naphthalene-d8	1146-65-2	E641A	0.1	%		85.1	92.2	97.7	93.5	Not Determined SMI
Phenanthrene-d10	1517-22-2	E641A	0.1	%		99.8	101	109	101	96.7
Chlorinated Hydrocarbons										
Hexachlorobenzene	118-74-1	E660A	0.010	µg/L		----	----	----	----	<0.010
Hexachlorobutadiene	87-68-3	E660A	0.050	µg/L		----	----	----	----	<0.050
Hexachlorocyclopentadiene	77-47-4	E660A	0.050	µg/L		----	----	----	----	<0.050
Hexachloroethane	67-72-1	E660A	0.050	µg/L		----	----	----	----	<0.050
Octachlorostyrene	29082-74-4	E660A	0.050	µg/L		----	----	----	----	<0.050
Pentachlorobenzene	608-93-5	E660A	0.010	µg/L		----	----	----	----	<0.010
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A	0.010	µg/L		----	----	----	----	<0.010
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A	0.010	µg/L		----	----	----	----	<0.010
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A	0.010	µg/L		----	----	----	----	<0.010
Trichlorobenzene, 1,2,3-	87-61-6	E660A	0.010	µg/L		----	----	----	----	<0.010
Trichlorobenzene, 1,2,4-	120-82-1	E660A	0.010	µg/L		----	----	----	----	<0.010
Trichlorobenzene, 1,3,5-	108-70-3	E660A	0.010	µg/L		----	----	----	----	<0.010
Trichlorotoluene, 2,4,5-	6639-30-1	E660A	0.050	µg/L		----	----	----	----	<0.300 DLM
Chlorinated Hydrocarbons Surrogates										
Decachlorobiphenyl	2051-24-3	E660A	0.1	%		----	----	----	----	56.1
Tetrachloro-m-xylene	877-09-8	E660A	0.1	%		----	----	----	----	66.8
Chlorinated Phenolics										

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1A	MW03-04	A3MW02-05	A3MW03-03	U07-10S
					Client sampling date / time	14-Mar-2023 09:17	14-Mar-2023 11:14	14-Mar-2023 12:01	14-Mar-2023 11:38	14-Mar-2023 13:13
						VA23A5434-001	VA23A5434-002	VA23A5434-003	VA23A5434-004	VA23A5434-005
						Result	Result	Result	Result	Result
Chlorinated Phenolics										
Chlorophenol, 2-	95-57-8	E651A	0.050	µg/L		----	----	----	----	<0.050
Chlorophenol, 3-	108-43-0	E651A	0.050	µg/L		----	----	----	----	<0.250 DLCI
Chlorophenol, 4-	106-48-9	E651A	0.050	µg/L		----	----	----	----	<0.655 DLCI
Dichlorophenol, 2,3-	576-24-9	E651A	0.050	µg/L		----	----	----	----	2.95
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.050	µg/L		----	----	----	----	11.3
Dichlorophenol, 2,6-	87-65-0	E651A	0.050	µg/L		----	----	----	----	<0.050
Dichlorophenol, 3,4-	95-77-2	E651A	0.050	µg/L		----	----	----	----	9.82
Dichlorophenol, 3,5-	591-35-5	E651A	0.050	µg/L		----	----	----	----	10.8
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.50	µg/L		----	----	----	----	<5.85 DLQ
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.10	µg/L		----	----	----	----	<0.10
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.10	µg/L		----	----	----	----	<0.82 DLCI
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.10	µg/L		----	----	----	----	<0.10
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.10	µg/L		----	----	----	----	<0.10
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.10	µg/L		----	----	----	----	<0.10
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.10	µg/L		----	----	----	----	3.55
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.10	µg/L		----	----	----	----	0.47
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.10	µg/L		----	----	----	----	0.23
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.10	µg/L		----	----	----	----	2.51
Pentachlorophenol [PCP]	87-86-5	E651A	0.10	µg/L		----	----	----	----	0.35
Non-Chlorinated Phenolics										
Dimethylphenol, 2,4-	105-67-9	E651A	0.50	µg/L		----	----	----	----	230
Dinitrophenol, 2,4-	51-28-5	E651H	1.0	µg/L		----	----	----	----	<2.0 DLCI
Methylphenol, 2-	95-48-7	E651A	0.50	µg/L		----	----	----	----	36.0
Methylphenol, 3-	108-39-4	E651A	0.50	µg/L		----	----	----	----	118
Methylphenol, 4-	106-44-5	E651A	0.50	µg/L		----	----	----	----	40.0
Nitrophenol, 2-	88-75-5	E651H	1.0	µg/L		----	----	----	----	<1.0
Nitrophenol, 4-	100-02-7	E651H	1.0	µg/L		----	----	----	----	<1.0
Phenol	108-95-2	E651A	1.00	µg/L		----	----	----	----	9.83
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H	1.0	µg/L		----	----	----	----	<1.0
Phenolics Surrogates										

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1A	MW03-04	A3MW02-05	A3MW03-03	U07-10S
					Client sampling date / time	14-Mar-2023 09:17	14-Mar-2023 11:14	14-Mar-2023 12:01	14-Mar-2023 11:38	14-Mar-2023 13:13
						VA23A5434-001	VA23A5434-002	VA23A5434-003	VA23A5434-004	VA23A5434-005
						Result	Result	Result	Result	Result
Phenolics Surrogates										
Chlorophenol-d4, 2-	93951-73-6	E651A	0.1	%		----	----	----	----	Not Determined [SMI]
Dichlorophenol-d3, 2,4-	93951-74-7	E651A	0.1	%		----	----	----	----	102
Tribromophenol, 2,4,6-	118-79-6	E651A	0.1	%		----	----	----	----	80.0
Tribromophenol, 2,4,6-	118-79-6	E651H	1.0	%		----	----	----	----	96.0

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U07-10D	U07-10I	A3MW03-02	A3MW03-01	DUP-01
					Client sampling date / time	14-Mar-2023 13:23	14-Mar-2023 13:49	14-Mar-2023 14:44	14-Mar-2023 14:25	14-Mar-2023 14:44
						VA23A5434-006	VA23A5434-007	VA23A5434-008	VA23A5434-009	VA23A5434-010
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		0.66	4.79	55.7	4.01	57.0
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	0.53
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	3.37	<0.40	3.54
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	0.86	<0.30	0.90
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	4.23	<0.50	4.44
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	830	<250	850
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	120	800	<100	750
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	820	----	840
VPHw	----	EC580A	100	µg/L		<100	120	800	<100	740
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		90.4	95.9	95.2	94.3	95.0
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		102	84.1	93.0	86.4	82.2
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		101	97.3	106	99.5	106
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		96.9	96.8	85.1	99.0	85.1
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		5.09	4.67	3.40	----	3.18
Acenaphthylene	208-96-8	E641A	0.010	µg/L		0.017	<0.020 DLQ	<0.240 DLQ	----	<0.230 DLQ
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.030 DLCI	<0.070 DLCI	----	<0.070 DLCI
Anthracene	120-12-7	E641A	0.010	µg/L		0.016	0.029	<0.040 DLQ	----	<0.030 DLQ
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	0.023	<0.010	----	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	0.0120	<0.0050	----	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	0.019	<0.010	----	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	0.029	<0.015	----	<0.015

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U07-10D	U07-10I	A3MW03-02	A3MW03-01	DUP-01
					Client sampling date / time	14-Mar-2023 13:23	14-Mar-2023 13:49	14-Mar-2023 14:44	14-Mar-2023 14:25	14-Mar-2023 14:44
						VA23A5434-006	VA23A5434-007	VA23A5434-008	VA23A5434-009	VA23A5434-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	0.010	<0.010	----	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.020 DLCI	<0.010	----	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.026	0.087	0.014	----	0.013
Fluorene	86-73-7	E641A	0.010	µg/L		1.22	1.36	2.52	----	2.35
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.129	0.676	36.8	----	38.0
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.016	0.029	0.278	----	0.258
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.060 DLQ	<0.350 DLQ	<1.39 DLQ	----	<1.40 DLQ
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	0.121	0.540	----	0.530
Pyrene	129-00-0	E641A	0.010	µg/L		0.019	0.073	<0.010	----	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.490 DLCI	<3.48 DLCI	----	<3.50 DLCI
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	0.020	<0.010	----	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.045	0.224	<0.030	----	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		6.34	6.18	6.46	----	6.06
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		6.39	6.40	6.47	----	6.07
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		97.4	92.6	98.8	----	99.6
Naphthalene-d8	1146-65-2	E641A	0.1	%		95.8	97.4	98.1	----	92.1
Phenanthrene-d10	1517-22-2	E641A	0.1	%		101	109	107	----	108

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	TRAVEL BLANK-2	----	----	----	----
					Client sampling date / time	14-Mar-2023 15:13	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A5434-011	--------	--------	--------	--------	
					Result	----	----	----	----	
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----	
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----	
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----	
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----	
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----	
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----	
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----	
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----	
Hydrocarbons Surrogates										
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	97.8	----	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	103	----	----	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	98.1	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5434**	Page	: 1 of 12
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Issue Date	: 04-Apr-2023 07:45
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Non-Chlorinated Phenolics	QC-MRG3-873482001	----	Methylphenol, 2-	95-48-7	E651A	0.92 µg/L MB-LOR	0.5 µg/L	Blank result exceeds permitted value
Non-Chlorinated Phenolics	QC-MRG3-873482001	----	Methylphenol, 3-	108-39-4	E651A	0.29 µg/L MB-LOR	0.2 µg/L	Blank result exceeds permitted value
Non-Chlorinated Phenolics	QC-MRG3-873482001	----	Methylphenol, 4-	106-44-5	E651A	0.44 µg/L MB-LOR	0.2 µg/L	Blank result exceeds permitted value
Non-Chlorinated Phenolics	QC-MRG3-873482001	----	Phenol	108-95-2	E651A	0.28 µg/L MB-LOR	0.2 µg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	*Description*
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Chlorinated Hydrocarbons : Neutral Extractable Chlorinated Hydrocarbons by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E660A	14-Mar-2023	29-Mar-2023	7 days	15 days	× EHT	31-Mar-2023	40 days	2 days	✓
Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651A	14-Mar-2023	24-Mar-2023	14 days	10 days	✓	24-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-05	E601A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-03	E601A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1A	E601A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-04	E601A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E601A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-01	E601A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-02	E601A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-01	E601A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10D	E601A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10I	E601A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-05	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW03-01	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW03-02	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW03-03	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-01	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1A	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-04	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRAVEL BLANK-2	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U07-10D	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U07-10I	E581.VH+F1	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U07-10S	E581.VH+F1	14-Mar-2023	20-Mar-2023	----	----		20-Mar-2023	14 days	6 days	✓
Non-Chlorinated Phenolics : Phenolics (Nitrophenols) by GC-ECD										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651H	14-Mar-2023	24-Mar-2023	14 days	10 days	✓	27-Mar-2023	40 days	3 days	✓
Non-Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651A	14-Mar-2023	24-Mar-2023	14 days	10 days	✓	24-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter										
HDPE U07-10S	E108	14-Mar-2023	21-Mar-2023	----	----		21-Mar-2023	0.25 hrs	0.26 hrs	× EHTR-FM
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-05	E641A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-03	E641A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1A	E641A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-04	E641A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E641A	14-Mar-2023	19-Mar-2023	14 days	5 days	✓	20-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-02	E641A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-01	E641A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10D	E641A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10I	E641A	14-Mar-2023	20-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Volatile Organic Compounds : VOCs (Regular Full + BC Special List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10S	E611H	14-Mar-2023	20-Mar-2023	----	----		20-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW02-05	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW03-01	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW03-02	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW03-03	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-01	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-1A	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-04	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
TRAVEL BLANK-2	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10D	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10I	E611A	14-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10S	E611A	14-Mar-2023	20-Mar-2023	----	----		20-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : VOCs (Regular Full + BC Special List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10S	E611H	14-Mar-2023	20-Mar-2023	----	----		20-Mar-2023	14 days	6 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	868494	2	21	9.5	5.0	✓
pH by Meter	E108	870405	1	1	100.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	2	28	7.1	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	868493	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	869893	2	21	9.5	5.0	✓
BTEX by Headspace GC-MS	E611A	868494	2	21	9.5	5.0	✓
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A	880143	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	869894	2	17	11.7	5.0	✓
pH by Meter	E108	870405	1	1	100.0	5.0	✓
Phenolics (Nitrophenols) by GC-ECD	E651H	873483	1	11	9.0	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	873482	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	2	28	7.1	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	868493	1	1	100.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	869893	2	21	9.5	5.0	✓
BTEX by Headspace GC-MS	E611A	868494	2	21	9.5	5.0	✓
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A	880143	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	869894	2	17	11.7	5.0	✓
Phenolics (Nitrophenols) by GC-ECD	E651H	873483	1	11	9.0	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	873482	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	2	28	7.1	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	868493	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	868494	2	21	9.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	2	28	7.1	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	868493	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 Vancouver - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A Vancouver - Environmental	Water	EPA 8270E (mod)	Phenolics are analyzed by GC-MS.
Phenolics (Nitrophenols) by GC-ECD	E651H Vancouver - Environmental	Water	EPA 8041A (mod)	Phenolics are analyzed by GC-ECD.
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A Waterloo - Environmental	Water	EPA 8270E (mod)	Chlorinated Hydrocarbons are analyzed by GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
Phenolics Extraction	EP651 Vancouver - Environmental	Water	EPA 3511 (mod)	Phenolics are extracted from acidic aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5434**	Page	: 1 of 14
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 07:44
Sampler	: RS & AGE 604-444-6400		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 11		
No. of samples analysed	: 11		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Brieanna Allen	Production/Validation Manager	Vancouver Inorganics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 870405)											
VA23A5434-005	U07-10S	pH	----	E108	0.10	pH units	6.10	6.10	0.00%	4%	----
Volatile Organic Compounds (QC Lot: 868320)											
VA23A5011-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 868493)											
VA23A5434-005	U07-10S	Butadiene, 1,3-	106-99-0	E611H	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Butylbenzene, n-	104-51-8	E611H	1.4	µg/L	<1.4	<1.4	0	Diff <2x LOR	----
		Butylbenzene, sec-	135-98-8	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, tert-	98-06-6	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Decane, n-	124-18-5	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611H	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E611H	1.0	µg/L	2.1	2.4	0.3	Diff <2x LOR	----
		Methylcyclohexane	108-87-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Nonane, n-	111-84-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propylbenzene, n-	103-65-1	E611H	1.0	µg/L	1.9	2.0	0.2	Diff <2x LOR	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611H	1.0	µg/L	24.3	28.4	15.8%	30%	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611H	1.0	µg/L	7.0	8.6	19.7%	30%	----
Volatile Organic Compounds (QC Lot: 868494)											
VA23A5434-005	U07-10S	Benzene	71-43-2	E611A	0.50	µg/L	23.6	22.6	4.52%	30%	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	25.1	24.5	2.36%	30%	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	1.00	µg/L	941	968	2.78%	30%	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	8.14	7.64	6.34%	30%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 868494) - continued											
VA23A5434-005	U07-10S	Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	21.0	21.1	0.640%	30%	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	11.2	12.3	8.76%	30%	----
Hydrocarbons (QC Lot: 868319)											
VA23A5011-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
Hydrocarbons (QC Lot: 868491)											
VA23A5394-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 868320)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 868493)						
Butadiene, 1,3-	106-99-0	E611H	0.2	µg/L	<0.20	----
Butylbenzene, n-	104-51-8	E611H	1	µg/L	<1.0	----
Butylbenzene, sec-	135-98-8	E611H	1	µg/L	<1.0	----
Butylbenzene, tert-	98-06-6	E611H	1	µg/L	<1.0	----
Decane, n-	124-18-5	E611H	1	µg/L	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611H	0.2	µg/L	<0.20	----
Dichloroethane, 1,2-	107-06-2	E611H	1	µg/L	<1.0	----
Hexane, n-	110-54-3	E611H	1	µg/L	<1.0	----
Isopropylbenzene	98-82-8	E611H	1	µg/L	<1.0	----
Methylcyclohexane	108-87-2	E611H	1	µg/L	<1.0	----
Nonane, n-	111-84-2	E611H	1	µg/L	<1.0	----
Propylbenzene, n-	103-65-1	E611H	1	µg/L	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611H	1	µg/L	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611H	1	µg/L	<1.0	----
Volatile Organic Compounds (QCLot: 868494)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 868319)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Hydrocarbons (QCLot: 868491)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 868559)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 869893)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 868560)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 869894)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 869894) - continued						
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Chlorinated Hydrocarbons (QCLot: 880143)						
Hexachlorobenzene	118-74-1	E660A	0.01	µg/L	<0.010	----
Hexachlorobutadiene	87-68-3	E660A	0.05	µg/L	<0.050	----
Hexachlorocyclopentadiene	77-47-4	E660A	0.05	µg/L	<0.050	----
Hexachloroethane	67-72-1	E660A	0.05	µg/L	<0.050	----
Octachlorostyrene	29082-74-4	E660A	0.05	µg/L	<0.050	----
Pentachlorobenzene	608-93-5	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,2,3-	87-61-6	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,2,4-	120-82-1	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,3,5-	108-70-3	E660A	0.01	µg/L	<0.010	----
Trichlorotoluene, 2,4,5-	6639-30-1	E660A	0.05	µg/L	<0.050	----
Chlorinated Phenolics (QCLot: 873482)						
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Chlorinated Phenolics (QCLot: 873482) - continued						
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	<0.050	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	<0.10	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	<0.10	----
Nitrogenated Phenolics (QCLot: 873483)						
Dinitrophenol, 2,4-	51-28-5	E651H	1	µg/L	<1.0	----
Nitrophenol, 2-	88-75-5	E651H	1	µg/L	<1.0	----
Nitrophenol, 4-	100-02-7	E651H	1	µg/L	<1.0	----
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H	1	µg/L	<1.0	----
Non-Chlorinated Phenolics (QCLot: 873482)						
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	<0.20	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	# 0.92	MB-LOR
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	# 0.29	MB-LOR
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	# 0.44	MB-LOR
Phenol	108-95-2	E651A	0.2	µg/L	# 0.28	MB-LOR

Qualifiers

Qualifier	Description
MB-LOR	*Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 870405)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Volatile Organic Compounds (QCLot: 868320)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	109	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	103	70.0	130	----
Volatile Organic Compounds (QCLot: 868493)									
Butadiene, 1,3-	106-99-0	E611H	0.2	µg/L	100 µg/L	97.6	60.0	140	----
Butylbenzene, n-	104-51-8	E611H	1	µg/L	100 µg/L	99.7	70.0	130	----
Butylbenzene, sec-	135-98-8	E611H	1	µg/L	100 µg/L	105	70.0	130	----
Butylbenzene, tert-	98-06-6	E611H	1	µg/L	100 µg/L	102	70.0	130	----
Decane, n-	124-18-5	E611H	1	µg/L	100 µg/L	129	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611H	0.2	µg/L	100 µg/L	98.6	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611H	1	µg/L	100 µg/L	87.2	70.0	130	----
Hexane, n-	110-54-3	E611H	1	µg/L	100 µg/L	106	70.0	130	----
Isopropylbenzene	98-82-8	E611H	1	µg/L	100 µg/L	110	70.0	130	----
Methylcyclohexane	108-87-2	E611H	1	µg/L	100 µg/L	109	70.0	130	----
Nonane, n-	111-84-2	E611H	1	µg/L	100 µg/L	114	70.0	130	----
Propylbenzene, n-	103-65-1	E611H	1	µg/L	100 µg/L	107	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E611H	1	µg/L	100 µg/L	105	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E611H	1	µg/L	100 µg/L	108	70.0	130	----
Volatile Organic Compounds (QCLot: 868494)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	118	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	113	70.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 868319)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	82.4	70.0	130	----
Hydrocarbons (QCLot: 868491)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	84.2	70.0	130	----
Hydrocarbons (QCLot: 868559)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	123	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	120	70.0	130	----
Hydrocarbons (QCLot: 869893)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	129	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	125	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 868560)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	91.9	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	98.6	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	100	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	93.1	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	94.8	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	87.5	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	87.6	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	88.5	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	111	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	98.2	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	124	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 869894)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 869894) - continued									
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	97.6	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	100	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	85.8	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	98.1	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	99.0	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	105	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	105	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	113	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	111	60.0	130	----
Chlorinated Hydrocarbons (QCLot: 880143)									
Hexachlorobenzene	118-74-1	E660A	0.01	µg/L	0.2 µg/L	76.6	40.0	130	----
Hexachlorobutadiene	87-68-3	E660A	0.05	µg/L	0.2 µg/L	87.5	40.0	130	----
Hexachlorocyclopentadiene	77-47-4	E660A	0.05	µg/L	0.2 µg/L	68.1	40.0	130	----
Hexachloroethane	67-72-1	E660A	0.05	µg/L	0.2 µg/L	86.0	40.0	130	----
Octachlorostyrene	29082-74-4	E660A	0.05	µg/L	0.2 µg/L	92.2	40.0	130	----
Pentachlorobenzene	608-93-5	E660A	0.01	µg/L	0.2 µg/L	82.8	40.0	130	----
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A	0.01	µg/L	0.2 µg/L	86.6	40.0	130	----
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A	0.01	µg/L	0.2 µg/L	83.3	40.0	130	----
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A	0.01	µg/L	0.2 µg/L	102	40.0	130	----
Trichlorobenzene, 1,2,3-	87-61-6	E660A	0.01	µg/L	0.2 µg/L	104	40.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E660A	0.01	µg/L	0.2 µg/L	96.9	40.0	130	----
Trichlorobenzene, 1,3,5-	108-70-3	E660A	0.01	µg/L	0.2 µg/L	89.2	40.0	130	----
Trichlorotoluene, 2,4,5-	6639-30-1	E660A	0.05	µg/L	0.2 µg/L	81.8	40.0	130	----
Chlorinated Phenolics (QCLot: 873482)									
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	2 µg/L	95.9	50.0	130	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	2 µg/L	93.0	50.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Chlorinated Phenolics (QCLot: 873482) - continued									
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	2 µg/L	97.3	50.0	130	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	2 µg/L	98.9	50.0	130	----
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	4 µg/L	97.3	50.0	130	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	2 µg/L	96.0	50.0	130	----
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	2 µg/L	97.6	50.0	130	----
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	2 µg/L	101	50.0	130	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	2 µg/L	99.7	60.0	130	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	2 µg/L	98.0	60.0	130	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	2 µg/L	100	60.0	130	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	2 µg/L	99.3	60.0	130	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	2 µg/L	103	60.0	130	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	2 µg/L	99.8	50.0	130	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	2 µg/L	100.0	50.0	130	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	2 µg/L	102	50.0	130	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	2 µg/L	103	50.0	130	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	2 µg/L	99.9	50.0	130	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	2 µg/L	101	50.0	130	----
Nitrogenated Phenolics (QCLot: 873483)									
Dinitrophenol, 2,4-	51-28-5	E651H	1	µg/L	5 µg/L	93.4	40.0	140	----
Nitrophenol, 2-	88-75-5	E651H	1	µg/L	5 µg/L	100	40.0	140	----
Nitrophenol, 4-	100-02-7	E651H	1	µg/L	5 µg/L	93.8	40.0	140	----
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H	1	µg/L	5 µg/L	93.7	40.0	140	----
Non-Chlorinated Phenolics (QCLot: 873482)									
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	2 µg/L	102	50.0	130	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	2 µg/L	123	50.0	130	----
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	2 µg/L	106	50.0	130	----
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	2 µg/L	108	50.0	130	----
Phenol	108-95-2	E651A	0.2	µg/L	2 µg/L	112	50.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 868320)										
VA23A5434-001	G1-1A	Benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Ethylbenzene	100-41-4	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.0 µg/L	100 µg/L	99.0	60.0	140	----
		Styrene	100-42-5	E611A	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		Toluene	108-88-3	E611A	94.0 µg/L	100 µg/L	94.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	99.1	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
Volatile Organic Compounds (QCLot: 868493)										
VA23A5434-005	U07-10S	Butadiene, 1,3-	106-99-0	E611H	74.5 µg/L	100 µg/L	74.5	60.0	140	----
		Butylbenzene, n-	104-51-8	E611H	106 µg/L	100 µg/L	106	60.0	140	----
		Butylbenzene, sec-	135-98-8	E611H	96.1 µg/L	100 µg/L	96.1	60.0	140	----
		Butylbenzene, tert-	98-06-6	E611H	91.2 µg/L	100 µg/L	91.2	60.0	140	----
		Decane, n-	124-18-5	E611H	126 µg/L	100 µg/L	126	60.0	140	----
		Dibromoethane, 1,2-	106-93-4	E611H	96.7 µg/L	100 µg/L	96.7	60.0	140	----
		Dichloroethane, 1,2-	107-06-2	E611H	88.2 µg/L	100 µg/L	88.2	60.0	140	----
		Hexane, n-	110-54-3	E611H	88.2 µg/L	100 µg/L	88.2	60.0	140	----
		Isopropylbenzene	98-82-8	E611H	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Methylcyclohexane	108-87-2	E611H	94.5 µg/L	100 µg/L	94.5	60.0	140	----
		Nonane, n-	111-84-2	E611H	96.7 µg/L	100 µg/L	96.7	60.0	140	----
		Propylbenzene, n-	103-65-1	E611H	96.8 µg/L	100 µg/L	96.8	60.0	140	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611H	104 µg/L	100 µg/L	104	60.0	140	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611H	100 µg/L	100 µg/L	100	60.0	140	----
Volatile Organic Compounds (QCLot: 868494)										
VA23A5434-005	U07-10S	Benzene	71-43-2	E611A	97.7 µg/L	100 µg/L	97.7	60.0	140	----
		Ethylbenzene	100-41-4	E611A	99.7 µg/L	100 µg/L	99.7	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	ND µg/L	100 µg/L	ND	60.0	140	----
		Styrene	100-42-5	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Toluene	108-88-3	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	218 µg/L	200 µg/L	109	60.0	140	----
		Xylene, o-	95-47-6	E611A	104 µg/L	100 µg/L	104	60.0	140	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Hydrocarbons (QCLot: 868319)										
VA23A5434-002	MW03-04	VHw (C6-C10)	----	E581.VH+F1	4460 µg/L	6310 µg/L	70.7	60.0	140	----
Hydrocarbons (QCLot: 868491)										
VA23A5394-003	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5520 µg/L	6310 µg/L	87.4	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #: ~~6070433606706~~ / 15402	
PO / AFE:	573161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	A5434

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Dean Watt	Sampler: RS & AGE

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	BC13-Full Phenolst pH (P)	VOCs EC&H - BC List (P)	EG60A - Chlorinated Hydrocarbons (P)	HOLD	AGE REQUIRED	ARD (see notes)
1	G1-1A	14-Mar-23	9:17	GW	4	X		X	X							
2	MW03-04		11:14		4	X		X	X							
3	A3MW02-05		12:01		4	X		X	X							
4	A3MW03-03		11:38		4	X		X	X							
5	U07-105		13:13		12	X		X	X		X	X	X			
6	U07-100		13:23		4	X		X	X							
7	U07-101		13:49		4	X		X	X							
8	A3MW03-02		14:44		4	X		X	X							
9	A3MW03-01		14:25		4	X	X									
10	DUP-01		14:44		4	X		X	X							
11	TRAVEL BLANK-2		15:13		1	X										

Environmental Division
Vancouver
Work Order Reference
VA23A5434

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				5	4		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 14, 2023	16:56

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
AB	03/14/23	5PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5455**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Date Analysis Commenced	: 16-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Mar-2023 08:48
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Robert Nguyen	Analsyt	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	G1-1A	----	----	----	----
					Client sampling date / time	14-Mar-2023 09:17	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5455-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		159000	----	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000100 DLA	----	----	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5455**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Issue Date	: 20-Mar-2023 08:49
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
G1-1A	E421	14-Mar-2023	16-Mar-2023	----	----		17-Mar-2023	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	864962	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	864962	1	19	5.2	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	864962	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	864962	1	19	5.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA23A5455**	Page	: 1 of 3
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Mar-2023 17:00
PO	: 573161	Date Analysis Commenced	: 16-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Mar-2023 08:48
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Robert Nguyen	Analsyt	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 864962)											
VA23A5455-001	G1-1A	Lead, dissolved	7439-92-1	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 864962)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 864962)										
VA23A5466-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0182 mg/L	0.02 mg/L	90.8	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #: (~~6070433 6007961~~) / 15402	
PO / AFE:	573161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	A5455

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Dean Watt	Sampler: RS & AGE

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	Dissolved Lead (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-1A	14-Mar-23	9:17	GW	1						X			

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Environmental Division
Vancouver
Work Order Reference
VA23A5455

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☑ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				9			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 14, 2023	16:56

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
AS	03/14/23	5PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5541**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: 20-935574	Issue Date	: 22-Mar-2023 10:09
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: G1-1B	G1-1C	----	----	----
					Client sampling date / time: 15-Mar-2023 09:44	15-Mar-2023 09:25	----	----	----
					VA23A5541-001	VA23A5541-002	--------	--------	--------
					Result	Result	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	<0.50	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	<250	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	----	----	----
VPHw	----	EC580A	100	µg/L	<100	<100	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%	80.0	86.7	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	89.3	91.1	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	101	102	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	100	98.4	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5541**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Issue Date	: 22-Mar-2023 10:09
C-O-C number	: 20-935574		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1B	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1C	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1B	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1C	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-1B	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-1C	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	870030	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	870030	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5541**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: 20-935574	Issue Date	: 22-Mar-2023 10:09
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 868320)											
VA23A5011-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 868319)											
VA23A5011-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 868320)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 868319)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 870030)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 868320)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	109	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	103	70.0	130	----
Hydrocarbons (QCLot: 868319)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	82.4	70.0	130	----
Hydrocarbons (QCLot: 870030)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	125	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	122	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 868320)										
VA23A5434-001	Anonymous	Benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Ethylbenzene	100-41-4	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.0 µg/L	100 µg/L	99.0	60.0	140	----
		Styrene	100-42-5	E611A	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		Toluene	108-88-3	E611A	94.0 µg/L	100 µg/L	94.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	99.1	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
Hydrocarbons (QCLot: 868319)										
VA23A5434-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4460 µg/L	6310 µg/L	70.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 935574

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	AECOM Canada Ltd.	Select Report Format: [X] PDF [X] EXCEL [X] EDD (DIGITAL)	[X] Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Stephen Sumsion	Merge QC/QCI Reports with COA: [X] YES [ ] NO [ ] N/A	[ ] 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	604-444-6400	[X] Compare Results to Criteria on Report - provide details below if box checked	[ ] 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: [X] EMAIL [ ] MAIL [ ] FAX	[ ] 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	3292 Production Way	Email 1 or Fax stephen.sumsion@aecom.com	[ ] 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Burnaby, BC	Email 2 johnny.au@aecom.com	[ ] Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Postal Code:	V5A 4R4	Email 3 raymund.samaga@aecom.com	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
Invoice To	Same as Report To [ ] YES [X] NO	Invoice Recipients	For all tests with rush TATs requested, please contact your AM to confirm availability.
	Copy of Invoice with Report [ ] YES [X] NO	Select Invoice Distribution: [X] EMAIL [ ] MAIL [ ] FAX	
Company:	Parkland Refining (B.C.) Ltd.	Email 1 or Fax christopher_boys@parkland.ca	
Contact:	Christopher Boys	Email 2 stephen.sumsion@aecom.com	

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	
ALS Lab Work Order # (ALS use only):	ASS4J	ALS Contact:	Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MBE F	EPH P	VGF	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-1B	15-Mar-23	9:44	GW	4	X	X				
	G1-1C	15-Mar-23	9:25	GW	4	X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A5541

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? [ ] YES [X] NO	BC CSR
Are samples for human consumption/ use? [ ] YES [X] NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: [ ] NONE [ ] ICE [X] ICE PACKS [ ] FROZEN [ ] COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: [ ] YES [ ] NO

Cooler Custody Seals Intact: [ ] YES [ ] N/A Sample Custody Seals Intact: [ ] YES [ ] N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			9		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Samaga	Date: March 15, 2023	Time: 17:12	Received by:	Date:	Time:	Received by: DV	Date: Mar 5	Time: 5:20 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

White Paper Co. 604 951-3900

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5544**	Page	: 1 of 5
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 15:30
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Hardness calculation added.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1B	G1-1C	A1-7S	G1-3A	G1-3B
					Client sampling date / time	15-Mar-2023 09:44	15-Mar-2023 09:25	15-Mar-2023 11:25	15-Mar-2023 14:13	15-Mar-2023 14:20
						VA23A5544-001	VA23A5544-002	VA23A5544-003	VA23A5544-004	VA23A5544-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		17.3	11.5	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.000050	mg/L		<0.000100 DLA	<0.000100 DLA	----	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	Field	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		----	----	1.12	<0.50	16.4
Styrene	100-42-5	E611A	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		----	----	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		----	----	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		----	----	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		----	----	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		----	----	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		----	----	<250	----	----
LEPHw	----	EC600A	250	µg/L		----	----	<250	----	----
VPHw	----	EC580A	100	µg/L		----	----	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		----	----	81.7	84.3	77.9
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		----	----	86.1	94.1	77.5
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		----	----	98.8	101	105
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		----	----	99.1	98.4	97.3
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		----	----	<0.010	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		----	----	<0.010	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-1B	G1-1C	A1-7S	G1-3A	G1-3B
					Client sampling date / time	15-Mar-2023 09:44	15-Mar-2023 09:25	15-Mar-2023 11:25	15-Mar-2023 14:13	15-Mar-2023 14:20
						VA23A5544-001	VA23A5544-002	VA23A5544-003	VA23A5544-004	VA23A5544-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Acridine	260-94-6	E641A	0.010	µg/L		----	----	<0.010	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		----	----	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		----	----	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		----	----	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		----	----	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		----	----	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		----	----	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		----	----	<0.010	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		----	----	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		----	----	<0.0050	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		----	----	<0.010	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		----	----	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		----	----	0.013	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		----	----	<0.050	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		----	----	<0.020	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		----	----	<0.010	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		----	----	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		----	----	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		----	----	<0.030	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		----	----	<0.060	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		----	----	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		----	----	81.4	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		----	----	87.0	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		----	----	99.6	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

					Client sample ID	A1-11A	A1-11B	----	----	----
					Client sampling date / time	15-Mar-2023 15:36	15-Mar-2023 16:15	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5544-006	VA23A5544-007	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	1.46	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		83.2	84.8	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		100	102	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		103	105	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.6	98.9	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5544**	Page	: 1 of 8
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Issue Date	: 20-Apr-2023 15:31
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-1B	E421	15-Mar-2023	18-Mar-2023	----	----		19-Mar-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-1C	E421	15-Mar-2023	18-Mar-2023	----	----		19-Mar-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-11A	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-11B	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7S	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-3A	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-3B	E601A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	22-Mar-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-11A	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-11B	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-7S	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-3A	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-3B	E581.VH+F1	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7S	E641A	15-Mar-2023	21-Mar-2023	14 days	6 days	✓	21-Mar-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-11A	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-11B	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-7S	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-3A	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-3B	E611A	15-Mar-2023	18-Mar-2023	----	----		18-Mar-2023	14 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	867169	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	870030	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	867169	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	870031	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	870030	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	867169	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	870031	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	868320	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	867169	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	868319	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5544**	Page	: 1 of 7
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Mar-2023 17:20
PO	: 573161	Date Analysis Commenced	: 18-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 15:30
Sampler	: RS & AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 867169)											
VA23A5518-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 868320)											
VA23A5011-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 868319)											
VA23A5011-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 867169)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 868320)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 868319)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 870030)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 870031)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 870031) - continued						
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.7	80.0	120	----
Volatile Organic Compounds (QCLot: 868320)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	109	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	103	70.0	130	----
Hydrocarbons (QCLot: 868319)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	82.4	70.0	130	----
Hydrocarbons (QCLot: 870030)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	125	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	122	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 870031)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	104	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	84.5	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	104	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 870031) - continued									
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	102	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	114	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 867169)										
VA23A5518-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0185 mg/L	0.02 mg/L	92.7	70.0	130	----
Volatile Organic Compounds (QCLot: 868320)										
VA23A5434-001	Anonymous	Benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Ethylbenzene	100-41-4	E611A	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.0 µg/L	100 µg/L	99.0	60.0	140	----
		Styrene	100-42-5	E611A	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		Toluene	108-88-3	E611A	94.0 µg/L	100 µg/L	94.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	99.1	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
Hydrocarbons (QCLot: 868319)										
VA23A5434-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4460 µg/L	6310 µg/L	70.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Reports / Recipients		Turnaround Time (TAT) Requested
Company:	AECOM Canada Ltd.	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Stephen Sumsion	Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	604-444-6400	☑ Compare Results to Criteria on Report - provide details below if box checked		☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:	3292 Production Way	Email 1 or Fax	stephen.sumsion@aecom.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:	Burnaby, BC	Email 2	johnny.au@aecom.com	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Postal Code:	V5A 4R4	Email 3	raymund.sampaga@aecom.com	
Invoice To	Same as Report To ☐ YES ☑ NO	**Invoice Recipients**		Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.
Company:	Parkland Refinery (B.C.) Ltd.	Email 1 or Fax	christopher.boys@parkland.ca	
Contact:	Christopher Boys	Email 2	stephen.sumsion@aecom.com	

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #: 60703360679642 / 15402		Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	
ALS Lab Work Order # (ALS use only):	ASS44	ALS Contact: Dean Watt	Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	Dissolved lead (F/P)	SUSPECTED HAZARD (see notes)	ENDED STORAGE REQUIRED	MPLES ON HOLD
	G1-1B	15-Mar-23	9:44	GW	1						X			
	G1-1C	↓	9:25	↓	1						X			
	A1-7S		11:25		4	X		X	X					
	G1-3A		14:13		4	X	X							
	G1-3B		14:20		4	X	X							
	A1-11A		15:36		4	X	X							
	A1-11B	↓	16:15	↓	4	X	X							

Environmental Division
Vancouver
Work Order Reference
VA23A5544

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Raymund Sampaga	March 15, 2023	17:12				DN	Mar 15	5:12

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5745**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Mar-2023 18:45
PO	: 573161	Date Analysis Commenced	: 17-Mar-2023
C-O-C number	: ----	Issue Date	: 21-Mar-2023 14:52
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: A1-7D	----	----	----	----
					Client sampling date / time: 16-Mar-2023 08:29	----	----	----	----
					VA23A5745-001	--------	--------	--------	--------
					Result	----	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%	94.8	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	114	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	75.1	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	97.4	----	----	----	----
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----
Acridine	260-94-6	E641A	0.010	µg/L	<0.010	----	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L	0.014	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	0.0178	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	0.020	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	A1-7D	----	----	----	----
					Client sampling date / time	16-Mar-2023 08:29	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A5745-001	--------	--------	--------	--------
						Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		0.020	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		0.020	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.037	----	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		0.018	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	----	----	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		0.115	----	----	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	----	----	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.034	----	----	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		0.026	----	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.161	----	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		0.115	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.276	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		125	----	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		108	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		118	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5745**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Mar-2023 18:45
PO	: 573161	Issue Date	: 21-Mar-2023 14:52
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7D	E601A	16-Mar-2023	19-Mar-2023	14 days	3 days	✓	20-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-7D	E581.VH+F1	16-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7D	E641A	16-Mar-2023	19-Mar-2023	14 days	3 days	✓	20-Mar-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-7D	E611A	16-Mar-2023	17-Mar-2023	----	----		17-Mar-2023	14 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✗ = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	867192	1	4	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	867194	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	868559	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	867192	1	4	25.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	868560	1	6	16.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	867194	1	1	100.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	868559	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	867192	1	4	25.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	868560	1	6	16.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	867194	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	867192	1	4	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	867194	0	1	0.0	5.0	✗

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5745**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Mar-2023 18:45
PO	: 573161	Date Analysis Commenced	: 17-Mar-2023
C-O-C number	: ----	Issue Date	: 21-Mar-2023 14:52
Sampler	: RS & AGE 604-444-6400		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 867192)											
KS2300746-007	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 867194)											
VA23A5745-001	A1-7D	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 867192)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 867194)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 868559)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 868560)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 868560) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 867192)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	98.1	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	111	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	105	70.0	130	----
Hydrocarbons (QCLot: 867194)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	74.7	70.0	130	----
Hydrocarbons (QCLot: 868559)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	123	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	120	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 868560)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	91.9	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	98.6	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	100	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	93.1	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	94.8	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	87.5	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	87.6	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	88.5	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	111	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 868560) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	98.2	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	124	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 867192)										
KS2300746-007	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	96.7 µg/L	100 µg/L	96.7	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Styrene	100-42-5	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
		Toluene	108-88-3	E611A	98.1 µg/L	100 µg/L	98.1	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	216 µg/L	200 µg/L	108	60.0	140	----
		Xylene, o-	95-47-6	E611A	102 µg/L	100 µg/L	102	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): A5745

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A1-7D	16-Mar-23	8:29	GW	4	X		X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A5745

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☑ YES ☑ NO

Are samples for human consumption/ use?
☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				12			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 16, 2023	18:43

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	MAR 16	16:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 1

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
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Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
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Project Information

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PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): A5745

ALS Contact: Dean Watt

Sampler: RJ & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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						P	P	P	P	F			
	A1-7D	16-Mar-23	8:29	GW	4	X		X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A5745

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
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BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				12			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 16, 2023	18:43

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	MAR 16	18:45

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A5948**	Page	: 1 of 5
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Date Analysis Commenced	: 21-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 15:33
Sampler	: RS&AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Hardness data added.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-6	G1-10	A1-9S	A1-9D	G1-9B
					Client sampling date / time	20-Mar-2023 11:32	20-Mar-2023 12:05	20-Mar-2023 09:34	20-Mar-2023 10:44	20-Mar-2023 12:05
						VA23A5948-001	VA23A5948-002	VA23A5948-003	VA23A5948-004	VA23A5948-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		46.3	----	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421	0.050	µg/L		<0.050	----	----	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	35.1
Styrene	100-42-5	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		----	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		----	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		----	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		----	<250	<250	<250	1360
EPH (C19-C32)	----	E601A	250	µg/L		----	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		----	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		----	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		----	<250	<250	<250	1330
VPHw	----	EC580A	100	µg/L		----	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		----	94.6	90.2	93.3	92.9
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		----	105	94.5	104	105
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		----	74.8	74.2	72.8	70.3
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		----	97.4	99.1	98.7	97.5
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		----	<0.010	0.024	<0.010	7.22
Acenaphthylene	208-96-8	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	1.28

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G1-6	G1-10	A1-9S	A1-9D	G1-9B
					Client sampling date / time	20-Mar-2023 11:32	20-Mar-2023 12:05	20-Mar-2023 09:34	20-Mar-2023 10:44	20-Mar-2023 12:05
						VA23A5948-001	VA23A5948-002	VA23A5948-003	VA23A5948-004	VA23A5948-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Acridine	260-94-6	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<2.15 DLCI
Anthracene	120-12-7	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<1.69 DLQ
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		----	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		----	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		----	0.012	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		----	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	0.124
Fluorene	86-73-7	E641A	0.010	µg/L		----	<0.010	0.016	<0.010	7.09
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		----	<0.010	0.054	0.010	82.0
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		----	<0.010	0.022	0.021	0.938
Naphthalene	91-20-3	E641A	0.050	µg/L		----	<0.050	<0.050	<0.050	<1.39 DLQ
Phenanthrene	85-01-8	E641A	0.020	µg/L		----	<0.020	<0.020	<0.020	10.7
Pyrene	129-00-0	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	0.497
Quinoline	91-22-5	E641A	0.050	µg/L		----	<0.050	<0.050	<0.050	<9.53 DLCI
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		----	<0.030	<0.030	<0.030	0.621
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		----	<0.060	<0.060	<0.060	26.3
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		----	<0.065	<0.065	<0.065	26.9
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		----	119	115	119	114
Naphthalene-d8	1146-65-2	E641A	0.1	%		----	107	104	102	105
Phenanthrene-d10	1517-22-2	E641A	0.1	%		----	112	112	109	114

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A5948**	Page	: 1 of 8
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Issue Date	: 20-Apr-2023 15:34
C-O-C number	: ----		
Sampler	: RS&AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-6	E421	20-Mar-2023	21-Mar-2023	----	----		22-Mar-2023	180 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9D	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9S	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-10	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-9B	E601A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-9D	E581.VH+F1	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-9S	E581.VH+F1	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-10	E581.VH+F1	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-9B	E581.VH+F1	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9D	E641A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9S	E641A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G1-10	E641A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G1-9B	E641A	20-Mar-2023	25-Mar-2023	14 days	5 days	✓	26-Mar-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-9D	E611A	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-9S	E611A	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-10	E611A	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-9B	E611A	20-Mar-2023	23-Mar-2023	----	----		23-Mar-2023	14 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	873113	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	870211	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	873111	1	11	9.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	875905	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	873113	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	870211	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	875906	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	873111	1	11	9.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	875905	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	873113	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	870211	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	875906	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	873111	1	11	9.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	873113	1	5	20.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	870211	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	873111	1	11	9.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A5948**	Page	: 1 of 7
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 355 North Willingdon Ave Burnaby BC Canada V5C 1X4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 20-Mar-2023 17:15
PO	: 573161	Date Analysis Commenced	: 21-Mar-2023
C-O-C number	: ----	Issue Date	: 20-Apr-2023 15:34
Sampler	: RS&AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Organics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 870211)											
VA23A5898-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 873113)											
VA23A5893-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 873111)											
VA23A5521-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 870211)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 873113)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 873111)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 875905)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 875906)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 875906) - continued						
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	94.7	80.0	120	----
Volatile Organic Compounds (QCLot: 873113)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	98.1	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	94.3	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	97.8	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	111	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 873111)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	73.4	70.0	130	----
Hydrocarbons (QCLot: 875905)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 875906)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	81.3	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	108	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 875906) - continued									
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	109	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	107	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 870211)										
VA23A5901-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.212 mg/L	0.2 mg/L	106	70.0	130	----
Volatile Organic Compounds (QCLot: 873113)										
VA23A5948-002	G1-10	Benzene	71-43-2	E611A	91.1 µg/L	100 µg/L	91.1	60.0	140	----
		Ethylbenzene	100-41-4	E611A	90.3 µg/L	100 µg/L	90.3	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	94.4 µg/L	100 µg/L	94.4	60.0	140	----
		Styrene	100-42-5	E611A	88.3 µg/L	100 µg/L	88.3	60.0	140	----
		Toluene	108-88-3	E611A	89.3 µg/L	100 µg/L	89.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	200 µg/L	200 µg/L	100	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.1 µg/L	100 µg/L	95.1	60.0	140	----
Hydrocarbons (QCLot: 873111)										
VA23A5948-003	A1-9S	VHw (C6-C10)	----	E581.VH+F1	4830 µg/L	6310 µg/L	76.5	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Vancouver
Work Order Reference
VA23A5948

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimi
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimi
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimi
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. fees may apply to rush requests on weekends, statutory holidays routine tests

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): 5948

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	Dissolved Lead (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-6	20-Mar-23	11:32	GW	1						X			
	G1-10	↓	12:05	↓	4	X		X	X					
	A1-9S		9:34		4	X		X	X					
	A1-9D		10:44		4	X		X	X					
	G1-9B		12:05		4	X		X	X					

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO

Are samples for human consumption/ use?
☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	4°

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 20, 2023	17:13

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RL	Mar 24	5:15 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6627**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 28-Mar-2023 16:35
PO	: 573161	Date Analysis Commenced	: 02-Apr-2023
C-O-C number	: ----	Issue Date	: 05-Apr-2023 08:36
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3I	G2-11A	G2-11B	MW02-02	A2MW09-14
					Client sampling date / time	28-Mar-2023 09:57	28-Mar-2023 12:05	28-Mar-2023 12:52	28-Mar-2023 13:35	28-Mar-2023 15:05
						VA23A6627-001	VA23A6627-002	VA23A6627-003	VA23A6627-004	VA23A6627-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	0.89	0.54	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		85.3	99.7	89.8	95.5	96.2
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		97.0	94.8	91.9	86.3	102
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		97.3	101	96.5	93.5	98.1
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		101	100	99.9	99.2	100
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	0.012	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3I	G2-11A	G2-11B	MW02-02	A2MW09-14
					Client sampling date / time	28-Mar-2023 09:57	28-Mar-2023 12:05	28-Mar-2023 12:52	28-Mar-2023 13:35	28-Mar-2023 15:05
						VA23A6627-001	VA23A6627-002	VA23A6627-003	VA23A6627-004	VA23A6627-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	0.023	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	0.011	<0.010	<0.010	<0.011 DLQ
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	<0.060	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		70.2	69.9	66.9	62.4	64.2
Naphthalene-d8	1146-65-2	E641A	0.1	%		110	115	113	103	110
Phenanthrene-d10	1517-22-2	E641A	0.1	%		104	105	104	95.9	102

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-15	DUP-08	----	----	----
					Client sampling date / time	28-Mar-2023 14:33	28-Mar-2023 09:57	----	----	----
						VA23A6627-006	VA23A6627-007	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		1.36	<0.50	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		300	<250	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	----	----	----
HEPHw	----	EC600A	250	µg/L		<250	<250	----	----	----
LEPHw	----	EC600A	250	µg/L		300	<250	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		101	91.7	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		101	87.2	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		100	97.3	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		97.6	97.9	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.058 DLQ	<0.010	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	----	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-15	DUP-08	----	----	----
					Client sampling date / time	28-Mar-2023 14:33	28-Mar-2023 09:57	----	----	----
						VA23A6627-006	VA23A6627-007	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		0.023	<0.010	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.016 DLQ	<0.010	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.016 DLCI	<0.010	----	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.299 DLQ	<0.050	----	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	----	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.070 DLCI	<0.050	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.306	<0.060	----	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.307	<0.065	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		68.7	64.2	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		116	109	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		108	100	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6627**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 28-Mar-2023 16:35
PO	: 573161	Issue Date	: 05-Apr-2023 08:36
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3I	E601A	28-Mar-2023	03-Apr-2023	14 days	6 days	✓	04-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-14	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-15	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-08	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11A	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11B	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW02-02	E601A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-14	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-15	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-08	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-11A	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-11B	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW02-02	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-3I	E581.VH+F1	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3I	E641A	28-Mar-2023	03-Apr-2023	14 days	6 days	✓	04-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-14	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-15	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-08	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11A	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11B	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW02-02	E641A	28-Mar-2023	04-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-14	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-15	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-08	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-11A	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-11B	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW02-02	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-3I	E611A	28-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	885686	2	27	7.4	5.0	✓
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	885687	2	15	13.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	885686	2	27	7.4	5.0	✓
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	885687	2	15	13.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A6627**	Page	: 1 of 7
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 28-Mar-2023 16:35
PO	: 573161	Date Analysis Commenced	: 02-Apr-2023
C-O-C number	: ----	Issue Date	: 05-Apr-2023 08:36
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 884420)											
VA23A6536-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 884419)											
VA23A6536-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 884420)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 884419)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 885686)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 885752)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885687)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 885687) - continued						
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885753)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 884420)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 884419)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	77.4	70.0	130	----
Hydrocarbons (QCLot: 885686)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	105	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 885752)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	105	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	98.3	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885687)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.6795 µg/L	98.2	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.67243 µg/L	98.5	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.68068 µg/L	107	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.65177 µg/L	96.2	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.48201 µg/L	106	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.70642 µg/L	90.4	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.56618 µg/L	103	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.79397 µg/L	99.2	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.68739 µg/L	98.3	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.59945 µg/L	108	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.69281 µg/L	97.6	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.69591 µg/L	103	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.70239 µg/L	97.6	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.69739 µg/L	97.2	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.7147 µg/L	99.0	60.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 885687) - continued									
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.73552 µg/L	99.3	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.73979 µg/L	99.7	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.66437 µg/L	99.3	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.68775 µg/L	101	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.6333 µg/L	112	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885753)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.6795 µg/L	96.8	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.67243 µg/L	96.8	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.68068 µg/L	95.1	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.65177 µg/L	95.6	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.48201 µg/L	99.4	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.70642 µg/L	88.0	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.56618 µg/L	97.3	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.79397 µg/L	94.2	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.68739 µg/L	94.4	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.59945 µg/L	104	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.69281 µg/L	94.4	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.69591 µg/L	96.1	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.70239 µg/L	98.7	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.69739 µg/L	91.7	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.7147 µg/L	97.7	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.73552 µg/L	97.0	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.73979 µg/L	98.7	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.66437 µg/L	99.6	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.68775 µg/L	93.5	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.6333 µg/L	111	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 884420)										
VA23A6536-002	Anonymous	Benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Ethylbenzene	100-41-4	E611A	97.0 µg/L	100 µg/L	97.0	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		Styrene	100-42-5	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Toluene	108-88-3	E611A	96.3 µg/L	100 µg/L	96.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	197 µg/L	200 µg/L	98.7	60.0	140	----
		Xylene, o-	95-47-6	E611A	99.1 µg/L	100 µg/L	99.1	60.0	140	----
Hydrocarbons (QCLot: 884419)										
VA23A6536-003	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4610 µg/L	6310 µg/L	73.1	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

- ☑ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information	
ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): A6827

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW11-3I	28-Mar-23	9:57	GW	4	X		X	X				
	G2-11A		12:05		4	X		X	X				
	G2-11B		12:52		4	X		X	X				
	MW02-02		13:35		4	X		X	X				
	A2MW09-14		15:05		4	X		X	X				
	A2MW09-15		14:33		4	X		X	X				
	~~AB~~ DUP-08		9:57		4	X		X	X				

Environmental Division
Vancouver
Work Order Reference
VA23A6627

Telephone : - 1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 28, 2023	Time: 16:34	Received by:	Date:	Time:	Received by: DV	Date: Mar 29	Time: 9:35 am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2018 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6778**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Mar-2023 17:10
PO	: 573161	Date Analysis Commenced	: 02-Apr-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 11:44
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-13	A2MW09-12	A2MW09-11	U8	A2MW09-06I
					Client sampling date / time	29-Mar-2023 10:16	29-Mar-2023 10:55	29-Mar-2023 11:14	29-Mar-2023 13:06	29-Mar-2023 14:12
						VA23A6778-001	VA23A6778-002	VA23A6778-003	VA23A6778-004	VA23A6778-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	42.1	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	1590	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	7.67	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	3490	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	21.9	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	3510	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	2130	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	9990	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	2000	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	4840	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		93.3	96.5	113	96.7	99.0
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		117	118	106	111	104
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		94.5	94.4	97.6	91.4	93.4
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		96.6	97.6	81.0	95.7	96.7
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	0.372	<0.010	0.092
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.054 DLQ	<0.010	<0.020 DLQ
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.027 DLQ	<0.010	<0.028 DLQ
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-13	A2MW09-12	A2MW09-11	U8	A2MW09-06I
					Client sampling date / time	29-Mar-2023 10:16	29-Mar-2023 10:55	29-Mar-2023 11:14	29-Mar-2023 13:06	29-Mar-2023 14:12
						VA23A6778-001	VA23A6778-002	VA23A6778-003	VA23A6778-004	VA23A6778-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	0.507	<0.010	0.192
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	31.3	<0.010	<0.019 DLCI
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	51.5	<0.010	<0.020 DLCI
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	131	<0.050	<0.286 DLQ
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	0.207	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	0.083	<0.010	0.033
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<1.73 DLQ	<0.050	<0.231 DLCI
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	0.083	<0.030	0.033
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	132	<0.060	<0.289
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	132	<0.065	0.317
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		80.8	82.7	98.0	80.3	97.3
Naphthalene-d8	1146-65-2	E641A	0.1	%		108	104	112	93.2	98.3
Phenanthrene-d10	1517-22-2	E641A	0.1	%		106	107	106	99.9	105

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-02	DUP-09	----	----	----
					Client sampling date / time	29-Mar-2023 10:21	29-Mar-2023 14:12	----	----	----
						VA23A6778-006	VA23A6778-007	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	----	----	----
HEPHw	----	EC600A	250	µg/L		<250	<250	----	----	----
LEPHw	----	EC600A	250	µg/L		<250	<250	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		96.7	91.8	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		107	112	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		91.6	93.2	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		96.6	96.4	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	0.090	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.021 DLQ	----	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.095 DLCI	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.028 DLQ	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	----	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW03-02	DUP-09	----	----	----
					Client sampling date / time	29-Mar-2023 10:21	29-Mar-2023 14:12	----	----	----
						VA23A6778-006	VA23A6778-007	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	0.195	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.021 DLCI	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.013	<0.019 DLCI	----	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.298 DLQ	----	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	----	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	0.036	----	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.265 DLCI	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	0.036	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.301	----	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	0.321	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		76.7	89.2	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		100	102	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		101	104	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6778**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Mar-2023 17:10
PO	: 573161	Issue Date	: 06-Apr-2023 11:44
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-06I	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-11	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-12	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-13	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-09	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-02	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U8	E601A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	06-Apr-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-11	E581.VH+F1	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-12	E581.VH+F1	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-13	E581.VH+F1	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-06I	E581.VH+F1	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-09	E581.VH+F1	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-02	E581.VH+F1	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U8	E581.VH+F1	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-06I	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-11	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-12	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-13	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-09	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-02	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U8	E641A	29-Mar-2023	05-Apr-2023	14 days	7 days	✓	05-Apr-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-11	E611A	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-12	E611A	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-13	E611A	29-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-06I	E611A	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-09	E611A	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW03-02	E611A	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U8	E611A	29-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	884422	2	30	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884423	2	30	6.6	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	887265	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	884422	2	30	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	887266	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884423	2	30	6.6	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	887265	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	884422	2	30	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	887266	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884423	2	30	6.6	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	884422	2	30	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884423	2	30	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A6778**	Page	: 1 of 8
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Mar-2023 17:10
PO	: 573161	Date Analysis Commenced	: 02-Apr-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 11:44
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 884422)											
VA23A6668-004	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 885115)											
VA23A6778-004	U8	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 884423)											
VA23A6668-004	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
Hydrocarbons (QC Lot: 885114)											
VA23A6778-004	U8	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 884422)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 885115)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 884423)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 885114)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 887265)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 887266)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 887266) - continued						
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 884422)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 885115)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 884423)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	77.4	70.0	130	----
Hydrocarbons (QCLot: 885114)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	95.0	70.0	130	----
Hydrocarbons (QCLot: 887265)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	111	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	107	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 887266)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	98.3	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	99.3	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	96.4	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	95.5	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	99.3	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 887266) - continued									
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	104	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	108	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	108	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	104	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 884422)										
VA23A6668-005	Anonymous	Benzene	71-43-2	E611A	96.3 µg/L	100 µg/L	96.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.1 µg/L	100 µg/L	98.1	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	99.6 µg/L	100 µg/L	99.6	60.0	140	----
		Toluene	108-88-3	E611A	97.9 µg/L	100 µg/L	97.9	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	98.9	60.0	140	----
		Xylene, o-	95-47-6	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
Volatile Organic Compounds (QCLot: 885115)										
VA23A6778-005	A2MW09-06I	Benzene	71-43-2	E611A	95.3 µg/L	100 µg/L	95.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	99.6 µg/L	100 µg/L	99.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Toluene	108-88-3	E611A	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	203 µg/L	200 µg/L	102	60.0	140	----
		Xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	60.0	140	----
Hydrocarbons (QCLot: 884423)										
VA23A6668-006	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5220 µg/L	6310 µg/L	82.8	60.0	140	----
Hydrocarbons (QCLot: 885114)										
VA23A6778-006	MW03-02	VHw (C6-C10)	----	E581.VH+F1	5620 µg/L	6310 µg/L	89.1	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: stephen.sumsion@aecom.com

Email 2: johnny.au@aecom.com

Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: christopher.boys@parkland.ca

Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): A6778

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A2 MW09-13	29-Mar-23	10:16	GW	4	X		X	X				
	A2 MW09-17		10:55										
	A2 MW09-11		11:14										
	U8		13:06										
	A2MW09-06I		14:12										
	MW03-02		10:21										
	DUP-09		14:12										

Environmental Division
Vancouver
Work Order Reference
VA23A6778

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				9°C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 29, 2023	Time: 17:10	Received by:	Date:	Time:	Received by: DJS	Date: Mr 29	Time: 17:10

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6899**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 30-Mar-2023 17:25
PO	: 573161	Date Analysis Commenced	: 03-Apr-2023
C-O-C number	: ----	Issue Date	: 11-Apr-2023 16:03
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U9	A2MW09-05I	PW03-3	PW03-1A	PW03-5
					Client sampling date / time	30-Mar-2023 10:22	30-Mar-2023 10:49	30-Mar-2023 11:25	30-Mar-2023 11:41	30-Mar-2023 13:52
						VA23A6899-001	VA23A6899-002	VA23A6899-003	VA23A6899-004	VA23A6899-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	4.44
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	270	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	300	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	230	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	300	<250
LEPHw	----	EC600A	250	µg/L		<250	270	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	230	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		88.0	98.6	94.2	96.4	69.8
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		110	111	106	118	77.3
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		91.5	92.0	90.8	90.0	87.2
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		97.5	95.4	97.1	97.5	95.7
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	0.258	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.062 DLQ	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.155 DLCI	<0.010	<0.022 DLCI	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.061 DLQ	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U9	A2MW09-05I	PW03-3	PW03-1A	PW03-5
					Client sampling date / time	30-Mar-2023 10:22	30-Mar-2023 10:49	30-Mar-2023 11:25	30-Mar-2023 11:41	30-Mar-2023 13:52
						VA23A6899-001	VA23A6899-002	VA23A6899-003	VA23A6899-004	VA23A6899-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	0.513	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.110	<0.027 DLCI	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.106	<0.010	<0.010	<0.010	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		0.186	<0.810 DLCI	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	0.032	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.770 DLCI	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	0.032	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		0.186	<0.815	<0.060	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.186	<0.816	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		70.6	81.2	77.9	78.8	60.0
Naphthalene-d8	1146-65-2	E641A	0.1	%		94.0	97.2	98.1	97.4	71.4
Phenanthrene-d10	1517-22-2	E641A	0.1	%		98.8	111	104	101	79.8

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW03-2B	PW03-4	PW03-2A	----	----
					Client sampling date / time	30-Mar-2023 12:10	30-Mar-2023 13:39	30-Mar-2023 15:40	----	----
						VA23A6899-006	VA23A6899-007	VA23A6899-008	--------	--------
						Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	----	----
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		69.6	72.8	82.3	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		110	115	112	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		92.0	91.5	90.3	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		96.0	97.3	96.4	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW03-2B	PW03-4	PW03-2A	----	----
					Client sampling date / time	30-Mar-2023 12:10	30-Mar-2023 13:39	30-Mar-2023 15:40	----	----
						VA23A6899-006	VA23A6899-007	VA23A6899-008	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	<0.030	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	<0.060	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		64.8	60.2	60.2	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		82.6	75.6	78.1	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		90.9	81.1	81.8	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6899**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 30-Mar-2023 17:25
PO	: 573161	Issue Date	: 11-Apr-2023 16:03
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-2A	E601A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	11-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-2B	E601A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	11-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-4	E601A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	11-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-5	E601A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	11-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-05I	E601A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-1A	E601A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-3	E601A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U9	E601A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-05I	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-1A	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-2A	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-2B	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-3	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-4	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-5	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U9	E581.VH+F1	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-2A	E641A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	10-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-2B	E641A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	10-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-4	E641A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	10-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-5	E641A	30-Mar-2023	10-Apr-2023	14 days	11 days	✓	10-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2MW09-05I	E641A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-1A	E641A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-3	E641A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U9	E641A	30-Mar-2023	06-Apr-2023	14 days	7 days	✓	08-Apr-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A2MW09-05I	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-1A	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-2A	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-2B	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-3	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-4	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-5	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U9	E611A	30-Mar-2023	03-Apr-2023	----	----		03-Apr-2023	14 days	4 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	885115	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	885114	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	889208	2	15	13.3	5.0	✓
BTEX by Headspace GC-MS	E611A	885115	1	15	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	889209	2	16	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	885114	1	14	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	889208	2	15	13.3	5.0	✓
BTEX by Headspace GC-MS	E611A	885115	1	15	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	889209	2	16	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	885114	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	885115	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	885114	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A6899**	Page	: 1 of 7
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 30-Mar-2023 17:25
PO	: 573161	Date Analysis Commenced	: 03-Apr-2023
C-O-C number	: ----	Issue Date	: 11-Apr-2023 16:03
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 885115)											
VA23A6778-004	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 885114)											
VA23A6778-004	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 885115)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 885114)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 889208)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 891194)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 889209)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 889209) - continued						
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 891193)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 885115)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 885114)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	95.0	70.0	130	----
Hydrocarbons (QCLot: 889208)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	113	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	112	70.0	130	----
Hydrocarbons (QCLot: 891194)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	110	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 889209)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	70.9	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	72.3	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	77.3	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	77.3	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	68.5	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	72.3	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	74.6	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	77.6	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	77.8	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	74.7	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	76.8	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	77.1	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	75.8	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	74.5	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	65.3	60.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 889209) - continued									
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	63.8	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	68.8	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	80.6	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	76.1	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	78.0	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 891193)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	98.5	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	120	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	98.8	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	99.4	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	105	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	116	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	129	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 885115)										
VA23A6778-005	Anonymous	Benzene	71-43-2	E611A	95.3 µg/L	100 µg/L	95.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	99.6 µg/L	100 µg/L	99.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Toluene	108-88-3	E611A	99.9 µg/L	100 µg/L	99.9	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	203 µg/L	200 µg/L	102	60.0	140	----
		Xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	60.0	140	----
Hydrocarbons (QCLot: 885114)										
VA23A6778-006	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5620 µg/L	6310 µg/L	89.1	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P)

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE	EPH	PAHs (including total PAHs)	LEPH/HEPH	Dissolved Metals (including hardness)	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	U9	30-Mar-23	10:22	GW	4	X		X	X			
	A2MW09-05I		10:49			X		X	X			
	PW03-3		11:25			X		X	X			
	PW03-1A		11:41			X		X	X			
	PW03-5		13:52			X		X	X			
	PW03-2B		12:10			X		X	X			
	PW03-4		13:39			X		X	X			
	PW03-2A		15:40			X		X	X			

Environmental Division Vancouver
Work Order Reference
VA23A6899

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

- Low volume for 100 mL amber vials for PW03-2A for LEPH/HEPH and PAH analyses. Combine, if necessary
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							9

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 30, 2023	19:23

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
IDA	3/30	5:12 PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7392**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 05-Apr-2023 17:10
PO	: 573161	Date Analysis Commenced	: 11-Apr-2023
C-O-C number	: ----	Issue Date	: 17-Apr-2023 16:22
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-3B	G2-3C	G2-9B	WS2-D	DUP-10
					Client sampling date / time	05-Apr-2023 15:41	05-Apr-2023 11:20	05-Apr-2023 12:47	05-Apr-2023 15:15	05-Apr-2023 12:47
						VA23A7392-001	VA23A7392-002	VA23A7392-003	VA23A7392-004	VA23A7392-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		40.4	9.69	5.56	<0.50	5.56
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	570	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	570	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		94.4	102	101	84.1	95.4
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		96.6	95.0	96.5	94.1	94.2
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		99.0	99.4	100	98.8	99.0
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		0.056	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.097 DLCI	<0.095 DLCI	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.045 DLQ	<0.012 DLCI	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-3B	G2-3C	G2-9B	WS2-D	DUP-10
					Client sampling date / time	05-Apr-2023 15:41	05-Apr-2023 11:20	05-Apr-2023 12:47	05-Apr-2023 15:15	05-Apr-2023 12:47
						VA23A7392-001	VA23A7392-002	VA23A7392-003	VA23A7392-004	VA23A7392-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.012 DLCI	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.031	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		0.072	0.012	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	0.014	<0.010	0.013	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	0.130	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		0.302	0.064	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.333	0.064	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		0.128	0.142	<0.060	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.461	0.206	<0.065	<0.065	<0.065

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	Travel Blank-5	----	----	----	----
					Client sampling date / time	05-Apr-2023 16:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A7392-006	--------	--------	--------	--------	
					Result	----	----	----	----	
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----	
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----	
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----	
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----	
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----	
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----	
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----	
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----	
Hydrocarbons Surrogates										
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	104	----	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	95.3	----	----	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.8	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7392**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 05-Apr-2023 17:10
PO	: 573161	Issue Date	: 17-Apr-2023 16:23
C-O-C number	: ----		
Sampler	: RS & AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-10	E601A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-3B	E601A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-9B	E601A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D	E601A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-3C	E601A	05-Apr-2023	13-Apr-2023	14 days	9 days	✓	14-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-10	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-3B	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-3C	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-9B	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-5	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) WS2-D	E581.VH+F1	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-10	E641A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-3B	E641A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-9B	E641A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D	E641A	05-Apr-2023	13-Apr-2023	14 days	8 days	✓	14-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-3C	E641A	05-Apr-2023	13-Apr-2023	14 days	9 days	✓	14-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-10	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-3B	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-3C	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-9B	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-5	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) WS2-D	E611A	05-Apr-2023	11-Apr-2023	----	----		11-Apr-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	892967	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	892968	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	895395	1	10	10.0	5.0	✓
BTEX by Headspace GC-MS	E611A	892967	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	895396	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	892968	1	19	5.2	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	895395	1	10	10.0	5.0	✓
BTEX by Headspace GC-MS	E611A	892967	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	895396	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	892968	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	892967	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	892968	1	19	5.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A7392**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 05-Apr-2023 17:10
PO	: 573161	Date Analysis Commenced	: 11-Apr-2023
C-O-C number	: ----	Issue Date	: 17-Apr-2023 16:23
Sampler	: RS & AGE 604-444-6400		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 892967)											
VA23A7224-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 892968)											
VA23A7233-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 892967)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 892968)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 895395)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 895396)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 895396) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 892967)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.6	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	94.6	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	93.5	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	99.1	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	96.5	70.0	130	----
Hydrocarbons (QCLot: 892968)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	79.1	70.0	130	----
Hydrocarbons (QCLot: 895395)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	120	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	114	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 895396)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	83.3	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	87.6	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	128	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	92.6	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	95.9	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	94.4	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	99.4	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	97.7	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	93.7	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	89.7	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	97.6	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	77.5	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	75.3	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	82.7	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	95.0	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 895396) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	98.3	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	128	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 892967)										
VA23A7224-001	Anonymous	Benzene	71-43-2	E611A	99.2 µg/L	100 µg/L	99.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Toluene	108-88-3	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	204 µg/L	200 µg/L	102	60.0	140	----
		Xylene, o-	95-47-6	E611A	101 µg/L	100 µg/L	101	60.0	140	----
Hydrocarbons (QCLot: 892968)										
VA23A7233-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4730 µg/L	6310 µg/L	74.9	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: stephen.sumsion@aecom.com

Email 2: johnny.au@aecom.com

Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: christopher.boys@parkland.ca

Email 2: stephen.sumsion@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G2-3B	05-Apr-23	15:41	GW	4	X		X	X				
	G2-3C	"	11:20	"	"	"		"	"				
	G2-9B	"	12:47	"	"	"		"	"				
	WS2-D	"	15:15	"	"	"		"	"				
	DUP-10	"	12:47	"	"	"		"	"				
	Travel Blank-5	"	16:00	"	1	X							

Environmental Division
Vancouver
Work Order Reference
VA23A7392

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☑ N/A Sample Custody Seals Intact: ☐ YES ☑ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8.5°C			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Rod Soga	Apr. 5, 2023	17:11

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
BAM	Apr 5/2023	5:10pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7545**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Date Analysis Commenced	: 09-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:00
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-9A	WS2-D2	MW5	U4-1	DUP-06
					Client sampling date / time	06-Apr-2023 09:36	06-Apr-2023 10:09	06-Apr-2023 14:16	06-Apr-2023 13:12	06-Apr-2023 14:16
						VA23A7545-001	VA23A7545-002	VA23A7545-003	VA23A7545-004	VA23A7545-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	0.60	mg/L		----	----	92.0	36.4	94.8
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	1.0	µg/L		----	----	79.0	6.1	81.4
Antimony, dissolved	7440-36-0	E421	0.10	µg/L		----	----	0.10	<0.10	0.11
Arsenic, dissolved	7440-38-2	E421	0.10	µg/L		----	----	0.15	<0.10	0.17
Barium, dissolved	7440-39-3	E421	0.10	µg/L		----	----	46.4	7.73	47.6
Beryllium, dissolved	7440-41-7	E421	0.020	µg/L		----	----	0.155	<0.020	0.151
Bismuth, dissolved	7440-69-9	E421	0.050	µg/L		----	----	<0.050	<0.050	<0.050
Boron, dissolved	7440-42-8	E421	10	µg/L		----	----	12	<10	12
Cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		----	----	0.188	0.0154	0.207
Calcium, dissolved	7440-70-2	E421	50	µg/L		----	----	29800	5950	30900
Cesium, dissolved	7440-46-2	E421	0.010	µg/L		----	----	0.010	<0.010	0.010
Chromium, dissolved	7440-47-3	E421	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Cobalt, dissolved	7440-48-4	E421	0.10	µg/L		----	----	8.18	<0.10	8.36
Copper, dissolved	7440-50-8	E421	0.20	µg/L		----	----	1.81	0.42	1.83
Iron, dissolved	7439-89-6	E421	10	µg/L		----	----	<10	<10	<10
Lead, dissolved	7439-92-1	E421	0.050	µg/L		----	----	<0.050	<0.050	<0.050
Lithium, dissolved	7439-93-2	E421	1.0	µg/L		----	----	<1.0	1.4	<1.0
Magnesium, dissolved	7439-95-4	E421	5.0	µg/L		----	----	4280	5230	4280
Manganese, dissolved	7439-96-5	E421	0.10	µg/L		----	----	790	0.91	779
Molybdenum, dissolved	7439-98-7	E421	0.050	µg/L		----	----	0.124	<0.050	0.119
Nickel, dissolved	7440-02-0	E421	0.50	µg/L		----	----	4.40	0.90	4.55
Phosphorus, dissolved	7723-14-0	E421	50	µg/L		----	----	<50	<50	<50
Potassium, dissolved	7440-09-7	E421	50	µg/L		----	----	2110	715	2150
Rubidium, dissolved	7440-17-7	E421	0.20	µg/L		----	----	2.08	<0.20	2.21
Selenium, dissolved	7782-49-2	E421	0.050	µg/L		----	----	0.070	<0.050	<0.050
Silicon, dissolved	7440-21-3	E421	50	µg/L		----	----	11100	10800	10800
Silver, dissolved	7440-22-4	E421	0.010	µg/L		----	----	<0.010	<0.010	<0.010
Sodium, dissolved	7440-23-5	E421	50	µg/L		----	----	31400	4200	30800

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-9A	WS2-D2	MW5	U4-1	DUP-06
					Client sampling date / time	06-Apr-2023 09:36	06-Apr-2023 10:09	06-Apr-2023 14:16	06-Apr-2023 13:12	06-Apr-2023 14:16
						VA23A7545-001	VA23A7545-002	VA23A7545-003	VA23A7545-004	VA23A7545-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421	0.20	µg/L		----	----	315	44.8	326
Sulfur, dissolved	7704-34-9	E421	500	µg/L		----	----	18400	6090	17200
Tellurium, dissolved	13494-80-9	E421	0.20	µg/L		----	----	<0.20	<0.20	<0.20
Thallium, dissolved	7440-28-0	E421	0.010	µg/L		----	----	0.028	<0.010	0.029
Thorium, dissolved	7440-29-1	E421	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Tin, dissolved	7440-31-5	E421	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Titanium, dissolved	7440-32-6	E421	0.30	µg/L		----	----	<0.30	<0.30	<0.30
Tungsten, dissolved	7440-33-7	E421	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Uranium, dissolved	7440-61-1	E421	0.010	µg/L		----	----	0.073	<0.010	0.074
Vanadium, dissolved	7440-62-2	E421	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Zinc, dissolved	7440-66-6	E421	1.0	µg/L		----	----	22.0	1.3	23.4
Zirconium, dissolved	7440-67-7	E421	0.30	µg/L		----	----	<0.30	<0.30	<0.30
Dissolved metals filtration location	----	EP421	-	-		----	----	Field	Field	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		2.43	68.1	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-9A	WS2-D2	MW5	U4-1	DUP-06
					Client sampling date / time	06-Apr-2023 09:36	06-Apr-2023 10:09	06-Apr-2023 14:16	06-Apr-2023 13:12	06-Apr-2023 14:16
						VA23A7545-001	VA23A7545-002	VA23A7545-003	VA23A7545-004	VA23A7545-005
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		79.9	86.0	85.3	83.2	79.3
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		91.6	99.1	102	85.1	94.2
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		86.0	86.6	84.5	84.5	84.3
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		102	98.6	98.7	99.0	97.4
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.152 DLCI	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.021 DLQ	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.014 DLCI	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.012	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		0.030	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.015	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.021	<0.010	0.012	<0.010	0.012
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		0.256	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		0.127	<0.010	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.139	<0.030	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		0.286	<0.060	<0.060	<0.060	<0.060

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	G2-9A	WS2-D2	MW5	U4-1	DUP-06
					Client sampling date / time	06-Apr-2023 09:36	06-Apr-2023 10:09	06-Apr-2023 14:16	06-Apr-2023 13:12	06-Apr-2023 14:16
						VA23A7545-001	VA23A7545-002	VA23A7545-003	VA23A7545-004	VA23A7545-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.425	<0.065	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		80.8	77.8	70.9	73.3	73.9
Naphthalene-d8	1146-65-2	E641A	0.1	%		98.5	99.7	93.4	97.5	91.9
Phenanthrene-d10	1517-22-2	E641A	0.1	%		109	106	99.0	106	93.5

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7545**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Issue Date	: 19-Apr-2023 13:00
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUP-06	E421	06-Apr-2023	09-Apr-2023	----	----		10-Apr-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW5	E421	06-Apr-2023	09-Apr-2023	----	----		10-Apr-2023	180 days	4 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) U4-1	E421	06-Apr-2023	09-Apr-2023	----	----		10-Apr-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-06	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-9A	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW5	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U4-1	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
WS2-D2	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-06	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G2-9A	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW5	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
U4-1	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
WS2-D2	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-06	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-9A	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW5	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U4-1	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
WS2-D2	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-06	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-9A	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW5	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U4-1	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
WS2-D2	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	890859	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	900838	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	890859	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900839	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	900838	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	890859	1	12	8.3	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900839	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	890859	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A7545**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Date Analysis Commenced	: 09-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:00
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 890859)											
VA23A7384-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.151	0.161	5.99%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00022	0.00022	0.000001	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.00032	0.00034	0.00002	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	0.000090	0.000092	0.000002	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000052	<0.0000050	0.0000002	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	1.29	1.32	2.39%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00042	0.00044	0.00002	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.374	0.378	1.29%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.100	mg/L	0.188	0.195	0.0067	Diff <2x LOR	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0114	0.0117	3.24%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000232	0.000243	0.000010	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.100	mg/L	0.475	0.508	0.033	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00046	0.00048	0.00001	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5.01	4.99	0.282%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	4.41	4.57	3.75%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.00165	0.00171	0.00005	Diff <2x LOR	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 890859) - continued											
VA23A7384-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00158	0.00154	0.00004	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000067	0.000070	0.000004	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00236	0.00248	4.86%	20%	----
Volatile Organic Compounds (QC Lot: 899539)											
VA23A7545-001	G2-9A	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	2.43	2.23	0.20	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 899538)											
VA23A7545-001	G2-9A	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 890859)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 890859) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 899539)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 899538)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 900838)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900839)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900839) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 890859)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	106	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.0	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	94.0	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	96.4	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	96.8	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.5	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.7	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	107	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.7	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.6	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.5	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.0	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.4	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	94.8	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	98.8	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.8	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.9	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.2	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	112	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.1	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	94.7	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.9	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 890859) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	95.7	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.3	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	104	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.4	80.0	120	----
Volatile Organic Compounds (QCLot: 899539)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	95.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	96.6	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	97.1	70.0	130	----
Hydrocarbons (QCLot: 899538)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	91.8	70.0	130	----
Hydrocarbons (QCLot: 900838)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	103	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	97.5	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900839)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	126	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	111	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900839) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	106	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	118	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	126	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 890859)										
VA23A7384-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.192 mg/L	0.2 mg/L	95.9	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0196 mg/L	0.02 mg/L	97.8	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0203 mg/L	0.02 mg/L	101	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0411 mg/L	0.04 mg/L	103	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00880 mg/L	0.01 mg/L	88.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00380 mg/L	0.004 mg/L	95.0	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	4.08 mg/L	4 mg/L	102	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00946 mg/L	0.01 mg/L	94.6	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.93 mg/L	2 mg/L	96.6	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.105 mg/L	0.1 mg/L	105	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	0.956 mg/L	1 mg/L	95.6	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0199 mg/L	0.02 mg/L	99.5	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.33 mg/L	10 mg/L	93.3	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.89 mg/L	4 mg/L	97.3	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0395 mg/L	0.04 mg/L	98.7	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.50 mg/L	10 mg/L	95.0	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00372 mg/L	0.004 mg/L	92.9	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	19.9 mg/L	20 mg/L	99.6	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00358 mg/L	0.004 mg/L	89.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 890859) - continued										
VA23A7384-002	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0191 mg/L	0.02 mg/L	95.4	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0192 mg/L	0.02 mg/L	96.1	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0370 mg/L	0.04 mg/L	92.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0180 mg/L	0.02 mg/L	89.9	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00365 mg/L	0.004 mg/L	91.4	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0965 mg/L	0.1 mg/L	96.5	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.410 mg/L	0.4 mg/L	103	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0414 mg/L	0.04 mg/L	103	70.0	130	----
Volatile Organic Compounds (QCLot: 899539)										
VA23A7545-002	WS2-D2	Benzene	71-43-2	E611A	93.2 µg/L	100 µg/L	93.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	95.9 µg/L	100 µg/L	95.9	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
		Toluene	108-88-3	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	97.8	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
Hydrocarbons (QCLot: 899538)										
VA23A7545-003	MW5	VHw (C6-C10)	----	E581.VH+F1	5290 µg/L	6310 µg/L	83.9	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt Sampler: RC & AGE

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G2-9A	06-Apr-23	9:36	GW	4	X		X	X				
	WS2-D2	↓	10:09	↓	4	↓		↓	↓	X			
	MW5		14:16		5					X			
	U4-1		13:12		5					X			
	DUP-06		14:16		5					X			

Environmental Division
Vancouver
Work Order Reference
VA23A7545

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
		5.9					

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Bd2. BA	Apr 6, 2023	17:09

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DC	6/4/23	5:20

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7547**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Date Analysis Commenced	: 16-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:01
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: A2-9C	----	----	----	----
					Client sampling date / time: 06-Apr-2023 09:51	----	----	----	----
					VA23A7547-001	--------	--------	--------	--------
					Result	----	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	155	----	----	----	----
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A	250	µg/L	<250	----	----	----	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%	84.2	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	92.8	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	85.2	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.6	----	----	----	----
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----
Acridine	260-94-6	E641A	0.010	µg/L	<0.083 DLCI	----	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L	<0.013 DLQ	----	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	A2-9C	----	----	----	----
					Client sampling date / time	06-Apr-2023 09:51	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7547-001	--------	--------	--------	--------
						Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	----	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		0.019	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.012	----	----	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	----	----	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		0.182	----	----	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.044	----	----	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	----	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.044	----	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		0.201	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		0.245	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		85.5	----	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		98.6	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		100	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7547**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Issue Date	: 19-Apr-2023 13:02
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2-9C	E601A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2-9C	E581.VH+F1	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2-9C	E641A	06-Apr-2023	18-Apr-2023	14 days	12 days	✓	18-Apr-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2-9C	E611A	06-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	11 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	900838	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900839	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	900838	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	900839	1	12	8.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	899539	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	899538	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A7547**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 06-Apr-2023 17:20
PO	: 573161	Date Analysis Commenced	: 16-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:01
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 899539)											
VA23A7545-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	2.43	2.23	0.20	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 899538)											
VA23A7545-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 899539)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 899538)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 900838)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900839)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900839) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 899539)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	95.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	96.6	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	97.1	70.0	130	----
Hydrocarbons (QCLot: 899538)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	91.8	70.0	130	----
Hydrocarbons (QCLot: 900838)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	103	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	97.5	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900839)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	126	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	111	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	106	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	118	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900839) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	126	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 899539)										
VA23A7545-002	Anonymous	Benzene	71-43-2	E611A	93.2 µg/L	100 µg/L	93.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	95.9 µg/L	100 µg/L	95.9	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
		Toluene	108-88-3	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	97.8	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
Hydrocarbons (QCLot: 899538)										
VA23A7545-003	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5290 µg/L	6310 µg/L	83.9	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	stephen.sumsion@aecom.com
Email 2	johnny.au@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A2-9C	06-Apr-23	9:51	GW	4	X		X	X				

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

Environmental Division Vancouver
Work Order Reference
VA23A7547
Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
		6°					

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Raul Z. Sapaga	Apr-6, 2023	17:09					6/4/23	5:20 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7669**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 11-Apr-2023 16:40
PO	: 573161	Date Analysis Commenced	: 13-Apr-2023
C-O-C number	: ----	Issue Date	: 18-Apr-2023 13:38
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U4-3	G2-10	MW3	Trip Blank-6	----
					Client sampling date / time	11-Apr-2023 12:50	11-Apr-2023 12:07	11-Apr-2023 14:24	11-Apr-2023 15:30	----
						VA23A7669-001	VA23A7669-002	VA23A7669-003	VA23A7669-004	--------
						Result	Result	Result	Result	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		126000	----	619000	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	1.0	µg/L		1.7	----	<1.0	----	----
Antimony, dissolved	7440-36-0	E421	0.10	µg/L		0.11	----	<0.10	----	----
Arsenic, dissolved	7440-38-2	E421	0.10	µg/L		<0.10	----	0.18	----	----
Barium, dissolved	7440-39-3	E421	0.10	µg/L		12.0	----	23.4	----	----
Beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	----	<0.020	----	----
Bismuth, dissolved	7440-69-9	E421	0.050	µg/L		<0.050	----	<0.050	----	----
Boron, dissolved	7440-42-8	E421	10	µg/L		84	----	20	----	----
Cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0179	----	0.0097	----	----
Calcium, dissolved	7440-70-2	E421	50	µg/L		26200	----	94700	----	----
Cesium, dissolved	7440-46-2	E421	0.010	µg/L		<0.010	----	0.012	----	----
Chromium, dissolved	7440-47-3	E421	0.50	µg/L		<0.50	----	<0.50	----	----
Cobalt, dissolved	7440-48-4	E421	0.10	µg/L		0.18	----	0.92	----	----
Copper, dissolved	7440-50-8	E421	0.20	µg/L		0.21	----	<0.20	----	----
Iron, dissolved	7439-89-6	E421	10	µg/L		<10	----	7620	----	----
Lead, dissolved	7439-92-1	E421	0.050	µg/L		<0.050	----	<0.050	----	----
Lithium, dissolved	7439-93-2	E421	1.0	µg/L		2.3	----	1.2	----	----
Magnesium, dissolved	7439-95-4	E421	5.0	µg/L		14600	----	92800	----	----
Manganese, dissolved	7439-96-5	E421	0.10	µg/L		7.73	----	2690	----	----
Molybdenum, dissolved	7439-98-7	E421	0.050	µg/L		0.089	----	<0.050	----	----
Nickel, dissolved	7440-02-0	E421	0.50	µg/L		<0.50	----	2.05	----	----
Phosphorus, dissolved	7723-14-0	E421	50	µg/L		<50	----	<50	----	----
Potassium, dissolved	7440-09-7	E421	50	µg/L		1330	----	3740	----	----
Rubidium, dissolved	7440-17-7	E421	0.20	µg/L		<0.20	----	1.66	----	----
Selenium, dissolved	7782-49-2	E421	0.050	µg/L		0.079	----	<0.050	----	----
Silicon, dissolved	7440-21-3	E421	50	µg/L		11800	----	14200	----	----
Silver, dissolved	7440-22-4	E421	0.010	µg/L		<0.010	----	<0.010	----	----
Sodium, dissolved	7440-23-5	E421	50	µg/L		18600	----	35000	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U4-3	G2-10	MW3	Trip Blank-6	----
					Client sampling date / time	11-Apr-2023 12:50	11-Apr-2023 12:07	11-Apr-2023 14:24	11-Apr-2023 15:30	----
						VA23A7669-001	VA23A7669-002	VA23A7669-003	VA23A7669-004	--------
						Result	Result	Result	Result	----
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421	0.20	µg/L		229	----	680	----	----
Sulfur, dissolved	7704-34-9	E421	500	µg/L		13400	----	72000	----	----
Tellurium, dissolved	13494-80-9	E421	0.20	µg/L		<0.20	----	<0.20	----	----
Thallium, dissolved	7440-28-0	E421	0.010	µg/L		<0.010	----	<0.010	----	----
Thorium, dissolved	7440-29-1	E421	0.10	µg/L		<0.10	----	<0.10	----	----
Tin, dissolved	7440-31-5	E421	0.10	µg/L		<0.10	----	<0.10	----	----
Titanium, dissolved	7440-32-6	E421	0.30	µg/L		<0.30	----	<0.30	----	----
Tungsten, dissolved	7440-33-7	E421	0.10	µg/L		<0.10	----	<0.10	----	----
Uranium, dissolved	7440-61-1	E421	0.010	µg/L		0.030	----	0.154	----	----
Vanadium, dissolved	7440-62-2	E421	0.50	µg/L		<0.50	----	<0.50	----	----
Zinc, dissolved	7440-66-6	E421	1.0	µg/L		3.9	----	1.7	----	----
Zirconium, dissolved	7440-67-7	E421	0.30	µg/L		<0.30	----	<0.30	----	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	Field	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	----
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	----
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	U4-3	G2-10	MW3	Trip Blank-6	----
					Client sampling date / time	11-Apr-2023 12:50	11-Apr-2023 12:07	11-Apr-2023 14:24	11-Apr-2023 15:30	----
						VA23A7669-001	VA23A7669-002	VA23A7669-003	VA23A7669-004	--------
						Result	Result	Result	Result	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		81.8	90.3	93.5	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		93.4	93.4	80.4	92.1	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		89.7	90.2	89.3	88.3	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		101	101	101	100	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.053 DLCI	<0.010	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.035	<0.010	<0.010	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	0.013	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	0.011	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	0.014	<0.010	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		0.021	0.064	<0.010	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		0.056	0.064	<0.030	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	<0.060	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	U4-3	G2-10	MW3	Trip Blank-6	----
					Client sampling date / time	11-Apr-2023 12:50	11-Apr-2023 12:07	11-Apr-2023 14:24	11-Apr-2023 15:30	----
Analyte	CAS Number	Method	LOR	Unit		VA23A7669-001	VA23A7669-002	VA23A7669-003	VA23A7669-004	--------
						Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons										
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	0.077	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		76.7	97.4	94.3	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		97.3	121	122	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		106	130	130	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7669**	Page	: 1 of 9
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 11-Apr-2023 16:40
PO	: 573161	Issue Date	: 18-Apr-2023 13:38
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Hydrocarbons	Anonymous	Anonymous	VHw (C6-C10)	----	E581.VH+F1	60.4 % DUP-H	30%	RPD exceeds DQO

Result Qualifiers

Qualifier	Description
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW3	E421	11-Apr-2023	13-Apr-2023	----	----		14-Apr-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) U4-3	E421	11-Apr-2023	13-Apr-2023	----	----		14-Apr-2023	180 days	3 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-10	E601A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW3	E601A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U4-3	E601A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-10	E581.VH+F1	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW3	E581.VH+F1	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Trip Blank-6	E581.VH+F1	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U4-3	E581.VH+F1	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-10	E641A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW3	E641A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U4-3	E641A	11-Apr-2023	16-Apr-2023	14 days	5 days	✓	17-Apr-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-10	E611A	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW3	E611A	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Trip Blank-6	E611A	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U4-3	E611A	11-Apr-2023	13-Apr-2023	----	----		13-Apr-2023	14 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	895838	1	15	6.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	895295	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	895839	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	899421	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	895838	1	15	6.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	895295	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	899423	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	895839	1	10	10.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	899421	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	895838	1	15	6.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	895295	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	899423	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	895839	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	895838	1	15	6.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	895295	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	895839	1	10	10.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A7669**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 11-Apr-2023 16:40
PO	: 573161	Date Analysis Commenced	: 13-Apr-2023
C-O-C number	: ----	Issue Date	: 18-Apr-2023 13:38
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 4		
No. of samples analysed	: 4		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 895295)											
VA23A7714-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0074	0.0072	0.0001	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00918	0.00927	0.952%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00497	0.00473	5.04%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0473	0.0472	0.101%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.085	0.087	0.002	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000142	0.0000102	0.0000040	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	22.1	22.8	2.82%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.00168	0.00174	3.27%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.000088	0.000084	0.000004	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0559	0.0552	1.31%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1.54	1.54	0.0242%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.0126	0.0126	0.0751%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00795	0.00818	2.84%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	11.6	12.1	3.85%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.0148	0.0150	1.15%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000950	0.000939	1.11%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.59	1.58	0.777%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	30.5	30.8	0.802%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.456	0.467	2.43%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	20.8	21.2	1.59%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 895295) - continued											
VA23A7714-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000044	0.000044	0.0000005	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00077	0.00076	0.00001	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000412	0.000413	0.320%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0012	0.0012	0.000009	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 895838)											
FJ2300731-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 895839)											
FJ2300749-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	2000	µg/L	420000	783000	60.4%	30%	DUP-H

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 895295)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 895295) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 895838)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 895839)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 899421)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 899423)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 899423) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 895295)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.2	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	102	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	100	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	105	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	95.7	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	91.8	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	90.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	102	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	93.6	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	96.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	99.4	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.2	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	101	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.2	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	91.0	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.2	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	104	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	98.6	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.6	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	104	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	94.6	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	95.7	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	82.3	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	102	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	98.9	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	92.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 895295) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.2	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	96.4	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	93.7	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	102	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	87.3	80.0	120	----
Volatile Organic Compounds (QCLot: 895838)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	114	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 895839)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	90.4	70.0	130	----
Hydrocarbons (QCLot: 899421)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	110	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	103	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 899423)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	97.3	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	99.8	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	97.2	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	113	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	96.8	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 899423) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	94.4	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	93.9	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	97.9	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	99.3	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	106	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 895295)										
VA23A7714-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.191 mg/L	0.2 mg/L	95.6	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0192 mg/L	0.02 mg/L	95.9	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0193 mg/L	0.02 mg/L	96.4	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0382 mg/L	0.04 mg/L	95.5	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00822 mg/L	0.01 mg/L	82.2	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.090 mg/L	0.1 mg/L	89.8	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00389 mg/L	0.004 mg/L	97.4	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00932 mg/L	0.01 mg/L	93.2	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0387 mg/L	0.04 mg/L	96.8	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0187 mg/L	0.02 mg/L	93.7	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0191 mg/L	0.02 mg/L	95.5	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.88 mg/L	2 mg/L	93.9	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	94.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0891 mg/L	0.1 mg/L	89.1	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0186 mg/L	0.02 mg/L	92.8	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0194 mg/L	0.02 mg/L	96.9	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0378 mg/L	0.04 mg/L	94.5	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.72 mg/L	10 mg/L	97.2	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0392 mg/L	0.04 mg/L	98.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.63 mg/L	10 mg/L	96.3	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00365 mg/L	0.004 mg/L	91.3	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0399 mg/L	0.04 mg/L	99.8	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 895295) - continued										
VA23A7714-002	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0193 mg/L	0.02 mg/L	96.6	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0388 mg/L	0.04 mg/L	97.1	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0189 mg/L	0.02 mg/L	94.6	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00371 mg/L	0.004 mg/L	92.8	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0978 mg/L	0.1 mg/L	97.8	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.400 mg/L	0.4 mg/L	99.9	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0375 mg/L	0.04 mg/L	93.7	70.0	130	----
Volatile Organic Compounds (QCLot: 895838)										
FJ2300731-003	Anonymous	Benzene	71-43-2	E611A	98.3 µg/L	100 µg/L	98.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	110 µg/L	100 µg/L	110	60.0	140	----
		Styrene	100-42-5	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		Toluene	108-88-3	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	218 µg/L	200 µg/L	109	60.0	140	----
		Xylene, o-	95-47-6	E611A	108 µg/L	100 µg/L	108	60.0	140	----
Hydrocarbons (QCLot: 895839)										
KS2301091-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5200 µg/L	6310 µg/L	82.4	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt Sampler: RS & AGE

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	U4-3	11-Apr-23	12:50	GW	5	X		X	X	X			
	G2-10	"	12:07	"	4	X		X	X				
	MW3	"	14:24	"	5	X		X	X	X			
	Trip Blank-6	"	15:30	"	1	X							

Environmental Division Vancouver
Work Order Reference
VA23A7669

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							9

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raquel Sapp	April 11, 2023	16:41

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
LtA	4/11	4:40p

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A7826**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 12-Apr-2023 16:40
PO	: 573161	Date Analysis Commenced	: 15-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:17
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Organics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-06S	A2MW09-10	PW03-1B	PW03-6	Equipment blank-1
					Client sampling date / time	12-Apr-2023 11:04	12-Apr-2023 10:56	12-Apr-2023 10:28	12-Apr-2023 10:38	12-Apr-2023 11:30
						VA23A7826-001	VA23A7826-002	VA23A7826-003	VA23A7826-004	VA23A7826-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		----	----	----	----	<600
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	1.0	µg/L		----	----	----	----	<1.0
Antimony, dissolved	7440-36-0	E421	0.10	µg/L		----	----	----	----	<0.10
Arsenic, dissolved	7440-38-2	E421	0.10	µg/L		----	----	----	----	<0.10
Barium, dissolved	7440-39-3	E421	0.10	µg/L		----	----	----	----	<0.10
Beryllium, dissolved	7440-41-7	E421	0.020	µg/L		----	----	----	----	<0.020
Bismuth, dissolved	7440-69-9	E421	0.050	µg/L		----	----	----	----	<0.050
Boron, dissolved	7440-42-8	E421	10	µg/L		----	----	----	----	<10
Cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		----	----	----	----	<0.0050
Calcium, dissolved	7440-70-2	E421	50	µg/L		----	----	----	----	<50
Cesium, dissolved	7440-46-2	E421	0.010	µg/L		----	----	----	----	<0.010
Chromium, dissolved	7440-47-3	E421	0.50	µg/L		----	----	----	----	<0.50
Cobalt, dissolved	7440-48-4	E421	0.10	µg/L		----	----	----	----	<0.10
Copper, dissolved	7440-50-8	E421	0.20	µg/L		----	----	----	----	<0.20
Iron, dissolved	7439-89-6	E421	10	µg/L		----	----	----	----	<10
Lead, dissolved	7439-92-1	E421	0.050	µg/L		----	----	----	----	<0.050
Lithium, dissolved	7439-93-2	E421	1.0	µg/L		----	----	----	----	<1.0
Magnesium, dissolved	7439-95-4	E421	5.0	µg/L		----	----	----	----	<5.0
Manganese, dissolved	7439-96-5	E421	0.10	µg/L		----	----	----	----	<0.10
Molybdenum, dissolved	7439-98-7	E421	0.050	µg/L		----	----	----	----	<0.050
Nickel, dissolved	7440-02-0	E421	0.50	µg/L		----	----	----	----	<0.50
Phosphorus, dissolved	7723-14-0	E421	50	µg/L		----	----	----	----	<50
Potassium, dissolved	7440-09-7	E421	50	µg/L		----	----	----	----	<50
Rubidium, dissolved	7440-17-7	E421	0.20	µg/L		----	----	----	----	<0.20
Selenium, dissolved	7782-49-2	E421	0.050	µg/L		----	----	----	----	<0.050
Silicon, dissolved	7440-21-3	E421	50	µg/L		----	----	----	----	<50
Silver, dissolved	7440-22-4	E421	0.010	µg/L		----	----	----	----	<0.010
Sodium, dissolved	7440-23-5	E421	50	µg/L		----	----	----	----	<50

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-06S	A2MW09-10	PW03-1B	PW03-6	Equipment blank-1
					Client sampling date / time	12-Apr-2023 11:04	12-Apr-2023 10:56	12-Apr-2023 10:28	12-Apr-2023 10:38	12-Apr-2023 11:30
						VA23A7826-001	VA23A7826-002	VA23A7826-003	VA23A7826-004	VA23A7826-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421	0.20	µg/L		----	----	----	----	<0.20
Sulfur, dissolved	7704-34-9	E421	500	µg/L		----	----	----	----	<500
Tellurium, dissolved	13494-80-9	E421	0.20	µg/L		----	----	----	----	<0.20
Thallium, dissolved	7440-28-0	E421	0.010	µg/L		----	----	----	----	<0.010
Thorium, dissolved	7440-29-1	E421	0.10	µg/L		----	----	----	----	<0.10
Tin, dissolved	7440-31-5	E421	0.10	µg/L		----	----	----	----	<0.10
Titanium, dissolved	7440-32-6	E421	0.30	µg/L		----	----	----	----	<0.30
Tungsten, dissolved	7440-33-7	E421	0.10	µg/L		----	----	----	----	<0.10
Uranium, dissolved	7440-61-1	E421	0.010	µg/L		----	----	----	----	<0.010
Vanadium, dissolved	7440-62-2	E421	0.50	µg/L		----	----	----	----	<0.50
Zinc, dissolved	7440-66-6	E421	1.0	µg/L		----	----	----	----	<1.0
Zirconium, dissolved	7440-67-7	E421	0.30	µg/L		----	----	----	----	<0.30
Dissolved metals filtration location	----	EP421	-	-		----	----	----	----	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	269	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	151	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	20.4	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	17.4	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	0.65	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	18.0	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	860	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	1940	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	810	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	1480	<100	<100	<100
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	A2MW09-06S	A2MW09-10	PW03-1B	PW03-6	Equipment blank-1
					Client sampling date / time	12-Apr-2023 11:04	12-Apr-2023 10:56	12-Apr-2023 10:28	12-Apr-2023 10:38	12-Apr-2023 11:30
						VA23A7826-001	VA23A7826-002	VA23A7826-003	VA23A7826-004	VA23A7826-005
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		85.0	97.2	81.3	81.3	83.1
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		107	90.5	114	106	108
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		84.2	86.0	88.4	85.8	85.1
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.1	73.4	98.5	98.3	99.2
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	0.199	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.022 DLCI	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.023 DLCI	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	0.197	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		0.022	13.2	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		0.013	5.99	<0.010	<0.010	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	48.5	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	0.036	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	0.034	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.290 DLCI	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	0.034	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	48.9	<0.060	<0.060	<0.060

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	A2MW09-06S	A2MW09-10	PW03-1B	PW03-6	Equipment blank-1
					Client sampling date / time	12-Apr-2023 11:04	12-Apr-2023 10:56	12-Apr-2023 10:28	12-Apr-2023 10:38	12-Apr-2023 11:30
Analyte	CAS Number	Method	LOR	Unit		VA23A7826-001	VA23A7826-002	VA23A7826-003	VA23A7826-004	VA23A7826-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	49.0	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		71.9	90.6	79.8	74.9	70.5
Naphthalene-d8	1146-65-2	E641A	0.1	%		108	102	111	96.2	94.6
Phenanthrene-d10	1517-22-2	E641A	0.1	%		116	106	108	102	105

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A7826**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 12-Apr-2023 16:40
PO	: 573161	Issue Date	: 19-Apr-2023 13:18
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
Equipment blank-1	E421	12-Apr-2023	15-Apr-2023	----	----		16-Apr-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2MW09-10	E601A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	18-Apr-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2MW09-06S	E601A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Equipment blank-1	E601A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-1B	E601A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW03-6	E601A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	19-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A2MW09-06S	E581.VH+F1	12-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A2MW09-10	E581.VH+F1	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Equipment blank-1	E581.VH+F1	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-1B	E581.VH+F1	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW03-6	E581.VH+F1	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-06S	E641A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-10	E641A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) Equipment blank-1	E641A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	19-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-1B	E641A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	18-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW03-6	E641A	12-Apr-2023	18-Apr-2023	14 days	6 days	✓	18-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-06S	E611A	12-Apr-2023	16-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A2MW09-10	E611A	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Equipment blank-1	E611A	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-1B	E611A	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW03-6	E611A	12-Apr-2023	17-Apr-2023	----	----		17-Apr-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	900602	2	34	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	897793	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	900603	2	31	6.4	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	902095	3	37	8.1	5.0	✓
BTEX by Headspace GC-MS	E611A	900602	2	34	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	897793	1	18	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	902094	3	26	11.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	900603	2	31	6.4	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	902095	3	37	8.1	5.0	✓
BTEX by Headspace GC-MS	E611A	900602	2	34	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	897793	1	18	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	902094	3	26	11.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	900603	2	31	6.4	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	900602	2	34	5.8	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	897793	1	18	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	900603	2	31	6.4	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A7826**	Page	: 1 of 14
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 12-Apr-2023 16:40
PO	: 573161	Date Analysis Commenced	: 15-Apr-2023
C-O-C number	: ----	Issue Date	: 19-Apr-2023 13:17
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Brieanna Allen	Production/Validation Manager	Vancouver Organics, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 897793)											
VA23A7799-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0158	0.0152	3.43%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00017	0.00017	0.000001	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00319	0.00320	0.465%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0606	0.0601	0.771%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.146	0.146	0.0999%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000100	mg/L	<0.0000100	<0.0000100	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	127	128	0.573%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000016	0.000016	0.00000002	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00408	0.00400	2.03%	20%	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.029	0.028	0.001	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0087	0.0086	0.0002	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	98.2	97.4	0.841%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00818	0.00783	4.32%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00497	0.00501	0.785%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.00128	0.00130	0.00002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.142	0.138	0.003	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	15.5	15.4	0.618%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00182	0.00178	0.00004	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000643	0.000541	17.2%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	7.59	7.34	3.34%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	112	111	0.206%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	1.30	1.30	0.139%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	187	181	3.60%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 897793) - continued											
VA23A7799-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.00438	0.00452	3.29%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00431	0.00420	0.00011	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 899539)											
VA23A7545-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	2.43	2.23	0.20	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 900602)											
VA23A7826-002	A2MW09-10	Benzene	71-43-2	E611A	0.50	µg/L	269	265	1.55%	30%	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	151	144	5.22%	30%	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	20.4	19.2	5.78%	30%	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	17.4	16.5	5.28%	30%	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	0.65	0.57	0.08	Diff <2x LOR	----
Hydrocarbons (QC Lot: 899538)											
VA23A7545-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
Hydrocarbons (QC Lot: 900603)											
VA23A7826-002	A2MW09-10	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	1940	1920	1.1%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 897793)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	MBRR
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 897793) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 899539)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 900602)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 899538)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 900603)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 900884)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 900887)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 902095)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Hydrocarbons (QCLot: 902095) - continued						
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900885)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900886)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900886) - continued						
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 902094)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Qualifiers

Qualifier	Description
MBRR	*Initial MB for this submission had positive results for flagged analyte (data not shown). Low level samples were repeated with new QC (2nd MB results shown). High level results (>5x initial MB level) and non-detect results were reported and are defensible*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 897793)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	97.1	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	98.4	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	96.8	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	93.8	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.1	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	96.9	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	111	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	99.7	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.4	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.3	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.5	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	95.9	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	97.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	103	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	100	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	93.9	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.2	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	96.4	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	97.0	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.2	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	96.7	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	101	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	94.9	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	95.4	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.0	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	91.5	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	93.5	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	99.1	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 897793) - continued									
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	96.5	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	95.5	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	95.8	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	98.8	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.7	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	92.9	80.0	120	----
Volatile Organic Compounds (QCLot: 899539)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.9	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	95.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	96.6	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	94.7	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	97.1	70.0	130	----
Volatile Organic Compounds (QCLot: 900602)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	97.5	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	98.7	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 899538)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	91.8	70.0	130	----
Hydrocarbons (QCLot: 900603)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	83.4	70.0	130	----
Hydrocarbons (QCLot: 900884)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	110	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	106	70.0	130	----
Hydrocarbons (QCLot: 900887)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	120	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	119	70.0	130	----
Hydrocarbons (QCLot: 902095)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 902095) - continued									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	104	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	99.3	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900885)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	118	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	111	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	101	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	124	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	122	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 900886)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	116	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	108	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 900886) - continued									
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	103	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	120	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 902094)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	128	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	125	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	123	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	126	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	110	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	109	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	119	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	123	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 897793)										
VA23A7799-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.199 mg/L	0.2 mg/L	99.3	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0211 mg/L	0.02 mg/L	105	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0400 mg/L	0.04 mg/L	100	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00860 mg/L	0.01 mg/L	86.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00386 mg/L	0.004 mg/L	96.6	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00978 mg/L	0.01 mg/L	97.8	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0394 mg/L	0.04 mg/L	98.5	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0190 mg/L	0.02 mg/L	95.1	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0187 mg/L	0.02 mg/L	93.4	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.5	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0957 mg/L	0.1 mg/L	95.7	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0192 mg/L	0.02 mg/L	95.8	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0365 mg/L	0.04 mg/L	91.3	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.8 mg/L	10 mg/L	108	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0199 mg/L	0.02 mg/L	99.6	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0454 mg/L	0.04 mg/L	113	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	8.78 mg/L	10 mg/L	87.8	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0417 mg/L	0.04 mg/L	104	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00370 mg/L	0.004 mg/L	92.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 897793) - continued										
VA23A7799-002	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0170 mg/L	0.02 mg/L	84.8	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0194 mg/L	0.02 mg/L	97.1	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0396 mg/L	0.04 mg/L	98.9	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00381 mg/L	0.004 mg/L	95.2	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.378 mg/L	0.4 mg/L	94.6	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0405 mg/L	0.04 mg/L	101	70.0	130	----
Volatile Organic Compounds (QCLot: 899539)										
VA23A7545-002	Anonymous	Benzene	71-43-2	E611A	93.2 µg/L	100 µg/L	93.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	95.9 µg/L	100 µg/L	95.9	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
		Toluene	108-88-3	E611A	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	196 µg/L	200 µg/L	97.8	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
Volatile Organic Compounds (QCLot: 900602)										
VA23A7826-003	PW03-1B	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	97.4 µg/L	100 µg/L	97.4	60.0	140	----
		Styrene	100-42-5	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Toluene	108-88-3	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	210 µg/L	200 µg/L	105	60.0	140	----
		Xylene, o-	95-47-6	E611A	102 µg/L	100 µg/L	102	60.0	140	----
Hydrocarbons (QCLot: 899538)										
VA23A7545-003	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5290 µg/L	6310 µg/L	83.9	60.0	140	----
Hydrocarbons (QCLot: 900603)										
VA23A7826-004	PW03-6	VHw (C6-C10)	----	E581.VH+F1	5220 µg/L	6310 µg/L	82.8	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt Sampler: RS & AGE

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	LD	SUSPECTED HAZARD (see notes)
	A2MW09-06S	12-Apr-23	11:04	GW	4	X		X	X			
	A2MW09-10	↓	10:56	↓	1	X		X	X			
	PW03-1B		10:28		1	X		X	X			
	PW03-6		10:38		1	X		X	X			
	Equipment Blank-1		11:30		5	X		X	X	X		

Environmental Division
Vancouver
Work Order Reference
VA23A7826

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☒ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
							6

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
	April 12, 2023	16:37

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	4/12	4:40

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6037**	Page	: 1 of 4
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Mar-2023 18:00
PO	: 5737161	Date Analysis Commenced	: 27-Mar-2023
C-O-C number	: ----	Issue Date	: 03-May-2023 10:51
Sampler	: AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample ID format updated.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW02-03	DUP-07	MW02-04	----	----
					Client sampling date / time	21-Mar-2023 14:34	21-Mar-2023 14:34	21-Mar-2023 13:38	----	----
						VA23A6037-001	VA23A6037-002	VA23A6037-003	--------	--------
						Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	----	----
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	----	----
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	----	----
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		90.9	87.9	96.7	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		93.6	94.0	101	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		98.2	97.4	97.3	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.8	99.0	99.0	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW02-03	DUP-07	MW02-04	----	----
					Client sampling date / time	21-Mar-2023 14:34	21-Mar-2023 14:34	21-Mar-2023 13:38	----	----
						VA23A6037-001	VA23A6037-002	VA23A6037-003	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
Phenanthrene	85-01-8	E641A	0.020	µg/L		<0.020	<0.020	<0.020	----	----
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	<0.030	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	<0.060	----	----
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		87.7	87.8	91.7	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%		95.2	95.7	101	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%		88.4	88.8	90.8	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6037**	Page	: 1 of 6
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Mar-2023 18:00
PO	: 5737161	Issue Date	: 03-May-2023 10:51
C-O-C number	: ----		
Sampler	: AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-07	E601A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	29-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW02-03	E601A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	29-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW02-04	E601A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	29-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-07	E581.VH+F1	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW02-03	E581.VH+F1	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW02-04	E581.VH+F1	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-07	E641A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	28-Mar-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW02-03	E641A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	28-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW02-04	E641A	21-Mar-2023	28-Mar-2023	14 days	7 days	✓	28-Mar-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-07	E611A	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW02-03	E611A	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW02-04	E611A	21-Mar-2023	27-Mar-2023	----	----		28-Mar-2023	14 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	877180	1	5	20.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	877179	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	879124	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	877180	1	5	20.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	879125	1	8	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	877179	1	14	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	879124	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	877180	1	5	20.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	879125	1	8	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	877179	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	877180	1	5	20.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	877179	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A6037**	Page	: 1 of 6
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Mar-2023 18:00
PO	: 5737161	Date Analysis Commenced	: 27-Mar-2023
C-O-C number	: ----	Issue Date	: 03-May-2023 10:51
Sampler	: AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 877180)											
VA23A6037-001	MW02-03	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 877179)											
VA23A6037-001	MW02-03	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 877180)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 877179)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 879124)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 879125)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 879125) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 877180)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	94.5	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	92.9	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	97.8	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	93.2	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	102	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	95.4	70.0	130	----
Hydrocarbons (QCLot: 877179)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	97.5	70.0	130	----
Hydrocarbons (QCLot: 879124)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	122	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	117	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 879125)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	97.7	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	99.7	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	93.8	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	89.8	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	98.2	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	83.7	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	88.0	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	94.1	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	98.5	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	102	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	94.5	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 879125) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	98.9	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 877180)										
VA23A6037-002	DUP-07	Benzene	71-43-2	E611A	96.1 µg/L	100 µg/L	96.1	60.0	140	----
		Ethylbenzene	100-41-4	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	109 µg/L	100 µg/L	109	60.0	140	----
		Styrene	100-42-5	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Toluene	108-88-3	E611A	98.6 µg/L	100 µg/L	98.6	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	205 µg/L	200 µg/L	103	60.0	140	----
		Xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	60.0	140	----
Hydrocarbons (QCLot: 877179)										
VA23A6037-003	MW02-04	VHw (C6-C10)	----	E581.VH+F1	5900 µg/L	6310 µg/L	93.5	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA23A6037

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimu
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim
Same day [E2] if received by 10am M-S - 200% rush surcharge
☐ fees may apply to rush requests on weekends, statutory holidays, routine tests

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please

Analysis R

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): 6037 **ALS Contact:** Dean Watt **Sampler:** AGE

Indicate Filtered (F), Preserved (P) or Filtered

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQU	SUSPECTED HAZARD (see n
	MW02-03	21-Mar-23	19:34	GW	4	X		X	X				
	DUP-07	21-Mar-23	14:34	↓	4	X		X	X				
	MW02-04	21-Mar-23	13:38	↓	4	X		X	X				

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				6			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Alberto Garcia Espinosa	Date: 21-Mar-23	Time: 17:53	Received by:	Date:	Time:	Received by: AB	Date: 03/21/23	Time: 6PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6536**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 27-Mar-2023 17:10
PO	: 573161	Date Analysis Commenced	: 29-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 12:37
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Erin Sanchez		Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3S	MW11-3D	MW11-4S	MW11-4I	MW11-4D
					Client sampling date / time	27-Mar-2023 12:47	27-Mar-2023 13:23	27-Mar-2023 13:15	27-Mar-2023 15:40	27-Mar-2023 15:25
						VA23A6536-001	VA23A6536-002	VA23A6536-003	VA23A6536-004	VA23A6536-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L		26500	----	50100	95200	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421	1.0	µg/L		4.8	----	11.5	4.6	----
Antimony, dissolved	7440-36-0	E421	0.10	µg/L		<0.10	----	<0.10	<0.10	----
Arsenic, dissolved	7440-38-2	E421	0.10	µg/L		0.59	----	0.48	0.47	----
Barium, dissolved	7440-39-3	E421	0.10	µg/L		30.5	----	33.4	52.7	----
Beryllium, dissolved	7440-41-7	E421	0.020	µg/L		<0.020	----	<0.020	0.025	----
Bismuth, dissolved	7440-69-9	E421	0.050	µg/L		<0.050	----	<0.050	<0.050	----
Boron, dissolved	7440-42-8	E421	10	µg/L		22	----	28	24	----
Cadmium, dissolved	7440-43-9	E421	0.0050	µg/L		0.0356	----	0.0908	0.0987	----
Calcium, dissolved	7440-70-2	E421	50	µg/L		8160	----	14000	26200	----
Cesium, dissolved	7440-46-2	E421	0.010	µg/L		<0.010	----	0.021	0.018	----
Chromium, dissolved	7440-47-3	E421	0.50	µg/L		<0.50	----	<0.50	<0.50	----
Cobalt, dissolved	7440-48-4	E421	0.10	µg/L		0.33	----	10.3	7.50	----
Copper, dissolved	7440-50-8	E421	0.20	µg/L		<0.20	----	21.5	1.56	----
Iron, dissolved	7439-89-6	E421	10	µg/L		261	----	24	1050	----
Lead, dissolved	7439-92-1	E421	0.050	µg/L		<0.050	----	<0.050	<0.050	----
Lithium, dissolved	7439-93-2	E421	1.0	µg/L		<1.0	----	<1.0	<1.0	----
Magnesium, dissolved	7439-95-4	E421	5.0	µg/L		1480	----	3670	7230	----
Manganese, dissolved	7439-96-5	E421	0.10	µg/L		48.9	----	1460	792	----
Molybdenum, dissolved	7439-98-7	E421	0.050	µg/L		<0.050	----	0.110	0.200	----
Nickel, dissolved	7440-02-0	E421	0.50	µg/L		0.74	----	7.83	2.58	----
Phosphorus, dissolved	7723-14-0	E421	50	µg/L		<50	----	<50	<50	----
Potassium, dissolved	7440-09-7	E421	50	µg/L		1060	----	1310	1760	----
Rubidium, dissolved	7440-17-7	E421	0.20	µg/L		1.09	----	3.26	1.41	----
Selenium, dissolved	7782-49-2	E421	0.050	µg/L		0.055	----	0.114	0.075	----
Silicon, dissolved	7440-21-3	E421	50	µg/L		5480	----	4300	8970	----
Silver, dissolved	7440-22-4	E421	0.010	µg/L		<0.010	----	<0.010	<0.010	----
Sodium, dissolved	7440-23-5	E421	50	µg/L		56900	----	166000	161000	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3S	MW11-3D	MW11-4S	MW11-4I	MW11-4D
					Client sampling date / time	27-Mar-2023 12:47	27-Mar-2023 13:23	27-Mar-2023 13:15	27-Mar-2023 15:40	27-Mar-2023 15:25
						VA23A6536-001	VA23A6536-002	VA23A6536-003	VA23A6536-004	VA23A6536-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421	0.20	µg/L		116	----	181	363	----
Sulfur, dissolved	7704-34-9	E421	500	µg/L		19200	----	23200	36600	----
Tellurium, dissolved	13494-80-9	E421	0.20	µg/L		<0.20	----	<0.20	<0.20	----
Thallium, dissolved	7440-28-0	E421	0.010	µg/L		<0.010	----	0.022	<0.010	----
Thorium, dissolved	7440-29-1	E421	0.10	µg/L		<0.10	----	<0.10	<0.10	----
Tin, dissolved	7440-31-5	E421	0.10	µg/L		<0.10	----	<0.10	<0.10	----
Titanium, dissolved	7440-32-6	E421	0.30	µg/L		<0.30	----	<0.30	<0.30	----
Tungsten, dissolved	7440-33-7	E421	0.10	µg/L		<0.10	----	<0.10	0.39	----
Uranium, dissolved	7440-61-1	E421	0.010	µg/L		<0.010	----	0.037	0.032	----
Vanadium, dissolved	7440-62-2	E421	0.50	µg/L		<0.50	----	<0.50	<0.50	----
Zinc, dissolved	7440-66-6	E421	1.0	µg/L		1.3	----	7.4	3.2	----
Zirconium, dissolved	7440-67-7	E421	0.30	µg/L		<0.30	----	<0.30	<0.30	----
Dissolved metals filtration location	----	EP421	-	-		Field	----	Field	Field	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L		<0.50	2.80	<0.50	<0.50	2.07
Styrene	100-42-5	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3S	MW11-3D	MW11-4S	MW11-4I	MW11-4D
					Client sampling date / time	27-Mar-2023 12:47	27-Mar-2023 13:23	27-Mar-2023 13:15	27-Mar-2023 15:40	27-Mar-2023 15:25
						VA23A6536-001	VA23A6536-002	VA23A6536-003	VA23A6536-004	VA23A6536-005
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%		84.8	86.1	85.4	81.4	88.9
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%		99.3	110	82.2	95.7	92.1
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		98.7	99.5	93.8	97.4	99.9
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		101	100	101	100	102
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A	0.010	µg/L		0.012	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L		0.012	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Naphthalene	91-20-3	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A	0.020	µg/L		0.021	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A	0.030	µg/L		<0.030	<0.030	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A	0.060	µg/L		<0.060	<0.060	<0.060	<0.060	<0.060

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	MW11-3S	MW11-3D	MW11-4S	MW11-4I	MW11-4D
					Client sampling date / time	27-Mar-2023 12:47	27-Mar-2023 13:23	27-Mar-2023 13:15	27-Mar-2023 15:40	27-Mar-2023 15:25
						VA23A6536-001	VA23A6536-002	VA23A6536-003	VA23A6536-004	VA23A6536-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A	0.1	%		68.9	71.5	63.9	67.9	70.8
Naphthalene-d8	1146-65-2	E641A	0.1	%		109	110	102	100	111
Phenanthrene-d10	1517-22-2	E641A	0.1	%		106	109	99.0	98.7	106

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	Travel Blank-4	----	----	----	----
					Client sampling date / time	27-Mar-2023 16:00	----	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6536-006	--------	--------	--------	--------	
					Result	----	----	----	----	
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A	0.50	µg/L	<0.50	----	----	----	----	
Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	----	----	----	----	
Styrene	100-42-5	E611A	0.50	µg/L	<0.50	----	----	----	----	
Toluene	108-88-3	E611A	0.50	µg/L	<0.50	----	----	----	----	
Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	----	----	----	----	
Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	----	----	----	----	
Xylenes, total	1330-20-7	E611A	0.50	µg/L	<0.50	----	----	----	----	
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----	----	----	----	
VPHw	----	EC580A	100	µg/L	<100	----	----	----	----	
Hydrocarbons Surrogates										
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	101	----	----	----	----	
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	97.7	----	----	----	----	
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	100	----	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6536**	Page	: 1 of 9
Client	: **AECOM Canada Ltd.**	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 27-Mar-2023 17:10
PO	: 573161	Issue Date	: 04-Apr-2023 12:37
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-3S	E421	27-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-4I	E421	27-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-4S	E421	27-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	180 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3D	E601A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3S	E601A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-4D	E601A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-4I	E601A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4S	E601A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	04-Apr-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-3D	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-3S	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-4D	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-4I	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-4S	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Travel Blank-4	E581.VH+F1	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3D	E641A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	03-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3S	E641A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	03-Apr-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4D	E641A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	03-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4I	E641A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	03-Apr-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4S	E641A	27-Mar-2023	03-Apr-2023	14 days	7 days	✓	03-Apr-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-3D	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-3S	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-4D	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-4I	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-4S	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Travel Blank-4	E611A	27-Mar-2023	02-Apr-2023	----	----		02-Apr-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	879380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	885078	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	879380	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	885079	1	7	14.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	885078	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	879380	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	885079	1	7	14.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	884420	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	879380	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	884419	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
	Vancouver - Environmental			
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23A6536**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 27-Mar-2023 17:10
PO	: 573161	Date Analysis Commenced	: 29-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 12:37
Sampler	: AGE, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 879380)											
VA23A6536-001	MW11-3S	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	4.8 µg/L	0.0049	0.0001	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.59 µg/L	0.00062	0.00003	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	30.5 µg/L	0.0312	2.35%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.020 µg/L	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	22 µg/L	0.022	0.0002	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0356 µg/L	0.0000329	0.0000027	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	8160 µg/L	8.40	2.90%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	0.33 µg/L	0.00034	0.000003	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.20 µg/L	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	261 µg/L	0.260	0.353%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<1.0 µg/L	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1480 µg/L	1.50	1.43%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	48.9 µg/L	0.0493	0.949%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.050 µg/L	<0.000050	0	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	0.74 µg/L	0.00075	0.00002	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<50 µg/L	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1060 µg/L	1.10	3.05%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	1.09 µg/L	0.00106	0.00004	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.055 µg/L	<0.000050	0.000005	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	5480 µg/L	5.61	2.32%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	56900 µg/L	58.2	2.19%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	116 µg/L	0.122	4.95%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	19200 µg/L	19.7	2.62%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.20 µg/L	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 879380) - continued											
VA23A6536-001	MW11-3S	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.30 µg/L	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.10 µg/L	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.010 µg/L	<0.000010	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	1.3 µg/L	0.0014	0.000004	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.30 µg/L	<0.00030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 884420)											
VA23A6536-001	MW11-3S	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 884419)											
VA23A6536-001	MW11-3S	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 879380)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 879380) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 884420)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 884419)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 885078)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885079)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 885079) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 879380)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	101	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	103	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	107	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	101	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	100	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	87.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	103	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.8	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	108	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	96.8	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.4	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	98.8	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	99.4	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100.0	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	98.1	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	112	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	106	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	96.3	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.0	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	105	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	97.1	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	81.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	99.6	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 879380) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	92.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	94.4	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.1	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.0	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	105	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	97.0	80.0	120	----
Volatile Organic Compounds (QCLot: 884420)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 884419)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	77.4	70.0	130	----
Hydrocarbons (QCLot: 885078)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	130	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	125	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 885079)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.6795 µg/L	102	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.67243 µg/L	102	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.68068 µg/L	106	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.65177 µg/L	102	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.48201 µg/L	108	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.70642 µg/L	95.7	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.56618 µg/L	107	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.79397 µg/L	101	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.68739 µg/L	103	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.59945 µg/L	108	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.69281 µg/L	99.2	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.69591 µg/L	103	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.70239 µg/L	100	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 885079) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.69739 µg/L	99.0	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.7147 µg/L	99.0	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.73552 µg/L	97.5	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.73979 µg/L	101	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.66437 µg/L	107	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.68775 µg/L	103	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.6333 µg/L	113	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 879380)										
VA23A6536-003	MW11-4S	Aluminum, dissolved	7429-90-5	E421	0.188 mg/L	0.2 mg/L	94.1	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0389 mg/L	0.04 mg/L	97.3	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00870 mg/L	0.01 mg/L	87.0	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.094 mg/L	0.1 mg/L	93.8	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00391 mg/L	0.004 mg/L	97.8	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0101 mg/L	0.01 mg/L	101	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0377 mg/L	0.04 mg/L	94.4	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0183 mg/L	0.02 mg/L	91.3	70.0	130	----
		Copper, dissolved	7440-50-8	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.85 mg/L	2 mg/L	92.5	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0180 mg/L	0.02 mg/L	90.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0938 mg/L	0.1 mg/L	93.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0362 mg/L	0.04 mg/L	90.6	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.6 mg/L	10 mg/L	106	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.70 mg/L	4 mg/L	92.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0180 mg/L	0.02 mg/L	90.2	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0451 mg/L	0.04 mg/L	113	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.47 mg/L	10 mg/L	94.7	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00358 mg/L	0.004 mg/L	89.6	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	ND mg/L	20 mg/L	ND	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0424 mg/L	0.04 mg/L	106	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00346 mg/L	0.004 mg/L	86.5	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 879380) - continued										
VA23A6536-003	MW11-4S	Thorium, dissolved	7440-29-1	E421	0.0183 mg/L	0.02 mg/L	91.4	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0197 mg/L	0.02 mg/L	98.6	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0373 mg/L	0.04 mg/L	93.2	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00385 mg/L	0.004 mg/L	96.2	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0947 mg/L	0.1 mg/L	94.7	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.387 mg/L	0.4 mg/L	96.8	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0416 mg/L	0.04 mg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 884420)										
VA23A6536-002	MW11-3D	Benzene	71-43-2	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Ethylbenzene	100-41-4	E611A	97.0 µg/L	100 µg/L	97.0	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		Styrene	100-42-5	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Toluene	108-88-3	E611A	96.3 µg/L	100 µg/L	96.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	197 µg/L	200 µg/L	98.7	60.0	140	----
		Xylene, o-	95-47-6	E611A	99.1 µg/L	100 µg/L	99.1	60.0	140	----
Hydrocarbons (QCLot: 884419)										
VA23A6536-003	MW11-4S	VHw (C6-C10)	----	E581.VH+F1	4610 µg/L	6310 µg/L	73.1	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Stephen Sumsion
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: stephen.sumsion@aecom.com
Email 2: johnny.au@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: stephen.sumsion@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): A6536

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW11-3S	27-Mar-23	12:47	GW	5	X		X	X	X			
	MW11-3D	↓	13:23	↓	4	X		X	X				
	MW11-4S		13:15		5	X		X	X	X			
	MW11-4I		15:40		5	X		X	X	X			
	MW11-4D		15:25		4	X		X	X				
	Travel Blank-4		16:00		1	X							

Environmental Division
Vancouver
Work Order Reference
VA23A6536

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	March 27, 2023	17:05

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
AB	03/27/23	5:10 PM

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9018**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Date Analysis Commenced	: 18-Aug-2023
C-O-C number	: ----	Issue Date	: 28-Aug-2023 09:14
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: G1-1B	G1-8	A1MW02-01	A1MW02-02	A1MW02-03
Client sampling date / time						16-Aug-2023 12:17	16-Aug-2023 12:30	16-Aug-2023 13:46	16-Aug-2023 13:38	16-Aug-2023 14:40
						VA23B9018-001	VA23B9018-002	VA23B9018-003	VA23B9018-004	VA23B9018-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA		600	µg/L	6770	16700	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	A	0.050	µg/L	0.084	0.169	----	----	----
Dissolved metals filtration location	----	EP421/VA		-	-	Field	Field	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	A	0.50	µg/L	----	----	294	1450	50.9
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L	----	----	2.58	381	7.04
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L	----	----	10.0	23.3	45.2
Styrene	100-42-5	E611A/VA	A	0.50	µg/L	----	----	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	A	0.50	µg/L	----	----	3.08	25.6	6.93
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L	----	----	6.88	64.7	8.69
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L	----	----	<0.48 DLQ	1.50	<1.20 DLQ
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L	----	----	6.88	66.2	8.69
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	A	250	µg/L	----	----	940	3070	5750
EPH (C19-C32)	----	E601A/VA	A	250	µg/L	----	----	<250	<250	1130
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L	----	----	1240	5680	6590
HEPHw	----	EC600A/VA		250	µg/L	----	----	<250	<250	1130
LEPHw	----	EC600A/VA		250	µg/L	----	----	930	2920	5740
VPHw	----	EC580A/VA		100	µg/L	----	----	930	3760	6520
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%	----	----	93.3	91.2	96.4
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%	----	----	94.2	90.0	94.8
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%	----	----	97.2	98.3	99.4
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%	----	----	94.0	71.0	83.7
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	A	0.010	µg/L	----	----	1.27	2.97	1.49

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID	G1-1B	G1-8	A1MW02-01	A1MW02-02	A1MW02-03
						Client sampling date / time	16-Aug-2023 12:17	16-Aug-2023 12:30	16-Aug-2023 13:46	16-Aug-2023 13:38	16-Aug-2023 14:40
							VA23B9018-001	VA23B9018-002	VA23B9018-003	VA23B9018-004	VA23B9018-005
							Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons											
Acenaphthylene	208-96-8	E641A/VA	A	0.010	µg/L		----	----	<0.210 DLQ	<0.520 DLQ	<0.130 DLQ
Acridine	260-94-6	E641A/VA	A	0.010	µg/L		----	----	<0.460 DLCI	<0.870 DLCI	<3.27 DLCI
Anthracene	120-12-7	E641A/VA	A	0.010	µg/L		----	----	<0.150 DLQ	<0.300 DLQ	0.307
Benz(a)anthracene	56-55-3	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.014 DLQ	<0.034 DLQ
Benzo(a)pyrene	50-32-8	E641A/VA	A	0.0050	µg/L		----	----	<0.0050	<0.0050	<0.0250 DLQ
Benzo(b+j)fluoranthene	n/a	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.010	<0.037 DLQ
Benzo(b+j+k)fluoranthene	n/a	E641A/VA		0.015	µg/L		----	----	<0.015	<0.015	<0.040
Benzo(g,h,i)perylene	191-24-2	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.010	0.037
Benzo(k)fluoranthene	207-08-9	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.010	<0.015 DLQ
Chrysene	218-01-9	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.023 DLCI	<0.045 DLCI
Dibenz(a,h)anthracene	53-70-3	E641A/VA	A	0.0050	µg/L		----	----	<0.0050	<0.0050	<0.0075 DLCI
Fluoranthene	206-44-0	E641A/VA	A	0.010	µg/L		----	----	0.067	0.098	0.127
Fluorene	86-73-7	E641A/VA	A	0.010	µg/L		----	----	2.19	4.59	1.56
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	A	0.010	µg/L		----	----	<0.010	<0.010	0.024
Methylnaphthalene, 1-	90-12-0	E641A/VA	A	0.010	µg/L		----	----	28.9	121	26.0
Methylnaphthalene, 2-	91-57-6	E641A/VA	A	0.010	µg/L		----	----	38.8	197	0.104
Naphthalene	91-20-3	E641A/VA	A	0.050	µg/L		----	----	<1.10 DLQ	139	<1.60 DLCI
Phenanthrene	85-01-8	E641A/VA	A	0.020	µg/L		----	----	2.14	4.04	1.05
Pyrene	129-00-0	E641A/VA	A	0.010	µg/L		----	----	0.061	0.129	0.283
Quinoline	91-22-5	E641A/VA	A	0.050	µg/L		----	----	<2.05 DLQ	<6.00 DLQ	<5.20 DLCI
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA		0.010	µg/L		----	----	<0.010	<0.010	0.024
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA		0.030	µg/L		----	----	0.128	0.227	0.471
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA		0.060	µg/L		----	----	5.60	151	4.41
PAHs, total (EPA 16)	n/a	E641A/VA		0.065	µg/L		----	----	5.73	151	4.88
Polycyclic Aromatic Hydrocarbons Surrogates											
Chrysene-d12	1719-03-5	E641A/VA		0.1	%		----	----	74.5	74.4	66.9
Naphthalene-d8	1146-65-2	E641A/VA		0.1	%		----	----	82.6	87.7	95.7
Phenanthrene-d10	1517-22-2	E641A/VA		0.1	%		----	----	108	102	94.9

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: MW03-05	G1-4B	----	----	----
						Client sampling date / time: 16-Aug-2023 14:25	16-Aug-2023 15:38	----	----	----
						VA23B9018-006	VA23B9018-007	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA		600	µg/L	399000	----	----	----	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	A	0.050	µg/L	0.337	----	----	----	----
Dissolved metals filtration location	----	EP421/VA		-	-	Field	----	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L	6.44	148	----	----	----
Styrene	100-42-5	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L	<0.40	1.54	----	----	----
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L	<0.30	0.39	----	----	----
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L	<0.50	1.93	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	A	250	µg/L	390	420	----	----	----
EPH (C19-C32)	----	E601A/VA	A	250	µg/L	<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L	120	470	----	----	----
HEPHw	----	EC600A/VA		250	µg/L	<250	----	----	----	----
LEPHw	----	EC600A/VA		250	µg/L	380	----	----	----	----
VPHw	----	EC580A/VA		100	µg/L	120	470	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%	90.3	86.0	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%	116	98.4	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%	96.9	95.5	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%	99.4	95.4	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	A	0.010	µg/L	3.41	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	MW03-05	G1-4B	----	----	----
					Client sampling date / time	16-Aug-2023 14:25	16-Aug-2023 15:38	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23B9018-006	VA23B9018-007	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthylene	208-96-8	E641A/VA	A	0.010	µg/L	<0.300 DLQ	----	----	----	----
Acridine	260-94-6	E641A/VA	A	0.010	µg/L	<0.270 DLCI	----	----	----	----
Anthracene	120-12-7	E641A/VA	A	0.010	µg/L	<0.220 DLQ	----	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	A	0.0050	µg/L	<0.0050	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA		0.015	µg/L	<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Chrysene	218-01-9	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	A	0.0050	µg/L	<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A/VA	A	0.010	µg/L	0.147	----	----	----	----
Fluorene	86-73-7	E641A/VA	A	0.010	µg/L	2.36	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	A	0.010	µg/L	18.1	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	A	0.010	µg/L	0.052	----	----	----	----
Naphthalene	91-20-3	E641A/VA	A	0.050	µg/L	<0.600 DLCI	----	----	----	----
Phenanthrene	85-01-8	E641A/VA	A	0.020	µg/L	1.40	----	----	----	----
Pyrene	129-00-0	E641A/VA	A	0.010	µg/L	0.098	----	----	----	----
Quinoline	91-22-5	E641A/VA	A	0.050	µg/L	<2.25 DLQ	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA		0.010	µg/L	<0.010	----	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA		0.030	µg/L	0.245	----	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA		0.060	µg/L	7.17	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A/VA		0.065	µg/L	7.42	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA		0.1	%	70.2	----	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA		0.1	%	87.2	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA		0.1	%	107	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9018**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Issue Date	: 28-Aug-2023 09:14
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-1B	E421	16-Aug-2023	18-Aug-2023	180 days	2 days	✓	19-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-8	E421	16-Aug-2023	18-Aug-2023	180 days	2 days	✓	19-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW03-05	E421	16-Aug-2023	18-Aug-2023	180 days	2 days	✓	19-Aug-2023	180 days	3 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-03	E601A	16-Aug-2023	24-Aug-2023	14 days	7 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-4B	E601A	16-Aug-2023	24-Aug-2023	14 days	7 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-01	E601A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1MW02-02	E601A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-05	E601A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A1MW02-01	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A1MW02-02	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A1MW02-03	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G1-4B	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW03-05	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
A1MW02-03	E641A	16-Aug-2023	24-Aug-2023	14 days	7 days	✓	25-Aug-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
A1MW02-01	E641A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
A1MW02-02	E641A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-05	E641A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A1MW02-01	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A1MW02-02	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A1MW02-03	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-4B	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-05	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1090616	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1100779	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1090616	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1100780	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1100779	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1090616	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1100780	1	9	11.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1090616	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9018**	Page	: 1 of 7
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Date Analysis Commenced	: 18-Aug-2023
C-O-C number	: ----	Issue Date	: 28-Aug-2023 09:14
Sampler	: RS+AGE 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1090616)											
VA23B8982-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1100262)											
VA23B9474-023	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1100263)											
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1090616)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 1100262)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1100263)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1100779)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1100780)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1100780) - continued						
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.0	80.0	120	----
Volatile Organic Compounds (QCLot: 1100262)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	111	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	116	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 1100263)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	88.9	70.0	130	----
Hydrocarbons (QCLot: 1100779)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	116	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	112	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1100780)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	113	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	113	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1100780) - continued									
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	103	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	116	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	107	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 1090616)										
VA23B8982-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0906 mg/L	0.1 mg/L	90.6	70.0	130	----
Volatile Organic Compounds (QCLot: 1100262)										
VA23B9360-002	Anonymous	Benzene	71-43-2	E611A	94.3 µg/L	100 µg/L	94.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.5 µg/L	100 µg/L	98.5	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Toluene	108-88-3	E611A	ND µg/L	100 µg/L	ND	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	ND µg/L	200 µg/L	ND	60.0	140	----
		Xylene, o-	95-47-6	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
Hydrocarbons (QCLot: 1100263)										
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5600 µg/L	6310 µg/L	88.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division
Vancouver
Work Order Reference
VA23B9018

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report	Reports / Recipients		Turnaround Time (TAT) Requested
Company:	AECOM Canada Ltd.	Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Johnny Au	Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minin
Phone:	604-444-6400	☑ Compare Results to Criteria on Report - provide details below if box checked		☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge mini
	Company address below will appear on the final report	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge mini
Street:	3292 Production Way	Email 1 or Fax	johnny.au@aecom.com	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge mini
City/Province:	Burnaby, BC	Email 2	alberto.garciaespinosa@aecom.com	☐ Same day [E2] if received by 10am M-S - 200% rush surcharg
Postal Code:	V5A 4R4	Email 3	raymund.sampaga@aecom.com	fees may apply to rush requests on weekends, statutory holiday
Invoice To	Same as Report To ☐ YES ☑ NO	Invoice Recipients		routine tests
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs:
Company:	Parkland Refinery (B.C.) Ltd.	Email 1 or Fax	christopher.boys@parkland.ca	For all tests with rush TATs requested, pleai
Contact:	Christopher Boys	Email 2	johnny.au@aecom.com	Analysis

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): B9018 | ALS Contact: Dean Watt | Sampler:

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE	EPH	PAHs (including total PAHs)	LEPH/HEPH	Dissolved Metals(including hardness)	Dissolved Lead	Hardness	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
					Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	P	P	P	P	F	F	F			
	G1-1B	16-Aug-23	12:17	GW	1						X	X			
	G1-8	↓	12:30	GW	1						X	X			
	A1MW02-01		13:46		4	X		X	X						
	A1MW02-02		13:38		4	X		X	X						
	A1MW02-03		14:40		4	X		X	X						
	~~A1~~ MW03-05		14:25	↓	5	X		X	X		X	X			
	G1-4B	↓	15:38	↓	4	X	X								

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				3			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: Aug. 16, 2023	Time: 1630	Received by:	Date:	Time:	Received by:	Date: Aug 16	Time: 1933

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9019**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Date Analysis Commenced	: 23-Aug-2023
C-O-C number	: ----	Issue Date	: 25-Aug-2023 13:04
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: G1-1B	G1-8	----	----	----
						Client sampling date / time: 16-Aug-2023 12:17	16-Aug-2023 12:30	----	----	----
						VA23B9019-001	VA23B9019-002	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L	<0.50	2.19	----	----	----
Styrene	100-42-5	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	A	0.50	µg/L	<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L	<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L	<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L	<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	A	250	µg/L	<250	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	A	250	µg/L	<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L	<100	<100	----	----	----
VPHw	----	EC580A/VA		100	µg/L	<100	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%	86.7	91.0	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%	94.1	95.2	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%	92.7	92.0	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%	99.8	99.0	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9019**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Issue Date	: 25-Aug-2023 13:05
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1B	E601A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-8	E601A	16-Aug-2023	24-Aug-2023	14 days	8 days	✓	25-Aug-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1B	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-8	E581.VH+F1	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-1B	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-8	E611A	16-Aug-2023	23-Aug-2023	14 days	7 days	✓	23-Aug-2023	14 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1100779	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1100779	1	15	6.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9019**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 16-Aug-2023 16:30
PO	: 573161	Date Analysis Commenced	: 23-Aug-2023
C-O-C number	: ----	Issue Date	: 25-Aug-2023 13:04
Sampler	: RS+AGE 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1100262)											
VA23B9474-023	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1100263)											
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1100262)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1100263)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1100779)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1100262)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	111	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	116	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 1100263)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	88.9	70.0	130	----
Hydrocarbons (QCLot: 1100779)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	116	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	112	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1100262)										
VA23B9360-002	Anonymous	Benzene	71-43-2	E611A	94.3 µg/L	100 µg/L	94.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.5 µg/L	100 µg/L	98.5	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Toluene	108-88-3	E611A	ND µg/L	100 µg/L	ND	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	ND µg/L	200 µg/L	ND	60.0	140	----
		Xylene, o-	95-47-6	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
Hydrocarbons (QCLot: 1100263)										
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5600 µg/L	6310 µg/L	88.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Environmental Division Vancouver
Work Order Reference
VA23B9019

Telephone : + 1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimu
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimu
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimu
Same day [E2] if received by 10am M-S - 200% rush surcharge
☐ fees may apply to rush requests on weekends, statutory holidays a routine tests
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please

Project Information	
ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B9019

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Re

Indicate Filtered (F), Preserved (P) or Filtered &

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P BTEX/Styrene/VPH/MTBE	P EPH	P PAHs (including total PAHs)	P LEPH/HEPH	F Dissolved Metals(including hardness)	SAMPLES ON HOLD	EXTENDED STORAGE REQUI	SUSPECTED HAZARD (see nc
	G1-1B	16-Aug-23	12:17	GW	4	X	X						
	G1-8	↓	12:30	GW	4	X	X						

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)					
Cooling Method:	☐ NONE	☐ ICE	☑ ICE PACKS	☐ FROZEN	☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification:	☐ YES	☐ NO			
Cooler Custody Seals Intact:	☐ YES	☐ N/A	Sample Custody Seals Intact:	☐ YES	☐ N/A
INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			2		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: Aug-16, 2023	Time: 16:30	Received by:	Date:	Time:	Received by:	Date: Aug 16	Time: 4:32pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2023 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9442**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 15:54
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW03-08	MW03-09	----	----	----
					Client sampling date / time	21-Aug-2023 16:12	21-Aug-2023 15:44	----	----	----
						VA23B9442-001	VA23B9442-002	--------	--------	--------
						Result	Result	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		0.55	<0.50	----	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	----	----	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		96.5	90.8	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		104	112	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		91.8	90.9	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		100	100	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	0.017	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	----	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW03-08	MW03-09	----	----	----
					Client sampling date / time	21-Aug-2023 16:12	21-Aug-2023 15:44	----	----	----
						VA23B9442-001	VA23B9442-002	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	0.018	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	0.018	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		<0.010	0.021	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	<0.050	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	----	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		<0.030	<0.030	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.060	<0.060	----	----	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		<0.065	<0.065	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		88.5	90.8	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		97.0	99.0	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		104	106	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

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right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9442**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Issue Date	: 31-Aug-2023 15:54
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-08	E601A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-09	E601A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW03-08	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW03-09	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-08	E641A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-09	E641A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-08	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-09	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1112570	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1112571	1	7	14.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1112570	1	11	9.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1112571	1	7	14.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9442**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 15:54
Sampler	: RS+AGE 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1111464)											
VA23B9442-001	MW03-08	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	0.55	0.53	0.02	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1111463)											
VA23B9442-001	MW03-08	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1111464)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1111463)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1112570)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1112571)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1112571) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1111464)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 1111463)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	80.1	70.0	130	----
Hydrocarbons (QCLot: 1112570)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	113	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	108	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1112571)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.63758 µg/L	99.1	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.57755 µg/L	107	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.61128 µg/L	102	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.68755 µg/L	102	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.59923 µg/L	94.2	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.65973 µg/L	94.2	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.74155 µg/L	94.0	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.68759 µg/L	103	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.68742 µg/L	95.5	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5789 µg/L	96.0	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.66288 µg/L	100	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.67796 µg/L	100	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.58095 µg/L	106	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.68993 µg/L	102	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.6292 µg/L	99.4	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.63756 µg/L	100	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.58909 µg/L	97.8	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.66932 µg/L	102	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1112571) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.6455 µg/L	99.3	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.56433 µg/L	113	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 1111464)										
VA23B9442-001	MW03-08	Benzene	71-43-2	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.6 µg/L	100 µg/L	98.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	94.0 µg/L	100 µg/L	94.0	60.0	140	----
		Toluene	108-88-3	E611A	98.0 µg/L	100 µg/L	98.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	209 µg/L	200 µg/L	104	60.0	140	----
		Xylene, o-	95-47-6	E611A	98.1 µg/L	100 µg/L	98.1	60.0	140	----
Hydrocarbons (QCLot: 1111463)										
VA23B9442-002	MW03-09	VHw (C6-C10)	----	E581.VH+F1	4870 µg/L	6310 µg/L	77.2	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax johnny.au@aecom.com

Email 2 alberto.garciaespinosa@aecom.com

Email 3 raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax christopher.boys@parkland.ca

Email 2 johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:

Job #: 60704333 / 15402

PO / AFE: ~~573161~~ 5737161

LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only): B6442

ALS Contact: Dean Watt

Sampler: RS+AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	PLES ON HOLD	NDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW03-08	21-Aug-23	16:12	GW	4	X		X	X				
	MW03-09	↓	15:44	↓	4	X		X	X				

Environmental Division
Vancouver
Work Order Reference
VA23B9442

Telephone : + 1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to invoice recipient list.

BC CSR

Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INIITIAL COOLER TEMPERATURES °C

FINAL COOLER TEMPERATURES °C 14

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: [signature]	Date: Aug-21, 2023	Time: 17:30	Received by:	Date:	Time:	Received by: RJ	Date: Aug-21	Time: 17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRCNT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9466**	Page	: 1 of 11
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 22-Aug-2023
C-O-C number	: ----	Issue Date	: 07-Sep-2023 11:59
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 15		
No. of samples analysed	: 15		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Harsha Attanayake	Laboratory Analyst	Organics, Burnaby, British Columbia
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Miles Gropen	Department Manager - Inorganics	Inorganics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Client ID updated.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*
SLMI	*Surrogate recovery was outside ALS DQO (Low) due to Matrix Interference*
SMI	*Surrogate recovery could not be measured due to sample matrix interference.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A3MW02-05	A3MW02-06	A3MW02-07	A3MW02-08	DUP-02
					Client sampling date / time	21-Aug-2023 12:38	21-Aug-2023 11:37	21-Aug-2023 10:45	21-Aug-2023 10:02	21-Aug-2023 10:02
						VA23B9466-001	VA23B9466-002	VA23B9466-003	VA23B9466-004	VA23B9466-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	1.08	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	150	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A/VA	100	µg/L		<100	150	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		86.1	90.6	89.0	88.3	90.6
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		72.5	112	104	102	86.8
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		86.1	88.8	90.8	89.9	87.6
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		99.6	97.3	100	102	99.7
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		0.395	3.40	15.5	2.91	2.94
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	0.052	0.037	0.012	0.011
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.043 DLCI	<0.059 DLCI	<0.037 DLCI	<0.024 DLCI	<0.025 DLCI
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.072 DLQ	0.131	0.100	0.097
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A3MW02-05	A3MW02-06	A3MW02-07	A3MW02-08	DUP-02
					Client sampling date / time	21-Aug-2023 12:38	21-Aug-2023 11:37	21-Aug-2023 10:45	21-Aug-2023 10:02	21-Aug-2023 10:02
						VA23B9466-001	VA23B9466-002	VA23B9466-003	VA23B9466-004	VA23B9466-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		0.026	0.167	0.832	0.278	0.264
Fluorene	86-73-7	E641A/VA	0.010	µg/L		0.014	1.09	7.39	1.30	1.30
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		0.013	2.00	0.039	0.455	0.460
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		<0.010	0.041	<0.010	0.214	0.215
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	<0.730 DLQ	<0.050	6.06	6.14
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		0.033	0.205	0.046	0.129	0.124
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.030	0.112	0.414	0.196	0.184
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<1.15 DLQ	<0.250 DLQ	<0.055 DLQ	<0.055 DLQ
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		0.056	0.279	1.25	0.474	0.448
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		0.442	4.75	23.1	10.5	10.6
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		0.498	5.03	24.4	11.0	11.1
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		85.8	97.2	74.2	94.7	102
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		95.0	95.8	96.5	110	113
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		105	108	103	114	118

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A3MW03-01	A3MW03-02	DUP-03	MW03-04	U7
					Client sampling date / time	21-Aug-2023 13:15	21-Aug-2023 13:10	21-Aug-2023 13:10	21-Aug-2023 12:00	21-Aug-2023 14:50
						VA23B9466-006	VA23B9466-007	VA23B9466-008	VA23B9466-009	VA23B9466-010
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	84.3	83.6	6.32	<0.50
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	0.62	0.60	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	1.75	1.67	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.60 DLQ	<0.60 DLQ	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	1.75	1.67	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	640	670	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	620	580	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		----	<250	<250	<250	<250
LEPHw	----	EC600A/VA	250	µg/L		----	640	660	<250	<250
VPHw	----	EC580A/VA	100	µg/L		<100	620	580	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		90.2	86.8	90.6	86.3	90.0
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		113	89.8	80.2	105	108
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		91.3	99.2	98.0	92.1	91.8
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		101	90.5	92.4	100	99.8
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		----	2.27	2.24	0.034	<0.010
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		----	0.229	0.207	<0.010	<0.010
Acridine	260-94-6	E641A/VA	0.010	µg/L		----	<0.055 DLCI	<0.051 DLCI	<0.023 DLCI	<0.010
Anthracene	120-12-7	E641A/VA	0.010	µg/L		----	<0.039 DLQ	<0.036 DLQ	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		----	<0.0050	<0.0050	<0.0050	<0.0050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A3MW03-01	A3MW03-02	DUP-03	MW03-04	U7
					Client sampling date / time	21-Aug-2023 13:15	21-Aug-2023 13:10	21-Aug-2023 13:10	21-Aug-2023 12:00	21-Aug-2023 14:50
						VA23B9466-006	VA23B9466-007	VA23B9466-008	VA23B9466-009	VA23B9466-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		----	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		----	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		----	<0.014 DLQ	<0.014 DLQ	0.017	<0.010
Fluorene	86-73-7	E641A/VA	0.010	µg/L		----	2.05	2.02	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		----	31.6	29.1	0.012	<0.010
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		----	0.212	0.136	<0.010	<0.010
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		----	<1.15 DLQ	<1.15 DLQ	<0.050	<0.050
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		----	0.332	0.332	0.029	<0.020
Pyrene	129-00-0	E641A/VA	0.010	µg/L		----	0.011	0.012	0.019	<0.010
Quinoline	91-22-5	E641A/VA	0.050	µg/L		----	<2.30 DLQ	<2.15 DLQ	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		----	<0.031	<0.031	0.036	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		----	4.88	4.80	0.063	<0.060
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		----	4.89	4.81	0.099	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		----	78.9	84.6	84.5	76.5
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		----	88.8	94.1	96.2	99.4
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		----	101	105	112	114

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U07-10S	U07-10I	U07-10D	MW03-07	Travel Blank-2
					Client sampling date / time	21-Aug-2023 10:35	21-Aug-2023 12:29	21-Aug-2023 11:58	21-Aug-2023 15:38	21-Aug-2023 16:30
						VA23B9466-011	VA23B9466-012	VA23B9466-013	VA23B9466-014	VA23B9466-015
						Result	Result	Result	Result	Result
Physical Tests										
pH	----	E108/VA	0.10	pH units		6.25	----	----	----	----
Volatile Organic Compounds										
Butylbenzene, n-	104-51-8	E611H/VA	1.0	µg/L		<1.5 DLCI	----	----	----	----
Butylbenzene, sec-	135-98-8	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Butylbenzene, tert-	98-06-6	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		31.2	<0.50	<0.75 DLQ	<0.50	<0.50
Butadiene, 1,3-	106-99-0	E611H/VA	0.20	µg/L		<0.20	----	----	----	----
Decane, n-	124-18-5	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Dibromoethane, 1,2-	106-93-4	E611H/VA	0.20	µg/L		<0.20	----	----	----	----
Dichloroethane, 1,2-	107-06-2	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		25.9	<0.50	<0.50	<0.50	<0.50
Hexane, n-	110-54-3	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Isopropylbenzene	98-82-8	E611H/VA	1.0	µg/L		1.8	----	----	----	----
Methylcyclohexane	108-87-2	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		515	41.9	39.9	5.13	<0.50
Nonane, n-	111-84-2	E611H/VA	1.0	µg/L		<1.0	----	----	----	----
Propylbenzene, n-	103-65-1	E611H/VA	1.0	µg/L		1.3	----	----	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		10.2	0.70	0.57	<0.50	<0.50
Trimethylbenzene, 1,2,4-	95-63-6	E611H/VA	1.0	µg/L		26.8	----	----	----	----
Trimethylbenzene, 1,3,5-	108-67-8	E611H/VA	1.0	µg/L		7.7	----	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		21.3	2.82	1.82	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		11.2	0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		32.5	3.12	1.82	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		18000	430	280	<250	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		380	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		210	300	230	<100	<100

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U07-10S	U07-10I	U07-10D	MW03-07	Travel Blank-2
					Client sampling date / time	21-Aug-2023 10:35	21-Aug-2023 12:29	21-Aug-2023 11:58	21-Aug-2023 15:38	21-Aug-2023 16:30
						VA23B9466-011	VA23B9466-012	VA23B9466-013	VA23B9466-014	VA23B9466-015
						Result	Result	Result	Result	Result
Hydrocarbons										
HEPHw	----	EC600A/VA	250	µg/L		310	<250	<250	<250	----
LEPHw	----	EC600A/VA	250	µg/L		9240	420	<250	<250	----
VPHw	----	EC580A/VA	100	µg/L		110	300	230	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		95.2	89.2	92.3	93.2	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		90.7	111	108	107	120
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		94.5	97.8	96.0	88.9	91.9
Bromofluorobenzene, 4-	460-00-4	E611H/VA	1.0	%		94.5	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		99.5	94.2	94.8	101	99.6
Difluorobenzene, 1,4-	540-36-3	E611H/VA	1.0	%		99.5	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		692	10.8	37.7	0.138	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		6.19	0.072	0.104	<0.010	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<970 DLQ	<0.038 DLCI	<0.031 DLCI	0.019	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<18.6 DLQ	<0.086 DLQ	0.100	<0.010	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<24.5 DLQ	0.067	<0.010	<0.010	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		0.816	0.0260	<0.0050	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		1.00	0.031	<0.010	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		1.50	0.050	<0.015	<0.015	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		0.116	<0.010	<0.010	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		0.505	0.019	<0.010	<0.010	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		1.68	<0.048 DLCI	<0.010	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		0.0344	<0.0050	<0.0050	<0.0050	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		38.3	0.390	0.131	<0.010	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		247	2.66	10.3	0.289	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		0.167	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		334	8.78	6.44	0.013	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		655	1.12	0.320	<0.010	----

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U07-10S	U07-10I	U07-10D	MW03-07	Travel Blank-2
					Client sampling date / time	21-Aug-2023 10:35	21-Aug-2023 12:29	21-Aug-2023 11:58	21-Aug-2023 15:38	21-Aug-2023 16:30
						VA23B9466-011	VA23B9466-012	VA23B9466-013	VA23B9466-014	VA23B9466-015
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		7520	<2.25 DLQ	<0.910 DLQ	<0.050	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		299	0.847	0.328	<0.020	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		26.2	0.318	0.073	<0.010	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<3.90 DLCI	<1.60 DLQ	<0.900 DLQ	<0.050	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		2.26	0.041	<0.010	<0.010	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		68.8	0.851	0.204	<0.030	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		8760	14.4	48.5	0.427	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		8830	15.2	48.7	0.427	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		----	62.6	79.8	86.9	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		Not Determined SMI	95.7	96.9	99.6	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		86.7	106	108	111	----
Chlorinated Hydrocarbons										
Hexachlorobenzene	118-74-1	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Hexachlorobutadiene	87-68-3	E660A/WT	0.050	µg/L		<0.050	----	----	----	----
Hexachlorocyclopentadiene	77-47-4	E660A/WT	0.050	µg/L		<0.050	----	----	----	----
Hexachloroethane	67-72-1	E660A/WT	0.050	µg/L		<0.050	----	----	----	----
Octachlorostyrene	29082-74-4	E660A/WT	0.050	µg/L		<0.050	----	----	----	----
Pentachlorobenzene	608-93-5	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Trichlorobenzene, 1,2,3-	87-61-6	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Trichlorobenzene, 1,2,4-	120-82-1	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Trichlorobenzene, 1,3,5-	108-70-3	E660A/WT	0.010	µg/L		<0.010	----	----	----	----
Trichlorotoluene, 2,4,5-	6639-30-1	E660A/WT	0.050	µg/L		<0.050	----	----	----	----
Chlorinated Hydrocarbons Surrogates										
Decachlorobiphenyl	2051-24-3	E660A/WT	0.1	%		36.6 SLMI	----	----	----	----
Tetrachloro-m-xylene	877-09-8	E660A/WT	0.1	%		86.3	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U07-10S	U07-10I	U07-10D	MW03-07	Travel Blank-2
					Client sampling date / time	21-Aug-2023 10:35	21-Aug-2023 12:29	21-Aug-2023 11:58	21-Aug-2023 15:38	21-Aug-2023 16:30
						VA23B9466-011	VA23B9466-012	VA23B9466-013	VA23B9466-014	VA23B9466-015
						Result	Result	Result	Result	Result
Chlorinated Phenolics										
Chlorophenol, 2-	95-57-8	E651A/VA	0.050	µg/L		<2.25 DLQ	----	----	----	----
Chlorophenol, 3-	108-43-0	E651A/VA	0.050	µg/L		71.7	----	----	----	----
Chlorophenol, 4-	106-48-9	E651A/VA	0.050	µg/L		0.665	----	----	----	----
Dichlorophenol, 2,3-	576-24-9	E651A/VA	0.050	µg/L		2.94	----	----	----	----
Dichlorophenol, 2,4- + 2,5-	----	E651A/VA	0.050	µg/L		11.0	----	----	----	----
Dichlorophenol, 2,6-	87-65-0	E651A/VA	0.050	µg/L		<0.377 DLCI	----	----	----	----
Dichlorophenol, 3,4-	95-77-2	E651A/VA	0.050	µg/L		11.3	----	----	----	----
Dichlorophenol, 3,5-	591-35-5	E651A/VA	0.050	µg/L		8.92	----	----	----	----
Methylphenol, 4-chloro-3-	59-50-7	E651A/VA	0.50	µg/L		<0.50	----	----	----	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A/VA	0.10	µg/L		<0.38 DLCI	----	----	----	----
Trichlorophenol, 2,3,5-	933-78-8	E651A/VA	0.10	µg/L		16.1	----	----	----	----
Trichlorophenol, 2,3,6-	933-75-5	E651A/VA	0.10	µg/L		<0.38 DLCI	----	----	----	----
Trichlorophenol, 2,4,5-	95-95-4	E651A/VA	0.10	µg/L		2.14	----	----	----	----
Trichlorophenol, 2,4,6-	88-06-2	E651A/VA	0.10	µg/L		<0.38 DLCI	----	----	----	----
Trichlorophenol, 3,4,5-	609-19-8	E651A/VA	0.10	µg/L		3.68	----	----	----	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A/VA	0.10	µg/L		0.75	----	----	----	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A/VA	0.10	µg/L		<0.38 DLCI	----	----	----	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A/VA	0.10	µg/L		3.38	----	----	----	----
Pentachlorophenol [PCP]	87-86-5	E651A/VA	0.10	µg/L		0.42	----	----	----	----
Non-Chlorinated Phenolics										
Dimethylphenol, 2,4-	105-67-9	E651A/VA	0.50	µg/L		324	----	----	----	----
Dinitrophenol, 2,4-	51-28-5	E651H/VA	1.0	µg/L		<4.6 DLCI	----	----	----	----
Methylphenol, 2-	95-48-7	E651A/VA	0.50	µg/L		<634 DLQ	----	----	----	----
Methylphenol, 3-	108-39-4	E651A/VA	0.50	µg/L		140	----	----	----	----
Methylphenol, 4-	106-44-5	E651A/VA	0.50	µg/L		52.0	----	----	----	----
Nitrophenol, 2-	88-75-5	E651H/VA	1.0	µg/L		<4.6 DLCI	----	----	----	----
Nitrophenol, 4-	100-02-7	E651H/VA	1.0	µg/L		<4.6 DLCI	----	----	----	----
Phenol	108-95-2	E651A/VA	1.00	µg/L		12.7	----	----	----	----
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H/VA	1.0	µg/L		<4.6 DLCI	----	----	----	----
Phenolics Surrogates										

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	U07-10S	U07-10I	U07-10D	MW03-07	Travel Blank-2
					Client sampling date / time	21-Aug-2023 10:35	21-Aug-2023 12:29	21-Aug-2023 11:58	21-Aug-2023 15:38	21-Aug-2023 16:30
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9466-011	VA23B9466-012	VA23B9466-013	VA23B9466-014	VA23B9466-015
						Result	Result	Result	Result	Result
Phenolics Surrogates										
Chlorophenol-d4, 2-	93951-73-6	E651A/VA	0.1	%		98.8	----	----	----	----
Dichlorophenol-d3, 2,4-	93951-74-7	E651A/VA	0.1	%		72.4	----	----	----	----
Tribromophenol, 2,4,6-	118-79-6	E651A/VA	0.1	%		71.4	----	----	----	----
Tribromophenol, 2,4,6-	118-79-6	E651H/VA	1.0	%		100	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9466**	Page	: 1 of 14
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Issue Date	: 07-Sep-2023 12:00
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 15		
No. of samples analysed	: 15		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Chlorinated Hydrocarbons Surrogates	VA23B9466-011	U07-10S	Decachlorobiphenyl	2051-24-3	36.6 %	40.0-130 %	Recovery less than lower data quality objective

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Chlorinated Hydrocarbons : Neutral Extractable Chlorinated Hydrocarbons by GC-MS										
Amber glass/Teflon lined cap U07-10S	E660A	21-Aug-2023	24-Aug-2023	7 days	3 days	✓	29-Aug-2023	7 days	8 days	✓
Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651A	21-Aug-2023	22-Aug-2023	14 days	1 days	✓	24-Aug-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-05	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-06	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-07	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-08	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-01	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-02	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-02	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-03	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-04	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10D	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10I	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E601A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-07	E601A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U7	E601A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-05	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-06	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-07	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW02-08	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW03-01	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A3MW03-02	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-02	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-03	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-04	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW03-07	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-2	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U07-10D	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U07-10I	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U7	E581.VH+F1	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Non-Chlorinated Phenolics : Phenolics (Nitrophenols) by GC-ECD										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651H	21-Aug-2023	22-Aug-2023	14 days	1 days	✓	24-Aug-2023	40 days	2 days	✓
Non-Chlorinated Phenolics : Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10S	E651A	21-Aug-2023	22-Aug-2023	14 days	1 days	✓	24-Aug-2023	40 days	2 days	✓
Physical Tests : pH by Meter										
HDPE U07-10S	E108	21-Aug-2023	30-Aug-2023	0.25 hrs	217 hrs	× EHTR-FM	30-Aug-2023	0.25 hrs	225 hrs	× EHTR-FM

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-05	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-06	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-07	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW02-08	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A3MW03-02	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-02	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-03	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW03-04	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U07-10D	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10I	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10S	E641A	21-Aug-2023	31-Aug-2023	14 days	10 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-07	E641A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U7	E641A	21-Aug-2023	31-Aug-2023	14 days	9 days	✓	31-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds : VOCs (Regular Full + BC Special List) by Headspace GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10S	E611H	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW02-05	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW02-06	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW02-07	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW02-08	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW03-01	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A3MW03-02	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-02	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-03	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-04	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-07	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Travel Blank-2	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10D	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U07-10I	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10S	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U7	E611A	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : VOCs (Regular Full + BC Special List) by Headspace GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
U07-10S	E611H	21-Aug-2023	30-Aug-2023	14 days	9 days	✓	30-Aug-2023	14 days	9 days	✓

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
pH by Meter	E108	1111364	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	1111465	1	1	100.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1112573	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A	1102855	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1112574	1	15	6.6	5.0	✓
pH by Meter	E108	1111364	1	19	5.2	5.0	✓
Phenolics (Nitrophenols) by GC-ECD	E651H	1098306	1	2	50.0	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	1098305	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	1111465	1	1	100.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1112573	1	17	5.8	5.0	✓
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A	1102855	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1112574	1	15	6.6	5.0	✓
Phenolics (Nitrophenols) by GC-ECD	E651H	1098306	1	2	50.0	5.0	✓
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A	1098305	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	1111465	1	1	100.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1111464	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1111463	1	17	5.8	5.0	✓
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H	1111465	1	1	100.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter	E108 ALS Environmental - Vancouver	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VOCs (Regular Full + BC Special List) by Headspace GC-MS	E611H ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Phenolics (Western Canada List, No Nitro-Phenols) by GC-MS	E651A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Phenolics are analyzed by GC-MS.
Phenolics (Nitrophenols) by GC-ECD	E651H ALS Environmental - Vancouver	Water	EPA 8041A (mod)	Phenolics are analyzed by GC-ECD.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Neutral Extractable Chlorinated Hydrocarbons by GC-MS	E660A ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Chlorinated Hydrocarbons are analyzed by GC-MS.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
Phenolics Extraction	EP651 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Phenolics are extracted from acidic aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9466**	Page	: 1 of 10
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 21-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 22-Aug-2023
C-O-C number	: ----	Issue Date	: 07-Sep-2023 12:00
Sampler	: RS+AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 15		
No. of samples analysed	: 15		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Harsha Attanayake	Laboratory Analyst	Vancouver Organics, Burnaby, British Columbia
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Miles Gropen	Department Manager - Inorganics	Vancouver Inorganics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1111364)											
KS2303215-001	Anonymous	pH	----	E108	0.10	pH units	8.40	8.40	0.00%	4%	----
Volatile Organic Compounds (QC Lot: 1111464)											
VA23B9442-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	0.55	0.53	0.02	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1111465)											
VA23B9466-011	U07-10S	Butadiene, 1,3-	106-99-0	E611H	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Butylbenzene, n-	104-51-8	E611H	1.5	µg/L	<1.5	<1.5	0	Diff <2x LOR	----
		Butylbenzene, sec-	135-98-8	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Butylbenzene, tert-	98-06-6	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Decane, n-	124-18-5	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dibromoethane, 1,2-	106-93-4	E611H	0.20	µg/L	<0.20	<0.20	0	Diff <2x LOR	----
		Dichloroethane, 1,2-	107-06-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Hexane, n-	110-54-3	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Isopropylbenzene	98-82-8	E611H	1.0	µg/L	1.8	1.8	0.08	Diff <2x LOR	----
		Methylcyclohexane	108-87-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Nonane, n-	111-84-2	E611H	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Propylbenzene, n-	103-65-1	E611H	1.0	µg/L	1.3	1.4	0.1	Diff <2x LOR	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611H	1.0	µg/L	26.8	28.7	6.68%	30%	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611H	1.0	µg/L	7.7	8.2	6.94%	30%	----
Hydrocarbons (QC Lot: 1111463)											
VA23B9442-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1111464)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 1111465)						
Butadiene, 1,3-	106-99-0	E611H	0.2	µg/L	<0.20	----
Butylbenzene, n-	104-51-8	E611H	1	µg/L	<1.0	----
Butylbenzene, sec-	135-98-8	E611H	1	µg/L	<1.0	----
Butylbenzene, tert-	98-06-6	E611H	1	µg/L	<1.0	----
Decane, n-	124-18-5	E611H	1	µg/L	<1.0	----
Dibromoethane, 1,2-	106-93-4	E611H	0.2	µg/L	<0.20	----
Dichloroethane, 1,2-	107-06-2	E611H	1	µg/L	<1.0	----
Hexane, n-	110-54-3	E611H	1	µg/L	<1.0	----
Isopropylbenzene	98-82-8	E611H	1	µg/L	<1.0	----
Methylcyclohexane	108-87-2	E611H	1	µg/L	<1.0	----
Nonane, n-	111-84-2	E611H	1	µg/L	<1.0	----
Propylbenzene, n-	103-65-1	E611H	1	µg/L	<1.0	----
Trimethylbenzene, 1,2,4-	95-63-6	E611H	1	µg/L	<1.0	----
Trimethylbenzene, 1,3,5-	108-67-8	E611H	1	µg/L	<1.0	----
Hydrocarbons (QCLot: 1111463)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1112573)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1112574)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1112574) - continued						
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Chlorinated Hydrocarbons (QCLot: 1102855)						
Hexachlorobenzene	118-74-1	E660A	0.01	µg/L	<0.010	----
Hexachlorobutadiene	87-68-3	E660A	0.05	µg/L	<0.050	----
Hexachlorocyclopentadiene	77-47-4	E660A	0.05	µg/L	<0.050	----
Hexachloroethane	67-72-1	E660A	0.05	µg/L	<0.050	----
Octachlorostyrene	29082-74-4	E660A	0.05	µg/L	<0.050	----
Pentachlorobenzene	608-93-5	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A	0.01	µg/L	<0.010	----
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,2,3-	87-61-6	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,2,4-	120-82-1	E660A	0.01	µg/L	<0.010	----
Trichlorobenzene, 1,3,5-	108-70-3	E660A	0.01	µg/L	<0.010	----
Trichlorotoluene, 2,4,5-	6639-30-1	E660A	0.05	µg/L	<0.050	----
Chlorinated Phenolics (QCLot: 1098305)						
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	<0.050	----
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Chlorinated Phenolics (QCLot: 1098305) - continued						
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	<0.050	----
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	<0.050	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	<0.10	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	<0.10	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	<0.10	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	<0.10	----
Nitrogenated Phenolics (QCLot: 1098306)						
Dinitrophenol, 2,4-	51-28-5	E651H	1	µg/L	<1.0	----
Nitrophenol, 2-	88-75-5	E651H	1	µg/L	<1.0	----
Nitrophenol, 4-	100-02-7	E651H	1	µg/L	<1.0	----
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H	1	µg/L	<1.0	----
Non-Chlorinated Phenolics (QCLot: 1098305)						
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	<0.20	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	<0.50	----
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	<0.20	----
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	<0.20	----
Phenol	108-95-2	E651A	0.2	µg/L	<0.20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1111364)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Volatile Organic Compounds (QCLot: 1111464)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	105	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	101	70.0	130	----
Volatile Organic Compounds (QCLot: 1111465)									
Butadiene, 1,3-	106-99-0	E611H	0.2	µg/L	100 µg/L	78.8	60.0	140	----
Butylbenzene, n-	104-51-8	E611H	1	µg/L	100 µg/L	113	70.0	130	----
Butylbenzene, sec-	135-98-8	E611H	1	µg/L	100 µg/L	110	70.0	130	----
Butylbenzene, tert-	98-06-6	E611H	1	µg/L	100 µg/L	110	70.0	130	----
Decane, n-	124-18-5	E611H	1	µg/L	100 µg/L	129	70.0	130	----
Dibromoethane, 1,2-	106-93-4	E611H	0.2	µg/L	100 µg/L	90.6	70.0	130	----
Dichloroethane, 1,2-	107-06-2	E611H	1	µg/L	100 µg/L	97.8	70.0	130	----
Hexane, n-	110-54-3	E611H	1	µg/L	100 µg/L	108	70.0	130	----
Isopropylbenzene	98-82-8	E611H	1	µg/L	100 µg/L	106	70.0	130	----
Methylcyclohexane	108-87-2	E611H	1	µg/L	100 µg/L	109	70.0	130	----
Nonane, n-	111-84-2	E611H	1	µg/L	100 µg/L	119	70.0	130	----
Propylbenzene, n-	103-65-1	E611H	1	µg/L	100 µg/L	105	70.0	130	----
Trimethylbenzene, 1,2,4-	95-63-6	E611H	1	µg/L	100 µg/L	107	70.0	130	----
Trimethylbenzene, 1,3,5-	108-67-8	E611H	1	µg/L	100 µg/L	109	70.0	130	----
Hydrocarbons (QCLot: 1111463)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	80.1	70.0	130	----
Hydrocarbons (QCLot: 1112573)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	105	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	101	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1112574)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1112574) - continued									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	119	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	103	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	117	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	122	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	105	60.0	130	----
Chlorinated Hydrocarbons (QCLot: 1102855)									
Hexachlorobenzene	118-74-1	E660A	0.01	µg/L	0.2 µg/L	97.3	40.0	130	----
Hexachlorobutadiene	87-68-3	E660A	0.05	µg/L	0.2 µg/L	88.8	40.0	130	----
Hexachlorocyclopentadiene	77-47-4	E660A	0.05	µg/L	0.2 µg/L	113	40.0	130	----
Hexachloroethane	67-72-1	E660A	0.05	µg/L	0.2 µg/L	87.7	40.0	130	----
Octachlorostyrene	29082-74-4	E660A	0.05	µg/L	0.2 µg/L	123	40.0	130	----
Pentachlorobenzene	608-93-5	E660A	0.01	µg/L	0.2 µg/L	101	40.0	130	----
Tetrachlorobenzene, 1,2,3,4-	634-66-2	E660A	0.01	µg/L	0.2 µg/L	116	40.0	130	----
Tetrachlorobenzene, 1,2,3,5-	634-90-2	E660A	0.01	µg/L	0.2 µg/L	127	40.0	130	----
Tetrachlorobenzene, 1,2,4,5-	95-94-3	E660A	0.01	µg/L	0.2 µg/L	105	40.0	130	----
Trichlorobenzene, 1,2,3-	87-61-6	E660A	0.01	µg/L	0.2 µg/L	99.8	40.0	130	----
Trichlorobenzene, 1,2,4-	120-82-1	E660A	0.01	µg/L	0.2 µg/L	99.4	40.0	130	----
Trichlorobenzene, 1,3,5-	108-70-3	E660A	0.01	µg/L	0.2 µg/L	98.0	40.0	130	----
Trichlorotoluene, 2,4,5-	6639-30-1	E660A	0.05	µg/L	0.2 µg/L	114	40.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Chlorinated Phenolics (QCLot: 1098305)									
Chlorophenol, 2-	95-57-8	E651A	0.05	µg/L	2 µg/L	80.0	50.0	130	----
Chlorophenol, 3-	108-43-0	E651A	0.05	µg/L	2 µg/L	87.3	50.0	130	----
Chlorophenol, 4-	106-48-9	E651A	0.05	µg/L	2 µg/L	86.5	50.0	130	----
Dichlorophenol, 2,3-	576-24-9	E651A	0.05	µg/L	2 µg/L	86.1	50.0	130	----
Dichlorophenol, 2,4- + 2,5-	----	E651A	0.05	µg/L	4 µg/L	86.2	50.0	130	----
Dichlorophenol, 2,6-	87-65-0	E651A	0.05	µg/L	2 µg/L	85.3	50.0	130	----
Dichlorophenol, 3,4-	95-77-2	E651A	0.05	µg/L	2 µg/L	87.2	50.0	130	----
Dichlorophenol, 3,5-	591-35-5	E651A	0.05	µg/L	2 µg/L	87.2	50.0	130	----
Methylphenol, 4-chloro-3-	59-50-7	E651A	0.1	µg/L	2 µg/L	86.8	60.0	130	----
Pentachlorophenol [PCP]	87-86-5	E651A	0.1	µg/L	2 µg/L	88.2	60.0	130	----
Tetrachlorophenol, 2,3,4,5-	4901-51-3	E651A	0.1	µg/L	2 µg/L	86.4	60.0	130	----
Tetrachlorophenol, 2,3,4,6-	58-90-2	E651A	0.1	µg/L	2 µg/L	87.1	60.0	130	----
Tetrachlorophenol, 2,3,5,6-	935-95-5	E651A	0.1	µg/L	2 µg/L	86.0	60.0	130	----
Trichlorophenol, 2,3,4-	15950-66-0	E651A	0.1	µg/L	2 µg/L	86.5	50.0	130	----
Trichlorophenol, 2,3,5-	933-78-8	E651A	0.1	µg/L	2 µg/L	86.7	50.0	130	----
Trichlorophenol, 2,3,6-	933-75-5	E651A	0.1	µg/L	2 µg/L	85.9	50.0	130	----
Trichlorophenol, 2,4,5-	95-95-4	E651A	0.1	µg/L	2 µg/L	87.0	50.0	130	----
Trichlorophenol, 2,4,6-	88-06-2	E651A	0.1	µg/L	2 µg/L	86.8	50.0	130	----
Trichlorophenol, 3,4,5-	609-19-8	E651A	0.1	µg/L	2 µg/L	88.1	50.0	130	----
Nitrogenated Phenolics (QCLot: 1098306)									
Dinitrophenol, 2,4-	51-28-5	E651H	1	µg/L	5 µg/L	81.2	40.0	140	----
Nitrophenol, 2-	88-75-5	E651H	1	µg/L	5 µg/L	82.5	40.0	140	----
Nitrophenol, 4-	100-02-7	E651H	1	µg/L	5 µg/L	81.5	40.0	140	----
Phenol, 2-methyl-4,6-dinitro- [DNOC]	534-52-1	E651H	1	µg/L	5 µg/L	83.0	40.0	140	----
Non-Chlorinated Phenolics (QCLot: 1098305)									
Dimethylphenol, 2,4-	105-67-9	E651A	0.2	µg/L	2 µg/L	89.3	50.0	130	----
Methylphenol, 2-	95-48-7	E651A	0.5	µg/L	2 µg/L	107	50.0	130	----
Methylphenol, 3-	108-39-4	E651A	0.2	µg/L	2 µg/L	84.7	50.0	130	----
Methylphenol, 4-	106-44-5	E651A	0.2	µg/L	2 µg/L	88.2	50.0	130	----
Phenol	108-95-2	E651A	0.2	µg/L	2 µg/L	102	50.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1111464)										
VA23B9442-001	Anonymous	Benzene	71-43-2	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.6 µg/L	100 µg/L	98.6	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	94.0 µg/L	100 µg/L	94.0	60.0	140	----
		Toluene	108-88-3	E611A	98.0 µg/L	100 µg/L	98.0	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	209 µg/L	200 µg/L	104	60.0	140	----
		Xylene, o-	95-47-6	E611A	98.1 µg/L	100 µg/L	98.1	60.0	140	----
Volatile Organic Compounds (QCLot: 1111465)										
VA23B9466-011	U07-10S	Butadiene, 1,3-	106-99-0	E611H	82.0 µg/L	100 µg/L	82.0	60.0	140	----
		Butylbenzene, n-	104-51-8	E611H	108 µg/L	100 µg/L	108	60.0	140	----
		Butylbenzene, sec-	135-98-8	E611H	106 µg/L	100 µg/L	106	60.0	140	----
		Butylbenzene, tert-	98-06-6	E611H	104 µg/L	100 µg/L	104	60.0	140	----
		Decane, n-	124-18-5	E611H	124 µg/L	100 µg/L	124	60.0	140	----
		Dibromoethane, 1,2-	106-93-4	E611H	85.8 µg/L	100 µg/L	85.8	60.0	140	----
		Dichloroethane, 1,2-	107-06-2	E611H	91.1 µg/L	100 µg/L	91.1	60.0	140	----
		Hexane, n-	110-54-3	E611H	101 µg/L	100 µg/L	101	60.0	140	----
		Isopropylbenzene	98-82-8	E611H	100 µg/L	100 µg/L	100	60.0	140	----
		Methylcyclohexane	108-87-2	E611H	101 µg/L	100 µg/L	101	60.0	140	----
		Nonane, n-	111-84-2	E611H	113 µg/L	100 µg/L	113	60.0	140	----
		Propylbenzene, n-	103-65-1	E611H	98.4 µg/L	100 µg/L	98.4	60.0	140	----
		Trimethylbenzene, 1,2,4-	95-63-6	E611H	108 µg/L	100 µg/L	108	60.0	140	----
		Trimethylbenzene, 1,3,5-	108-67-8	E611H	106 µg/L	100 µg/L	106	60.0	140	----
Hydrocarbons (QCLot: 1111463)										
VA23B9442-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	4870 µg/L	6310 µg/L	77.2	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 2

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Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	~~57316T~~ 5737161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	
ALS Lab Work Order # (ALS use only):		ALS Contact: Dean Watt	Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	BC13 - Full phenolics pH (P)	E611H - VOCs BC List (P)	E660A - Chlorinated Hydrocarbons (P)	ES ON HOLD	D STORAGE REQUIRED	USPECTED HAZARD (see notes)
1	A3MW02-05	21-Aug-23	12:38	GW	4	X		X	X							
2	~~M~~ A3MW02-06		11:37			X		X	X							
3	A3MW02-07		10:45			X		X	X							
4	A3MW02-08		10:02			X		X	X							
5	DUP-02		10:02			X		X	X							
6	A3MW03-01		13:15			X	X									
7	A3MW03-02		13:10			X		X	X							
8	DUP-03		13:10			X		X	X							
9	MW03-04		12:00			X		X	X							
10	U7		14:50		✓	X		X	X							
11	U07-105		10:35		10	X		X	X		X	X	X			
12	U07-101		12:29		4	X		X	X							

Environmental Division
Vancouver
Work Order Reference
VA23B9466

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down.below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Include raymund.sampaga@aecom.com to invoice recipient list.
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Ryd2 Sagc	Date: Aug - 21, 2023	Time: 17:30	Received by:	Date:	Time:	Received by: RJ	Date: Aug - 21	Time: 17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 2 of 2

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~573161~~ 5737161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt Sampler: RS+AGE

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
13	UO7-10D	21-Aug-23	11:58	GW	4	X		X	X				
14	MW03-07	↓	15:38	↓	4	X		X	X				
15	TRAVEL BLANK-2	↓	16:30	↓	1	X							

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to invoice recipient list

BC CSR

Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Rod Boss	Aug. 21, 2023	17:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	Aug 21	17:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9542**	Page	: 1 of 4
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 22-Aug-2023 17:45
PO	: 5737161	Date Analysis Commenced	: 27-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 09:48
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample ID updated.

Qualifiers

Qualifier	*Description*
SUR-ND	*Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A1-7S	A1-11A	A1-11B	G1-3A	G1-3B
					Client sampling date / time	22-Aug-2023 13:07	22-Aug-2023 15:50	22-Aug-2023 15:38	22-Aug-2023 14:15	22-Aug-2023 14:24
						VA23B9542-001	VA23B9542-002	VA23B9542-003	VA23B9542-004	VA23B9542-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		2.30	<0.50	2.68	<0.50	12.1
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		<250	----	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		<250	----	----	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		89.7	82.6	83.5	84.4	82.8
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		111	122	114	108	138 SUR-ND
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		90.8	91.6	90.1	89.7	91.4
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		98.1	98.2	98.6	98.3	98.0
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		0.023	----	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		0.027	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		0.0314	----	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A1-7S	A1-11A	A1-11B	G1-3A	G1-3B
					Client sampling date / time	22-Aug-2023 13:07	22-Aug-2023 15:50	22-Aug-2023 15:38	22-Aug-2023 14:15	22-Aug-2023 14:24
						VA23B9542-001	VA23B9542-002	VA23B9542-003	VA23B9542-004	VA23B9542-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		0.034	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		0.047	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		0.028	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		0.013	----	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		0.037	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		0.0052	----	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		0.073	----	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		0.028	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		0.026	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.036	----	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		0.061	----	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		0.038	----	----	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.064	----	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		0.047	----	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		0.341	----	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		0.109	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		0.450	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		78.5	----	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		92.4	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		107	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9542**	Page	: 1 of 9
Amendment	: **1**		
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 22-Aug-2023 17:45
PO	: 5737161	Issue Date	: 31-Aug-2023 09:49
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Hydrocarbons Surrogates	VA23B9542-005	G1-3B	Dichlorotoluene, 3,4-	95-75-0	138 %	70.0-130 %	Recovery greater than upper data quality objective

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-11A	E601A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-11B	E601A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7S	E601A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-3A	E601A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-3B	E601A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-11A	E581.VH+F1	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-11B	E581.VH+F1	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-7S	E581.VH+F1	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-3A	E581.VH+F1	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-3B	E581.VH+F1	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7S	E641A	22-Aug-2023	29-Aug-2023	14 days	7 days	✓	29-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-11A	E611A	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-11B	E611A	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-7S	E611A	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-3A	E611A	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G1-3B	E611A	22-Aug-2023	27-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	6 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1106187	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1106186	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1108012	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1106187	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1108013	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1106186	1	19	5.2	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1108012	1	9	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1106187	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1108013	1	3	33.3	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1106186	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1106187	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1106186	1	19	5.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9542**	Page	: 1 of 6
Amendment	: **1**		
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 22-Aug-2023 17:45
PO	: 5737161	Date Analysis Commenced	: 27-Aug-2023
C-O-C number	: ----	Issue Date	: 31-Aug-2023 09:48
Sampler	: RS+AGE 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1106187)											
VA23B9481-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1106186)											
VA23B9481-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1106187)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1106186)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1108012)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1108013)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1108013) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1106187)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 1106186)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	93.4	70.0	130	----
Hydrocarbons (QCLot: 1108012)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	109	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	107	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1108013)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	109	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	123	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	116	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	98.7	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	120	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1108013) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	115	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 1106187)										
VA23B9481-002	Anonymous	Benzene	71-43-2	E611A	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Ethylbenzene	100-41-4	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	107 µg/L	100 µg/L	107	60.0	140	----
		Styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Toluene	108-88-3	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	218 µg/L	200 µg/L	109	60.0	140	----
		Xylene, o-	95-47-6	E611A	103 µg/L	100 µg/L	103	60.0	140	----
Hydrocarbons (QCLot: 1106186)										
VA23B9542-001	A1-7S	VHw (C6-C10)	----	E581.VH+F1	6020 µg/L	6310 µg/L	95.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

ALS www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax johnny.au@aecom.com

Email 2 alberto.garciaespinosa@aecom.com

Email 3 raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax christopher.boys@parkland.ca

Email 2 johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:

Job #: 60704333 / 15402

PO / AFE: ~~573161~~ 5737161

LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A1-7S	22-Aug-23	13:07	GW	4	X		X	X				
	A1-11A	↓	15:50	↓	↓	X	X						
	A1-11B	↓	15:38	↓	↓	X	X						
	G1-3A	↓	14:15	↓	↓	X	X						
	G1-3B	↓	14:24	↓	↓	X	X						

Environmental Division
Vancouver
Work Order Reference
VA23B9542

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to invoice recipient list.

BC CSR

Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C: 17°

FINAL COOLER TEMPERATURES °C:

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: [signature]	Date: Aug. 22, 2023	Time: 16:42	Received by:	Date:	Time:	Received by: [signature]	Date: Aug 22	Time: 5:45 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ABC 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9696**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Date Analysis Commenced	: 24-Aug-2023
C-O-C number	: ----	Issue Date	: 30-Aug-2023 18:13
Sampler	: RS+AGE		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A1-7D	A1-9S	A1-9D	G1-9B	NDM97-2
					Client sampling date / time	23-Aug-2023 08:48	23-Aug-2023 09:39	23-Aug-2023 10:12	23-Aug-2023 10:54	23-Aug-2023 14:25
						VA23B9696-001	VA23B9696-002	VA23B9696-003	VA23B9696-004	VA23B9696-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		----	----	----	----	99.0
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		----	----	----	----	<0.000050
Dissolved metals filtration location	----	EP421/VA	-	-		----	----	----	----	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	1.12	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	17.0	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	0.49	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	2420	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	2380	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		83.0	98.8	91.3	87.8	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		113	130	101	79.6	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		89.0	89.1	87.9	85.8	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		97.0	97.8	101	96.6	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		0.012	<0.015 DLCI	<0.010	16.2	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A1-7D	A1-9S	A1-9D	G1-9B	NDM97-2
					Client sampling date / time	23-Aug-2023 08:48	23-Aug-2023 09:39	23-Aug-2023 10:12	23-Aug-2023 10:54	23-Aug-2023 14:25
						VA23B9696-001	VA23B9696-002	VA23B9696-003	VA23B9696-004	VA23B9696-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		0.032	<0.010	<0.010	2.15	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		0.062	<0.010	<0.010	<2.60 DLCI	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		0.046	<0.010	<0.010	<1.75 DLQ	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		0.129	<0.010	<0.010	<0.010	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		0.189	<0.0050	<0.0050	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		0.190	<0.010	<0.010	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		0.263	<0.015	<0.015	<0.015	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		0.163	<0.010	<0.010	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		0.073	<0.010	<0.010	<0.010	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		0.152	<0.010	<0.010	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		0.0308	<0.0050	<0.0050	<0.0050	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		0.302	<0.010	<0.010	0.158	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		0.042	0.017	<0.010	11.0	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		0.155	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		0.068	<0.025 DLCI	<0.010	367	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.106	<0.040 DLQ	<0.010	7.79	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		0.084	<0.050	<0.050	<2.30 DLCI	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		0.167	<0.020	<0.020	14.9	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.266	<0.010	<0.010	0.595	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.950 DLQ	<0.050	<20.8 DLCI	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		0.278	<0.010	<0.010	<0.010	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		1.65	<0.030	<0.030	0.753	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		0.383	<0.060	<0.060	44.2	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		2.03	<0.065	<0.065	45.0	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		108	94.0	66.1	71.9	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		91.1	85.8	82.2	79.3	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		108	113	97.2	102	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9696**	Page	: 1 of 8
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Issue Date	: 30-Aug-2023 18:14
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) NDM97-2	E421	23-Aug-2023	24-Aug-2023	180 days	1 days	✓	27-Aug-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7D	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9D	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9S	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-9B	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-7D	E581.VH+F1	23-Aug-2023	27-Aug-2023	14 days	4 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-9S	E581.VH+F1	23-Aug-2023	27-Aug-2023	14 days	4 days	✓	28-Aug-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-9D	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-9B	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-7D	E641A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9D	E641A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A1-9S	E641A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G1-9B	E641A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-7D	E611A	23-Aug-2023	27-Aug-2023	14 days	4 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-9S	E611A	23-Aug-2023	27-Aug-2023	14 days	4 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-9D	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-9B	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1107409	2	31	6.4	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1102347	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	2	31	6.4	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1110325	2	23	8.7	5.0	✓
BTEX by Headspace GC-MS	E611A	1107409	2	31	6.4	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1102347	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1110326	2	8	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	2	31	6.4	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1110325	2	23	8.7	5.0	✓
BTEX by Headspace GC-MS	E611A	1107409	2	31	6.4	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1102347	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1110326	2	8	25.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	2	31	6.4	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1107409	2	31	6.4	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1102347	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	2	31	6.4	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9696**	Page	: 1 of 10
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Date Analysis Commenced	: 24-Aug-2023
C-O-C number	: ----	Issue Date	: 30-Aug-2023 18:13
Sampler	: RS+AGE 604-444-6400		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1102347)											
VA23B9696-005	NDM97-2	Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1106187)											
VA23B9481-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1107409)											
VA23B9696-003	A1-9D	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1106186)											
VA23B9481-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----
Hydrocarbons (QC Lot: 1107410)											
VA23B9696-003	A1-9D	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1102347)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Volatile Organic Compounds (QCLot: 1106187)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Volatile Organic Compounds (QCLot: 1107409)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1106186)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1107410)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1108018)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1110325)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1108019)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1108019) - continued						
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1110326)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1110326) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	99.8	80.0	120	----
Volatile Organic Compounds (QCLot: 1106187)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 1107409)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	105	70.0	130	----
Hydrocarbons (QCLot: 1106186)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	93.4	70.0	130	----
Hydrocarbons (QCLot: 1107410)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 1108018)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	100	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	98.7	70.0	130	----
Hydrocarbons (QCLot: 1110325)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	113	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	106	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1108019)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1108019) - continued									
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	99.0	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	108	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	115	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	118	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1110326)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	92.7	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	97.2	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	96.3	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	112	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	96.4	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	112	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	LCS Recovery (%)	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1110326) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	125	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 1102347)										
WR2300930-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
Volatile Organic Compounds (QCLot: 1106187)										
VA23B9481-002	Anonymous	Benzene	71-43-2	E611A	98.9 µg/L	100 µg/L	98.9	60.0	140	----
		Ethylbenzene	100-41-4	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	107 µg/L	100 µg/L	107	60.0	140	----
		Styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Toluene	108-88-3	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	218 µg/L	200 µg/L	109	60.0	140	----
		Xylene, o-	95-47-6	E611A	103 µg/L	100 µg/L	103	60.0	140	----
Volatile Organic Compounds (QCLot: 1107409)										
VA23B9696-004	G1-9B	Benzene	71-43-2	E611A	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	95.4 µg/L	100 µg/L	95.4	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.6 µg/L	100 µg/L	99.6	60.0	140	----
		Styrene	100-42-5	E611A	90.2 µg/L	100 µg/L	90.2	60.0	140	----
		Toluene	108-88-3	E611A	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	212 µg/L	200 µg/L	106	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
Hydrocarbons (QCLot: 1106186)										
VA23B9542-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	6020 µg/L	6310 µg/L	95.3	60.0	140	----
Hydrocarbons (QCLot: 1107410)										
VA23B9699-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5260 µg/L	6310 µg/L	83.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Environmental Division Vancouver
Work Order Reference
VA23B9696

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and routine tests

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please cont

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~573161~~ 5737161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Requ

Indicate Filtered (F), Preserved (P) or Filtered and P

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE	EPH	PAHs (including total PAHs)	LEPH/HEPH	Dissolved Metals (including hardness)	Dissolved Lead	Hardness	SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see
	A1-7D	23-Aug-23	8:48	GW	4	X		X	X		[redacted]	[redacted]			
	A1-9S	↓	9:39	↓	↓	X		X	X						
	A1-9D		10:12			X		X	X						
	~~A1-12S~~ G1-9B		10:54		↓	X		X	X						
	~~A1-12D~~ NOM97-2		14:25		1						X	X			
	~~A1-12G~~														

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ YES ☑ NO

Are samples for human consumption/ use?
☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to list of invoice recipients.
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug. 23, 2023	16:06

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
PW	Aug 23	4:10 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9699**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Date Analysis Commenced	: 28-Aug-2023
C-O-C number	: ----	Issue Date	: 29-Aug-2023 15:34
Sampler	: RS+AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: A1-12S	A1-12D	A1-12C	DUP-05	MW17-4
Client sampling date / time						23-Aug-2023 10:45	23-Aug-2023 11:15	23-Aug-2023 10:15	23-Aug-2023 11:15	23-Aug-2023 08:32
						VA23B9699-001	VA23B9699-002	VA23B9699-003	VA23B9699-004	VA23B9699-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L	<0.50	1.28	2.54	1.24	0.79
Styrene	100-42-5	E611A/VA	A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	A	0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L	<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L	<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L	<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	A	250	µg/L	<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	A	250	µg/L	<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L	<100	<100	<100	<100	<100
VPHw	----	EC580A/VA		100	µg/L	<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%	87.1	84.1	84.5	83.4	82.8
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%	102	104	71.9	106	106
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%	91.1	91.1	88.5	87.6	89.8
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%	101	99.4	101	101	101

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID	DUP-04	NDM97-2	----	----	----
						Client sampling date / time	23-Aug-2023 08:32	23-Aug-2023 14:25	----	----	----
							VA23B9699-006	VA23B9699-007	--------	--------	--------
							Result	Result	----	----	----
Volatile Organic Compounds [Fuels]											
Benzene	71-43-2	E611A/VA	A	0.50	µg/L		<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L		<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L		0.75	<0.50	----	----	----
Styrene	100-42-5	E611A/VA	A	0.50	µg/L		<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	A	0.50	µg/L		<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L		<0.40	<0.40	----	----	----
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L		<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L		<0.50	<0.50	----	----	----
Hydrocarbons											
EPH (C10-C19)	----	E601A/VA	A	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	A	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L		<100	<100	----	----	----
VPHw	----	EC580A/VA		100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates											
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%		82.2	81.0	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%		99.5	107	----	----	----
Volatile Organic Compounds Surrogates											
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%		88.9	90.8	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%		102	101	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9699**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Issue Date	: 29-Aug-2023 15:35
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12C	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12D	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-12S	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-04	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-05	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW17-4	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) NDM97-2	E601A	23-Aug-2023	29-Aug-2023	14 days	6 days	✓	29-Aug-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12C	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12D	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-12S	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-04	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-05	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW17-4	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) NDM97-2	E581.VH+F1	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-12C	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) A1-12D	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A1-12S	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-04	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-05	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW17-4	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
NDM97-2	E611A	23-Aug-2023	28-Aug-2023	14 days	5 days	✓	28-Aug-2023	14 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1107409	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1108018	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	1107409	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	1	12	8.3	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1108018	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	1107409	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1107409	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1107410	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9699**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 23-Aug-2023 16:10
PO	: 5737161	Date Analysis Commenced	: 28-Aug-2023
C-O-C number	: ----	Issue Date	: 29-Aug-2023 15:34
Sampler	: RS+AGE 604-444-6400		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1107409)											
VA23B9696-003	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1107410)											
VA23B9696-003	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1107409)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1107410)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1108018)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1107409)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	109	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	105	70.0	130	----
Hydrocarbons (QCLot: 1107410)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	101	70.0	130	----
Hydrocarbons (QCLot: 1108018)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	100	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	98.7	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1107409)										
VA23B9696-004	Anonymous	Benzene	71-43-2	E611A	98.2 µg/L	100 µg/L	98.2	60.0	140	----
		Ethylbenzene	100-41-4	E611A	95.4 µg/L	100 µg/L	95.4	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	99.6 µg/L	100 µg/L	99.6	60.0	140	----
		Styrene	100-42-5	E611A	90.2 µg/L	100 µg/L	90.2	60.0	140	----
		Toluene	108-88-3	E611A	97.2 µg/L	100 µg/L	97.2	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	212 µg/L	200 µg/L	106	60.0	140	----
		Xylene, o-	95-47-6	E611A	95.0 µg/L	100 µg/L	95.0	60.0	140	----
Hydrocarbons (QCLot: 1107410)										
VA23B9699-001	A1-12S	VHw (C6-C10)	----	E581.VH+F1	5260 µg/L	6310 µg/L	83.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~5704461~~ 5737161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A1-12S	23-Aug-23	10:45	GW	4	X	X						
	A1-12D	↓	11:15	↓	↓	X	X						
	A1-12C		10:15			X	X						
	DUP-05		11:15			X	X						
	MW17-4		8:32			X	X						
	DUP-04		8:32			X	X						
	NOM97-2	↓	14:25	↓	↓	X	X						

Environmental Division Vancouver
Work Order Reference
VA23B9699

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to list of invoice recipients.
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug-23, 2023	16:06

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DN	Aug 23	4:10pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0175**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Date Analysis Commenced	: 07-Sep-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 17:07
Sampler	: RS/AGE		
Site	: Burnaby refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: G1 - 6	----	----	----	----
					Client sampling date / time: 29-Aug-2023 15:20	----	----	----	----
					VA23C0175-001	--------	--------	--------	--------
					Result	----	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A/VA	0.50	µg/L	<0.50	----	----	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L	<0.50	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L	11.0	----	----	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L	<0.50	----	----	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L	<0.50	----	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L	0.50	----	----	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L	<0.30	----	----	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L	0.50	----	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A/VA	250	µg/L	<250	----	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L	<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L	<100	----	----	----	----
VPHw	----	EC580A/VA	100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%	88.7	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%	96.8	----	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%	88.8	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%	97.0	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C0175**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Issue Date	: 11-Sep-2023 17:07
C-O-C number	: ----		
Sampler	: RS/AGE		
Site	: Burnaby refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G1 - 6	E601A	29-Aug-2023	07-Sep-2023	14 days	8 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G1 - 6	E581.VH+F1	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1 - 6	E611A	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23C0175**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Date Analysis Commenced	: 07-Sep-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 17:07
Sampler	: RS/AGE 604 444 6593		
Site	: Burnaby refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1124988)											
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1124989)											
VA23C0072-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1124988)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1121964)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1124989)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1124988)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	108	70.0	130	----
Hydrocarbons (QCLot: 1121964)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----
Hydrocarbons (QCLot: 1124989)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	94.9	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1124988)										
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Ethylbenzene	100-41-4	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Toluene	108-88-3	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	227 µg/L	200 µg/L	113	60.0	140	----
		Xylene, o-	95-47-6	E611A	110 µg/L	100 µg/L	110	60.0	140	----
Hydrocarbons (QCLot: 1124989)										
VA23C0175-001	G1 - 6	VHw (C6-C10)	----	E581.VH+F1	5700 µg/L	6310 µg/L	90.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~5781~~ 5737161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	C0175

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: johnny.au@aecom.com

Email 2: alberto.garciaespinosa@aecom.com

Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: christopher.boys@parkland.ca

Email 2: johnny.au@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt Sampler: RS+AGE

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-6	29-Aug-23	15:20	GW	4	X	X						

Environmental Division
Vancouver
Work Order Reference
VA23C0175

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

include raymund.sampaga@aecom.com to invoice recipient list.

BC CSR

Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
			19.0				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund D. Sampaga	Date: Aug-29, 2023	Time: 16:30	Received by:	Date:	Time:	Received by: PL	Date: Aug29	Time: 1730

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0190**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: 20-1019346	Issue Date	: 31-Aug-2023 12:17
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)					*Client sample ID*	**G1-6**	----	----	----	----
					Client sampling date / time	29-Aug-2023 00:00	----	----	----	----
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	**VA23C0190-001**	--------	--------	--------	--------	
					Result	----	----	----	----	
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L	41.6	----	----	----	----	
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L	<0.000050	----	----	----	----	
Dissolved metals filtration location	----	EP421/VA	-	-	Field	----	----	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C0190**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Issue Date	: 31-Aug-2023 12:17
C-O-C number	: 20-1019346		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
G1-6	E421	29-Aug-2023	30-Aug-2023	180 days	1 days	✓	31-Aug-2023	180 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	1110419	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	1110419	1	18	5.5	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	1110419	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	1110419	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA23C0190**	Page	: 1 of 3
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
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- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia

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LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1110419)											
VA23C0083-001	Anonymous	Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1110419)						
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	97.1	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1110419)										
VA23C0083-002	Anonymous	Lead, dissolved	7439-92-1	E421	0.0194 mg/L	0.02 mg/L	97.0	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1019346

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd -
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☒ NO
	Copy of Invoice with Report ☐ YES ☒ NO
Company:	Parkland Refining (BC) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #	
Job #:	60704333 / 15402
PO / AFE:	5737161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	

Reports / Recipients

Select Report Format: ☒ PDF ☒ EXCEL ☒ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A

☒ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: johnny.au@aecom.com

Email 2: alberto.garciaespinosa@aecom.com

Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: christopher.boys@parkland.ca

Email 2: johnny.au@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt Sampler: RS + AGE

Turnaround Time (TAT) Requested

☒ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	F	Dissolved Lead + hardness	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-6	29-Aug-23	15:20	GW	1	X				

Environmental Division Vancouver
Work Order Reference
VA23C0190
Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

- Include raymund.sampaga@aecom.com to invoice recipient list.
- BC CSR

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4°			

SHIPMENT RELEASE (client use)

Released by: Date: Aug-29, 2023 Time: 16:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Aug 29 Time: 4:30pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B8754**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Date Analysis Commenced	: 16-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 11:30
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	G1-7A	----	----	----	----
					Client sampling date / time	14-Aug-2023 15:42	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B8754-001	--------	--------	--------	--------
						Result	----	----	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.50	mg/L		185	----	----	----	----
Dissolved Metals										
Calcium, dissolved	7440-70-2	E421/VA	0.050	mg/L		61.9	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.000050	mg/L		<0.000250 DLA	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	0.0050	mg/L		7.45	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B8754**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Issue Date	: 23-Aug-2023 11:31
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
G1-7A	E421	14-Aug-2023	16-Aug-2023	180 days	2 days	✓	17-Aug-2023	180 days	3 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Dissolved Metals in Water by CRC ICPMS	E421	1086460	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
Dissolved Metals in Water by CRC ICPMS	E421	1086460	1	18	5.5	5.0	✓
Method Blanks (MB)							
Dissolved Metals in Water by CRC ICPMS	E421	1086460	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Dissolved Metals in Water by CRC ICPMS	E421	1086460	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **VA23B8754**	Page	: 1 of 4
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Date Analysis Commenced	: 16-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 11:31
Sampler	: AGE, RS 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1086460)											
VA23B8739-021	Anonymous	Calcium, dissolved	7440-70-2	E421	0.050	mg/L	73.7	72.2	2.00%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	13.0	13.2	1.73%	20%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1086460)						
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1086460)									
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	103	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	110	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1086460)										
VA23B8739-022	Anonymous	Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0185 mg/L	0.02 mg/L	92.6	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only): B8754

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	Dissolved Lead (F/P)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-7A	14-Aug-23	15:42	GW	1						X			

Environmental Division
Vancouver
Work Order Reference
VA23B8754

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				9			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug. 14. 2023	17:00

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:
RQ	Aug 14

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B8757**	Page	: 1 of 3
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Date Analysis Commenced	: 23-Aug-2023
C-O-C number	: ----	Issue Date	: 24-Aug-2023 15:49
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: G1-7A	TRAVEL BLANK-1	----	----	----
					Client sampling date / time: 14-Aug-2023 15:42	14-Aug-2023 16:00	----	----	----
					VA23B8757-001	VA23B8757-002	--------	--------	--------
					Result	Result	----	----	----
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L	<0.40	0.49 RRV	----	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L	<0.30	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L	<0.50	<0.50	----	----	----
Hydrocarbons									
EPH (C10-C19)	----	E601A/VA	250	µg/L	<250	----	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L	<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L	<100	<100	----	----	----
VPHw	----	EC580A/VA	100	µg/L	<100	<100	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%	85.9	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%	100	112	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%	90.0	91.0	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%	99.9	100	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B8757**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Issue Date	: 24-Aug-2023 15:49
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G1-7A	E601A	14-Aug-2023	24-Aug-2023	14 days	9 days	✓	24-Aug-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G1-7A	E581.VH+F1	14-Aug-2023	23-Aug-2023	14 days	9 days	✓	23-Aug-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
TRAVEL BLANK-1	E581.VH+F1	14-Aug-2023	23-Aug-2023	14 days	9 days	✓	23-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-7A	E611A	14-Aug-2023	23-Aug-2023	14 days	9 days	✓	23-Aug-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
TRAVEL BLANK-1	E611A	14-Aug-2023	23-Aug-2023	14 days	9 days	✓	23-Aug-2023	14 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1100708	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1100708	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1100262	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1100263	1	14	7.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B8757**	Page	: 1 of 5
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 14-Aug-2023 17:15
PO	: 573161	Date Analysis Commenced	: 23-Aug-2023
C-O-C number	: ----	Issue Date	: 24-Aug-2023 15:49
Sampler	: AGE, RS 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1100262)											
VA23B9474-023	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1100263)											
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1100262)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1100263)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1100708)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1100262)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	107	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	111	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	116	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	111	70.0	130	----
Hydrocarbons (QCLot: 1100263)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	88.9	70.0	130	----
Hydrocarbons (QCLot: 1100708)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1100262)										
VA23B9360-002	Anonymous	Benzene	71-43-2	E611A	94.3 µg/L	100 µg/L	94.3	60.0	140	----
		Ethylbenzene	100-41-4	E611A	98.5 µg/L	100 µg/L	98.5	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Toluene	108-88-3	E611A	ND µg/L	100 µg/L	ND	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	ND µg/L	200 µg/L	ND	60.0	140	----
		Xylene, o-	95-47-6	E611A	94.5 µg/L	100 µg/L	94.5	60.0	140	----
Hydrocarbons (QCLot: 1100263)										
VA23B9474-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5600 µg/L	6310 µg/L	88.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:	60704333 / 15402	Major/Minor Code:	Routing Code:
PO / AFE:	573161	Requisitioner:	
LSD:	Burnaby Refinery	Location:	

ALS Lab Work Order # (ALS use only): B8757

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals (including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-7A	14-Aug-23	15:42	GW	4	X	X						
	TRAVEL BLANK-1	↓	16:00	↓	1	X							

Environmental Division
Vancouver
Work Order Reference
VA23B8757

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: Aug-14, 2023	Time: 17:00	Received by:	Date:	Time:	Received by: DJ	Date: Aug 17	Time: 5:15 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B8892**	Page	: 1 of 5
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Date Analysis Commenced	: 21-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 09:02
Sampler	: ----		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G1-1C	G1-5	G1-1A	G1-7B	DUP-01
					Client sampling date / time	15-Aug-2023 10:12	15-Aug-2023 09:19	15-Aug-2023 11:03	15-Aug-2023 11:40	15-Aug-2023 09:19
						VA23B8892-001	VA23B8892-002	VA23B8892-003	VA23B8892-004	VA23B8892-005
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	68.0	1.42	7.70	70.3
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		----	----	<250	----	----
LEPHw	----	EC600A/VA	250	µg/L		----	----	<250	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		83.7	88.1	87.1	89.1	88.7
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		95.7	91.5	85.7	92.4	86.4
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		88.5	88.0	86.3	87.6	87.2
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		99.0	98.4	98.0	98.2	97.2
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		----	----	<0.0050	----	----

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G1-1C	G1-5	G1-1A	G1-7B	DUP-01
					Client sampling date / time	15-Aug-2023 10:12	15-Aug-2023 09:19	15-Aug-2023 11:03	15-Aug-2023 11:40	15-Aug-2023 09:19
						VA23B8892-001	VA23B8892-002	VA23B8892-003	VA23B8892-004	VA23B8892-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		----	----	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		----	----	<0.0050	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		----	----	<0.050	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		----	----	<0.020	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		----	----	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		----	----	<0.030	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		----	----	<0.060	----	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		----	----	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		----	----	74.8	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		----	----	86.0	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		----	----	106	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A1-3D	G1-2A	G1-2B	----	----
					Client sampling date / time	15-Aug-2023 09:59	15-Aug-2023 15:51	15-Aug-2023 16:01	----	----
						VA23B8892-006	VA23B8892-007	VA23B8892-008	--------	--------
						Result	Result	Result	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		0.55	<0.50	<0.50	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		84.3	87.1	86.3	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		89.2	98.4	91.3	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		88.0	87.4	85.9	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		97.5	98.1	97.7	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B8892**	Page	: 1 of 9
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Issue Date	: 23-Aug-2023 09:02
C-O-C number	: ----		
Sampler	: ----		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A1-3D	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-01	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1A	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-1C	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-2A	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-2B	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-5	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G1-7B	E601A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-2A	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-2B	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) A1-3D	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-01	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1A	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-1C	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-5	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G1-7B	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G1-1A	E641A	15-Aug-2023	21-Aug-2023	14 days	6 days	✓	21-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-2A	E611A	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-2B	E611A	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A1-3D	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-01	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-1A	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-1C	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-5	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-7B	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1095705	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1095706	1	5	20.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1095705	1	20	5.0	5.0	✓
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1095706	1	5	20.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B8892**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Date Analysis Commenced	: 21-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 09:02
Sampler	: ---- 604 444 6593		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1096497)											
VA23B8881-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1096498)											
VA23B8892-001	G1-1C	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1096497)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1095705)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1096498)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1095706)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1095706) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1096497)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	99.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	97.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100.0	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	106	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 1095705)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	110	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	107	70.0	130	----
Hydrocarbons (QCLot: 1096498)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	93.2	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1095706)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	92.0	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	96.9	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	100.0	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	108	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	94.8	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	87.9	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	85.8	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	85.0	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	105	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1095706) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	112	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 1096497)										
VA23B8881-002	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	98.3 µg/L	100 µg/L	98.3	60.0	140	----
		Toluene	108-88-3	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	212 µg/L	200 µg/L	106	60.0	140	----
		Xylene, o-	95-47-6	E611A	104 µg/L	100 µg/L	104	60.0	140	----
Hydrocarbons (QCLot: 1096498)										
VA23B8892-002	G1-5	VHw (C6-C10)	----	E581.VH+F1	5430 µg/L	6310 µg/L	86.0	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

M

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	S ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G1-1C	15-Aug-23	10:12	GW	4	X	X						
	G1-5		9:19		4	X	X						
	G1-1A		11:03		4	X		X	X				
	G1-7B		11:40		4	X	X						
	DUP-01		9:19		4	X	X						
	A1-3D		9:59		4	X	X						
	G1-2A	15-Aug-23	15:51	GW	4	X	X						
	G1-2B		16:01		4	X	X						

Environmental Division
Vancouver
Work Order Reference
VA23B8892

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	4

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug. 15, 2023	16:35

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	Aug 15	4:34pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2023 FRONT

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**.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B8919**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333 / 15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Date Analysis Commenced	: 17-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 12:39
Sampler	: AGE, RS		
Site	: ----		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre
mg/L	milligrams per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G1-1C	G1-5	G1-10	G1-7B	G1-1A
					Client sampling date / time	15-Aug-2023 10:12	15-Aug-2023 09:19	15-Aug-2023 14:15	15-Aug-2023 11:40	15-Aug-2023 11:03
						VA23B8919-001	VA23B8919-002	VA23B8919-003	VA23B8919-004	VA23B8919-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L		12.3	111	----	60.0	70.4
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		0.150	<0.050	----	<0.100 DLA	<0.050
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		4790	35000	----	20800	18300
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		78.6	5840	----	1970	6010
Dissolved metals filtration location	----	EP421/VA	-	-		Field	Field	----	Field	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		----	----	<0.40	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		----	----	<0.30	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		----	----	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		----	----	<250	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		----	----	<250	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		----	----	<100	----	----
HEPHw	----	EC600A/VA	250	µg/L		----	----	<250	----	----
LEPHw	----	EC600A/VA	250	µg/L		----	----	<250	----	----
VPHw	----	EC580A/VA	100	µg/L		----	----	<100	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		----	----	92.6	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		----	----	91.8	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		----	----	86.4	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		----	----	98.1	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G1-1C	G1-5	G1-10	G1-7B	G1-1A
					Client sampling date / time	15-Aug-2023 10:12	15-Aug-2023 09:19	15-Aug-2023 14:15	15-Aug-2023 11:40	15-Aug-2023 11:03
						VA23B8919-001	VA23B8919-002	VA23B8919-003	VA23B8919-004	VA23B8919-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		----	----	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		----	----	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		----	----	<0.0050	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		----	----	<0.050	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		----	----	<0.020	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		----	----	<0.010	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		----	----	<0.050	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		----	----	74.1	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		----	----	95.6	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		----	----	113	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	DUP-01	MW03-06	G1-2A	G1-2B	----
					Client sampling date / time	15-Aug-2023 09:19	15-Aug-2023 13:30	15-Aug-2023 15:51	15-Aug-2023 16:01	----
						VA23B8919-006	VA23B8919-007	VA23B8919-008	VA23B8919-009	--------
						Result	Result	Result	Result	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	0.60	mg/L		113	----	60.0	170	----
Dissolved Metals										
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		<0.050	----	<0.050	<0.250 DLA	----
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		35900	----	20500	62500	----
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		5780	----	2140	3400	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	Field	Field	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		----	<0.50	----	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		----	<0.50	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		----	32.8	----	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		----	<0.50	----	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		----	<0.50	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		----	<0.40	----	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		----	<0.30	----	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		----	<0.50	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		----	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		----	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		----	<100	----	----	----
HEPHw	----	EC600A/VA	250	µg/L		----	<250	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		----	<250	----	----	----
VPHw	----	EC580A/VA	100	µg/L		----	<100	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		----	90.7	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		----	93.4	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		----	88.4	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		----	98.0	----	----	----

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	DUP-01	MW03-06	G1-2A	G1-2B	----
					Client sampling date / time	15-Aug-2023 09:19	15-Aug-2023 13:30	15-Aug-2023 15:51	15-Aug-2023 16:01	----
						VA23B8919-006	VA23B8919-007	VA23B8919-008	VA23B8919-009	--------
						Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		----	0.018	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		----	<0.0050	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		----	<0.015	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		----	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		----	0.010	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		----	0.090	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		----	<0.010	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		----	<0.050	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		----	0.022	----	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		----	0.012	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		----	<0.050	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		----	72.7	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		----	91.8	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		----	104	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B8919**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333 / 15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Issue Date	: 23-Aug-2023 12:39
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: ----		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUP-01	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-1A	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-1C	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-2A	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-2B	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-5	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) G1-7B	E421	15-Aug-2023	17-Aug-2023	180 days	2 days	✓	18-Aug-2023	180 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G1-10	E601A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-06	E601A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G1-10	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW03-06	E581.VH+F1	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G1-10	E641A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW03-06	E641A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G1-10	E611A	15-Aug-2023	22-Aug-2023	14 days	6 days	✓	22-Aug-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW03-06	E611A	15-Aug-2023	22-Aug-2023	14 days	7 days	✓	22-Aug-2023	14 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1088283	2	39	5.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1096418	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1088283	2	39	5.1	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1096419	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1096418	1	14	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1088283	2	39	5.1	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1096419	1	16	6.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1096497	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1088283	2	39	5.1	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1096498	1	15	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B8919**	Page	: 1 of 8
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333 / 15402	Date Samples Received	: 15-Aug-2023 16:40
PO	: 573161	Date Analysis Commenced	: 17-Aug-2023
C-O-C number	: ----	Issue Date	: 23-Aug-2023 12:39
Sampler	: AGE, RS 604 444 6593		
Site	: ----		
Quote number	: Aecom 2020 Price List (BC/YT)		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angelo Salandanan	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1088283)											
KS2303004-001	Anonymous	Calcium, dissolved	7440-70-2	E421	0.050	mg/L	23.5	24.1	2.59%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	4.06	4.03	0.634%	20%	----
Dissolved Metals (QC Lot: 1088287)											
VA23B8889-001	Anonymous	Calcium, dissolved	7440-70-2	E421	0.050	mg/L	24600 µg/L	23.5	4.63%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	0.271 µg/L	0.000271	0.0000002	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	4430 µg/L	4.49	1.24%	20%	----
Volatile Organic Compounds (QC Lot: 1096497)											
VA23B8881-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1096498)											
VA23B8892-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1088283)						
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Dissolved Metals (QCLot: 1088287)						
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Volatile Organic Compounds (QCLot: 1096497)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1096418)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1096498)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1096419)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1096419) - continued						
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1088283)									
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 1088287)									
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	114	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	104	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	113	80.0	120	----
Volatile Organic Compounds (QCLot: 1096497)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	99.8	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	99.7	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	97.6	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	100.0	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	106	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 1096418)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	108	70.0	130	----
Hydrocarbons (QCLot: 1096498)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	93.2	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1096419)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	106	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1096419) - continued									
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	115	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	110	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	113	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	114	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1088283)										
KS2303004-002	Anonymous	Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0180 mg/L	0.02 mg/L	89.8	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
Dissolved Metals (QCLot: 1088287)										
VA23B8889-002	Anonymous	Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0188 mg/L	0.02 mg/L	94.3	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
Volatile Organic Compounds (QCLot: 1096497)										
VA23B8881-002	Anonymous	Benzene	71-43-2	E611A	100 µg/L	100 µg/L	100	60.0	140	----
		Ethylbenzene	100-41-4	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Styrene	100-42-5	E611A	98.3 µg/L	100 µg/L	98.3	60.0	140	----
		Toluene	108-88-3	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	212 µg/L	200 µg/L	106	60.0	140	----
		Xylene, o-	95-47-6	E611A	104 µg/L	100 µg/L	104	60.0	140	----
Hydrocarbons (QCLot: 1096498)										
VA23B8892-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5430 µg/L	6310 µg/L	86.0	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 1 of 1

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA23B8919

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Ad
☐ Fees may apply to rush requests on weekends, statutory holidays and routine tests
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please con

Project Information	
ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	573161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)		
AFE/Cost Center:		PO#
Major/Minor Code:		Routing Code:
Requisitioner:		
Location:		

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS & AGE

Analysis Requ

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and P													SAMPLES ON HOLD	EXTENDED STORAGE REQUIRE	SUSPECTED HAZARD (see note
						P BTEX/Styrene/VPH/MTBE	P EPH	P PAHs (including total PAHs)	P LEPH/HEPH	F Dissolved Metals(including hardness)	F Dissolved Lead	F Hardness									
	G1-1C	15-Aug-23	10:12	GW	1						X	X									
	G1-5	15-Aug-23	9:19		1						X	X									
	G1-10		14:15		4	X		X	X												
	G1-7B		11:40		1						X	X									
	G1-1A		11:03		1						X	X									
	DUP-01		9:19		1						X	X									
	MW03-06		13:30		4	X		X	X												
	G1-2A	15-Aug-23	15:51	GW	1						X	X									
	G1-2B		16:01		1						X	X									

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				13			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: Aug. 15, 2023	Time: 16:35	Received by:	Date:	Time:	Received by: DU	Date: Aug 15	Time: 4:40pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2023 FRONT

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.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0065**	Page	: 1 of 12
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15404	Date Samples Received	: 28-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:24
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 13		
No. of samples analysed	: 13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A2MW09-05I	A2MW09-06I	MW11-3I	MW11-3D	MW11-4I
					Client sampling date / time	28-Aug-2023 13:34	28-Aug-2023 14:01	28-Aug-2023 15:37	28-Aug-2023 15:58	28-Aug-2023 14:50
						VA23C0065-001	VA23C0065-002	VA23C0065-003	VA23C0065-004	VA23C0065-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	600	µg/L		----	----	----	----	94100
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	1.0	µg/L		----	----	----	----	5.6
Antimony, dissolved	7440-36-0	E421/VA	0.10	µg/L		----	----	----	----	<0.10
Arsenic, dissolved	7440-38-2	E421/VA	0.10	µg/L		----	----	----	----	0.48
Barium, dissolved	7440-39-3	E421/VA	0.10	µg/L		----	----	----	----	47.3
Beryllium, dissolved	7440-41-7	E421/VA	0.020	µg/L		----	----	----	----	<0.020
Bismuth, dissolved	7440-69-9	E421/VA	0.050	µg/L		----	----	----	----	<0.050
Boron, dissolved	7440-42-8	E421/VA	10	µg/L		----	----	----	----	24
Cadmium, dissolved	7440-43-9	E421/VA	0.0050	µg/L		----	----	----	----	0.125
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		----	----	----	----	25700
Cesium, dissolved	7440-46-2	E421/VA	0.010	µg/L		----	----	----	----	0.011
Chromium, dissolved	7440-47-3	E421/VA	0.50	µg/L		----	----	----	----	<0.50
Cobalt, dissolved	7440-48-4	E421/VA	0.10	µg/L		----	----	----	----	9.30
Copper, dissolved	7440-50-8	E421/VA	0.20	µg/L		----	----	----	----	1.17
Iron, dissolved	7439-89-6	E421/VA	10	µg/L		----	----	----	----	1150
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		----	----	----	----	<0.050
Lithium, dissolved	7439-93-2	E421/VA	1.0	µg/L		----	----	----	----	<1.0
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		----	----	----	----	7260
Manganese, dissolved	7439-96-5	E421/VA	0.10	µg/L		----	----	----	----	838
Molybdenum, dissolved	7439-98-7	E421/VA	0.050	µg/L		----	----	----	----	0.177
Nickel, dissolved	7440-02-0	E421/VA	0.50	µg/L		----	----	----	----	2.55
Phosphorus, dissolved	7723-14-0	E421/VA	50	µg/L		----	----	----	----	<50
Potassium, dissolved	7440-09-7	E421/VA	50	µg/L		----	----	----	----	1810
Rubidium, dissolved	7440-17-7	E421/VA	0.20	µg/L		----	----	----	----	1.44
Selenium, dissolved	7782-49-2	E421/VA	0.050	µg/L		----	----	----	----	<0.050
Silicon, dissolved	7440-21-3	E421/VA	50	µg/L		----	----	----	----	8950
Silver, dissolved	7440-22-4	E421/VA	0.010	µg/L		----	----	----	----	<0.010
Sodium, dissolved	7440-23-5	E421/VA	50	µg/L		----	----	----	----	167000

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A2MW09-05I	A2MW09-06I	MW11-3I	MW11-3D	MW11-4I
					Client sampling date / time	28-Aug-2023 13:34	28-Aug-2023 14:01	28-Aug-2023 15:37	28-Aug-2023 15:58	28-Aug-2023 14:50
						VA23C0065-001	VA23C0065-002	VA23C0065-003	VA23C0065-004	VA23C0065-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421/VA	0.20	µg/L		----	----	----	----	340
Sulfur, dissolved	7704-34-9	E421/VA	500	µg/L		----	----	----	----	31900
Tellurium, dissolved	13494-80-9	E421/VA	0.20	µg/L		----	----	----	----	<0.20
Thallium, dissolved	7440-28-0	E421/VA	0.010	µg/L		----	----	----	----	<0.010
Thorium, dissolved	7440-29-1	E421/VA	0.10	µg/L		----	----	----	----	<0.10
Tin, dissolved	7440-31-5	E421/VA	0.10	µg/L		----	----	----	----	<0.10
Titanium, dissolved	7440-32-6	E421/VA	0.30	µg/L		----	----	----	----	<0.30
Tungsten, dissolved	7440-33-7	E421/VA	0.10	µg/L		----	----	----	----	0.54
Uranium, dissolved	7440-61-1	E421/VA	0.010	µg/L		----	----	----	----	0.028
Vanadium, dissolved	7440-62-2	E421/VA	0.50	µg/L		----	----	----	----	<0.50
Zinc, dissolved	7440-66-6	E421/VA	1.0	µg/L		----	----	----	----	3.4
Zirconium, dissolved	7440-67-7	E421/VA	0.30	µg/L		----	----	----	----	<0.30
Dissolved metals filtration location	----	EP421/VA	-	-		----	----	----	----	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		117	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		1.23	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	0.74	<0.50	2.77	<0.50
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		1.35	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		2.56	0.88	0.43 RRV	0.60 RRV	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.32 DLQ	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		2.56	0.88	<0.50	0.60	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		270	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		710	110	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A/VA	250	µg/L		270	<250	<250	<250	<250
VPHw	----	EC580A/VA	100	µg/L		590	110	<100	<100	<100

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A2MW09-05I	A2MW09-06I	MW11-3I	MW11-3D	MW11-4I
					Client sampling date / time	28-Aug-2023 13:34	28-Aug-2023 14:01	28-Aug-2023 15:37	28-Aug-2023 15:58	28-Aug-2023 14:50
						VA23C0065-001	VA23C0065-002	VA23C0065-003	VA23C0065-004	VA23C0065-005
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		79.0	84.4	87.2	79.1	86.6
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		109	122	108	111	115
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		94.1	91.7	87.9	86.7	89.6
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		93.8	98.7	97.0	98.0	97.5
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		0.311	0.050	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.057 DLQ	<0.011 DLQ	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.125 DLCI	<0.051 DLCI	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.065 DLQ	<0.020 DLQ	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A/VA	0.010	µg/L		0.352	0.088	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		2.59	0.035	<0.010	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		1.05	0.046	0.020	0.017	<0.010
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.960 DLCI	<0.240 DLCI	<0.050	<0.050	<0.050
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		0.059	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.028	0.021	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.890 DLCI	<0.300 DLCI	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		<0.030	<0.030	<0.030	<0.030	<0.030

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	A2MW09-05I	A2MW09-06I	MW11-3I	MW11-3D	MW11-4I
					Client sampling date / time	28-Aug-2023 13:34	28-Aug-2023 14:01	28-Aug-2023 15:37	28-Aug-2023 15:58	28-Aug-2023 14:50
						VA23C0065-001	VA23C0065-002	VA23C0065-003	VA23C0065-004	VA23C0065-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.964	<0.242	<0.060	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		<0.965	<0.244	<0.065	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		129	111	128	112	124
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		101	92.2	108	94.2	102
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		118	112	126	109	122

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW11-4D	G2-3B	G2-3C	G2-10	WS2-D2
					Client sampling date / time	28-Aug-2023 15:25	28-Aug-2023 10:02	28-Aug-2023 11:10	28-Aug-2023 11:53	28-Aug-2023 10:57
						VA23C0065-006	VA23C0065-007	VA23C0065-008	VA23C0065-009	VA23C0065-010
						Result	Result	Result	Result	Result
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		2.97	40.7	9.17	<0.50	92.4
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	1.30	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	0.56	1.79	0.63 RRV	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	0.37	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	0.56	2.16	0.63	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	<100
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		78.9	87.7	79.7	89.9	87.2
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		114	118	125	115	106
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		88.5	86.9	88.5	88.8	85.8
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		97.8	98.7	98.0	97.7	97.2
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	0.016	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.041 DLCI	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.017 DLQ	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	MW11-4D	G2-3B	G2-3C	G2-10	WS2-D2
					Client sampling date / time	28-Aug-2023 15:25	28-Aug-2023 10:02	28-Aug-2023 11:10	28-Aug-2023 11:53	28-Aug-2023 10:57
						VA23C0065-006	VA23C0065-007	VA23C0065-008	VA23C0065-009	VA23C0065-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	0.016	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	0.013	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	<0.010	0.012	<0.010	<0.010
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		<0.010	0.024	0.042	0.022	0.017
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	<0.050	0.082	<0.050	<0.050
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.010	0.181	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		<0.030	0.197	<0.030	<0.030	<0.030
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.060	<0.060	0.082	<0.060	<0.060
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		<0.065	0.226	0.082	<0.065	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		121	116	128	114	112
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		94.4	98.5	97.2	96.0	97.2
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		112	113	116	109	109

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U4-3	DUP-07	TRAVEL BLANK-3	----	----
					Client sampling date / time	28-Aug-2023 11:59	28-Aug-2023 11:10	28-Aug-2023 16:00	----	----
						VA23C0065-011	VA23C0065-012	VA23C0065-013	--------	--------
						Result	Result	Result	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	600	µg/L		135000	----	----	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	1.0	µg/L		2.8	----	----	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.10	µg/L		0.11	----	----	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.10	µg/L		0.10	----	----	----	----
Barium, dissolved	7440-39-3	E421/VA	0.10	µg/L		11.6	----	----	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.020	µg/L		<0.020	----	----	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.050	µg/L		<0.050	----	----	----	----
Boron, dissolved	7440-42-8	E421/VA	10	µg/L		97	----	----	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0050	µg/L		0.0303	----	----	----	----
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		28400	----	----	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.010	µg/L		<0.010	----	----	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.50	µg/L		<0.50	----	----	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.10	µg/L		0.60	----	----	----	----
Copper, dissolved	7440-50-8	E421/VA	0.20	µg/L		0.86	----	----	----	----
Iron, dissolved	7439-89-6	E421/VA	10	µg/L		<10	----	----	----	----
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		<0.050	----	----	----	----
Lithium, dissolved	7439-93-2	E421/VA	1.0	µg/L		2.7	----	----	----	----
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		15600	----	----	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.10	µg/L		17.7	----	----	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.050	µg/L		0.123	----	----	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.50	µg/L		0.80	----	----	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	50	µg/L		<50	----	----	----	----
Potassium, dissolved	7440-09-7	E421/VA	50	µg/L		1510	----	----	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.20	µg/L		0.26	----	----	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.050	µg/L		<0.050	----	----	----	----
Silicon, dissolved	7440-21-3	E421/VA	50	µg/L		11700	----	----	----	----
Silver, dissolved	7440-22-4	E421/VA	0.010	µg/L		<0.010	----	----	----	----
Sodium, dissolved	7440-23-5	E421/VA	50	µg/L		20400	----	----	----	----
Strontium, dissolved	7440-24-6	E421/VA	0.20	µg/L		244	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	U4-3	DUP-07	TRAVEL BLANK-3	----	----
					Client sampling date / time	28-Aug-2023 11:59	28-Aug-2023 11:10	28-Aug-2023 16:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0065-011	VA23C0065-012	VA23C0065-013	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
Sulfur, dissolved	7704-34-9	E421/VA	500	µg/L		11100	----	----	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.20	µg/L		<0.20	----	----	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.010	µg/L		<0.010	----	----	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.10	µg/L		<0.10	----	----	----	----
Tin, dissolved	7440-31-5	E421/VA	0.10	µg/L		0.38	----	----	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.30	µg/L		<0.30	----	----	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.10	µg/L		<0.10	----	----	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.010	µg/L		0.036	----	----	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.50	µg/L		<0.50	----	----	----	----
Zinc, dissolved	7440-66-6	E421/VA	1.0	µg/L		5.7	----	----	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.30	µg/L		<0.30	----	----	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		Field	----	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	8.94	<0.50	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	1.16	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	1.64	0.52 RRV	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	0.34	<0.30	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	1.98	0.52	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	----	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	----	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	----	----
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	U4-3	DUP-07	TRAVEL BLANK-3	----	----
					Client sampling date / time	28-Aug-2023 11:59	28-Aug-2023 11:10	28-Aug-2023 16:00	----	----
						VA23C0065-011	VA23C0065-012	VA23C0065-013	--------	--------
						Result	Result	Result	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		87.6	89.8	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		114	124	117	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		86.9	87.9	88.7	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		97.0	97.5	97.1	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		0.0088	<0.0050	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	----	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		0.022	<0.010	----	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		0.010	<0.010	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	0.012	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.015	0.037	----	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	0.068	----	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		0.030	<0.020	----	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.017	<0.010	----	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		0.013	<0.010	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		0.048	<0.030	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	U4-3	DUP-07	TRAVEL BLANK-3	----	----
					Client sampling date / time	28-Aug-2023 11:59	28-Aug-2023 11:10	28-Aug-2023 16:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0065-011	VA23C0065-012	VA23C0065-013	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons										
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.060	0.068	----	----	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		0.088	0.068	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		109	119	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		96.1	102	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		110	123	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C0065**	Page	: 1 of 12
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15404	Date Samples Received	: 28-Aug-2023 17:30
PO	: 5737161	Issue Date	: 11-Sep-2023 07:25
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 13		
No. of samples analysed	: 13		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-4I	E421	28-Aug-2023	30-Aug-2023	180 days	1 days	✓	30-Aug-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) U4-3	E421	28-Aug-2023	30-Aug-2023	180 days	2 days	✓	30-Aug-2023	180 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-07	E601A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-10	E601A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U4-3	E601A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D2	E601A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-05I	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2MW09-06I	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-3B	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-3C	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3D	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3I	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4D	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4I	E601A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A2MW09-05I	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A2MW09-06I	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-07	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-10	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-3B	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) G2-3C	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) U4-3	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) WS2-D2	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-3D	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-3I	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-4D	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) MW11-4I	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRAVEL BLANK-3	E581.VH+F1	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-07	E641A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-10	E641A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U4-3	E641A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D2	E641A	28-Aug-2023	07-Sep-2023	14 days	10 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-05I	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) A2MW09-06I	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-3B	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-3C	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3D	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-3I	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4D	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW11-4I	E641A	28-Aug-2023	03-Sep-2023	14 days	6 days	✓	05-Sep-2023	40 days	2 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A2MW09-05I	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A2MW09-06I	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-07	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-10	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-3B	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-3C	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
U4-3	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
WS2-D2	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-3D	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-3I	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-4D	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW11-4I	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
TRAVEL BLANK-3	E611A	28-Aug-2023	06-Sep-2023	14 days	9 days	✓	07-Sep-2023	14 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1121291	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1109878	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1121290	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1121964	2	32	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	1121291	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1109878	1	10	10.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	2	19	10.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1121290	1	18	5.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1121964	2	32	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	1121291	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1109878	1	10	10.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	2	19	10.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1121290	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1121291	1	18	5.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1109878	1	10	10.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1121290	1	18	5.5	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23C0065**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15404	Date Samples Received	: 28-Aug-2023 17:30
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:25
Sampler	: RS+AGE 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 13		
No. of samples analysed	: 13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Delson Resende	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Dissolved Metals (QC Lot: 1109878)											
VA23C0044-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0133	0.0133	0.0821%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00333	0.00333	0.00270%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0298	0.0303	1.46%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.021	0.021	0.000008	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	23.5	23.2	1.62%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	0.00166	0.00170	0.00003	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	16.2	16.4	0.911%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	6.52	6.52	0.134%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.752	0.743	1.26%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.000738	0.000718	2.73%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	0.154	0.153	0.0006	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	1.46	1.47	0.320%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00073	0.00075	0.00002	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	11.5	11.4	0.856%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	8.53	8.70	1.90%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.109	0.109	0.0970%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	1.07	0.99	0.08	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1109878) - continued											
VA23C0044-002	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	0.00372	0.00394	5.81%	20%	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000015	0.000014	0.0000006	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	0.00630	0.00636	0.924%	20%	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	0.00057	0.00058	0.000007	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1121291)											
VA23C0065-001	A2MW09-05I	Benzene	71-43-2	E611A	0.50	µg/L	117	110	6.06%	30%	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	1.23	1.04	0.19	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	1.35	1.19	0.16	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	2.56	2.23	0.33	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.32	<0.30	0.30	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1121290)											
VA23C0065-001	A2MW09-05I	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	710	650	8.9%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1109878)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1109878) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 1121291)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1117760)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1121290)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 1121964)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1117761)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1117761) - continued						
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1109878)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	100	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	96.6	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	97.2	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	107	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	94.7	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	95.6	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	97.2	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	98.6	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	97.4	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.4	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.2	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	96.6	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	98.0	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	99.0	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	102	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.3	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	100	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	95.6	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	110	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	102	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	99.9	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	99.5	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	102	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	92.7	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	99.3	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	97.6	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	99.1	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.1	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	95.1	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	97.4	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1109878) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	96.1	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	100	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.3	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	99.5	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	92.6	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	94.1	80.0	120	----
Volatile Organic Compounds (QCLot: 1121291)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	112	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	113	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	115	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	114	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	124	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	113	70.0	130	----
Hydrocarbons (QCLot: 1117760)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	100	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	96.8	70.0	130	----
Hydrocarbons (QCLot: 1121290)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	80.7	70.0	130	----
Hydrocarbons (QCLot: 1121964)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1117761)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	111	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1117761) - continued									
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	99.2	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	93.4	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	95.8	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	97.2	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	113	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	116	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	125	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	123	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	108	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	120	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	120	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1109878)										
VA23C0044-007	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.191 mg/L	0.2 mg/L	95.4	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0183 mg/L	0.02 mg/L	91.5	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0390 mg/L	0.04 mg/L	97.6	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00889 mg/L	0.01 mg/L	88.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.095 mg/L	0.1 mg/L	95.1	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00374 mg/L	0.004 mg/L	93.4	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00938 mg/L	0.01 mg/L	93.8	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0376 mg/L	0.04 mg/L	93.9	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0187 mg/L	0.02 mg/L	93.3	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0181 mg/L	0.02 mg/L	90.3	70.0	130	----
		Iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0185 mg/L	0.02 mg/L	92.4	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.102 mg/L	0.1 mg/L	102	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0186 mg/L	0.02 mg/L	93.2	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0369 mg/L	0.04 mg/L	92.3	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.78 mg/L	10 mg/L	97.8	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	3.86 mg/L	4 mg/L	96.6	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0186 mg/L	0.02 mg/L	92.9	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0380 mg/L	0.04 mg/L	95.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00364 mg/L	0.004 mg/L	91.1	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	19.0 mg/L	20 mg/L	95.3	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0371 mg/L	0.04 mg/L	92.8	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00367 mg/L	0.004 mg/L	91.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1109878) - continued										
VA23C0044-007	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0185 mg/L	0.02 mg/L	92.3	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0381 mg/L	0.04 mg/L	95.2	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0186 mg/L	0.02 mg/L	93.0	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00366 mg/L	0.004 mg/L	91.5	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0962 mg/L	0.1 mg/L	96.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.370 mg/L	0.4 mg/L	92.6	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0408 mg/L	0.04 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 1121291)										
VA23C0065-001	A2MW09-05I	Benzene	71-43-2	E611A	ND µg/L	100 µg/L	ND	60.0	140	----
		Ethylbenzene	100-41-4	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	105 µg/L	100 µg/L	105	60.0	140	----
		Styrene	100-42-5	E611A	98.8 µg/L	100 µg/L	98.8	60.0	140	----
		Toluene	108-88-3	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	217 µg/L	200 µg/L	108	60.0	140	----
		Xylene, o-	95-47-6	E611A	99.7 µg/L	100 µg/L	99.7	60.0	140	----
Hydrocarbons (QCLot: 1121290)										
VA23C0065-002	A2MW09-06I	VHw (C6-C10)	----	E581.VH+F1	4900 µg/L	6310 µg/L	77.7	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Environmental Division Vancouver
Work Order Reference
VA23C0065

Telephone : +1 604 253 4188

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and routine tests

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please cont

Project Information

ALS Account # / Quote #:
Job #: 60704333 / 15402
PO / AFE: ~~AFE161~~ 5737161
LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt Sampler: RS + AGE

Analysis Requi

Indicate Filtered (F), Preserved (P) or Filtered and P

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE	EPH	PAHs (including total PAHs)	LEPH/HEPH	Dissolved Metals(including hardness)	SAMPLES ON HOLD	EXTENDED STORAGE REQUI	SUSPECTED HAZARD (see nc
	A2MW09-05I	28-Aug-23	13:34	GW	4	X		X	X				
	A2MW09-06I		14:01			X		X	X				
	MW11-3I		15:37			X		X	X				
	MW11-3D		15:58			X		X	X				
	MW11-4I		14:50		5	X		X	X	X			
	MW11-4D		15:25		4	X		X	X				
	G2-3B		10:02			X		X	X				
	G2-3C		11:10			X		X	X				
	G2-10		11:53			X		X	X				
	WS2-02		10:57			X		X	X				
	U4-3		11:59		5	X		X	X	X			
	DUP-07		11:10		4	X		X	X				

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to invoice recipient list
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11	16		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug - 28, 2023	17:28

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	Aug 28	5:30 pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

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**.

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Page 2 of 2

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
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☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~57316T~~ 5737161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS+AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	P BTEX/Styrene/VPH/MTBE	P EPH	P PAHs (including total PAHs)	P LEPH/HEPH	F Dissolved Metals(including hardness)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	TRAVEL BLANK - 3	28-Aug-23	16:00	GW	1	X							

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund-sampaga@aecom.com to invoice recipient list.
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				11	16		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Rgd 2 - [illegible]	Aug. 28, 2023	17:28

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DN	Aug 29	5:34pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0183**	Page	: 1 of 4
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Date Analysis Commenced	: 07-Sep-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:26
Sampler	: RS/AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.
Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	*Description*	*Laboratory*	*Address*
A	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab		LOR	Unit	Client sample ID: A2 - 9C	----	----	----	----
						Client sampling date / time: 29-Aug-2023 12:55	----	----	----	----
						VA23C0183-001	--------	--------	--------	--------
						Result	----	----	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	A	0.50	µg/L	<0.50	----	----	----	----
Ethylbenzene	100-41-4	E611A/VA	A	0.50	µg/L	<0.50	----	----	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	A	0.50	µg/L	186	----	----	----	----
Styrene	100-42-5	E611A/VA	A	0.50	µg/L	<0.50	----	----	----	----
Toluene	108-88-3	E611A/VA	A	0.50	µg/L	<0.50	----	----	----	----
Xylene, m+p-	179601-23-1	E611A/VA	A	0.40	µg/L	<0.40	----	----	----	----
Xylene, o-	95-47-6	E611A/VA	A	0.30	µg/L	<0.30	----	----	----	----
Xylenes, total	1330-20-7	E611A/VA		0.50	µg/L	<0.50	----	----	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	A	250	µg/L	<250	----	----	----	----
EPH (C19-C32)	----	E601A/VA	A	250	µg/L	<250	----	----	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	A	100	µg/L	<100	----	----	----	----
HEPHw	----	EC600A/VA		250	µg/L	<250	----	----	----	----
LEPHw	----	EC600A/VA		250	µg/L	<250	----	----	----	----
VPHw	----	EC580A/VA		100	µg/L	<100	----	----	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA		1.0	%	89.1	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA		1.0	%	98.5	----	----	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA		1.0	%	89.0	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA		1.0	%	97.4	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Acridine	260-94-6	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Anthracene	120-12-7	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	A	0.0050	µg/L	<0.0050	----	----	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)										
					Client sample ID	A2 - 9C	----	----	----	----
					Client sampling date / time	29-Aug-2023 12:55	----	----	----	----
Analyte	CAS Number	Method/Lab		LOR	Unit	VA23C0183-001	--------	--------	--------	--------
						Result	----	----	----	----
Polycyclic Aromatic Hydrocarbons										
Benzo(b+j)fluoranthene	n/a	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA		0.015	µg/L	<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Chrysene	218-01-9	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	A	0.0050	µg/L	<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Fluorene	86-73-7	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Naphthalene	91-20-3	E641A/VA	A	0.050	µg/L	<0.050	----	----	----	----
Phenanthrene	85-01-8	E641A/VA	A	0.020	µg/L	<0.020	----	----	----	----
Pyrene	129-00-0	E641A/VA	A	0.010	µg/L	<0.010	----	----	----	----
Quinoline	91-22-5	E641A/VA	A	0.050	µg/L	<0.050	----	----	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA		0.010	µg/L	<0.010	----	----	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA		0.030	µg/L	<0.030	----	----	----	----
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA		0.060	µg/L	<0.060	----	----	----	----
PAHs, total (EPA 16)	n/a	E641A/VA		0.065	µg/L	<0.065	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA		0.1	%	111	----	----	----	----
Naphthalene-d8	1146-65-2	E641A/VA		0.1	%	95.9	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A/VA		0.1	%	112	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C0183**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Issue Date	: 11-Sep-2023 07:26
C-O-C number	: ----		
Sampler	: RS/AGE		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2 - 9C	E601A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
A2 - 9C	E581.VH+F1	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
A2 - 9C	E641A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A2 - 9C	E611A	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23C0183**	Page	: 1 of 6
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:30
PO	: 5737161	Date Analysis Commenced	: 07-Sep-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:26
Sampler	: RS/AGE 604 444 6593		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Volatile Organic Compounds (QC Lot: 1124988)											
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1124989)											
VA23C0072-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 1124988)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1121964)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1124989)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965) - continued						
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 1124988)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	108	70.0	130	----
Hydrocarbons (QCLot: 1121964)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----
Hydrocarbons (QCLot: 1124989)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	94.9	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	125	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	123	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	108	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	120	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965) - continued									
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	120	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%): MS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Volatile Organic Compounds (QCLot: 1124988)										
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Ethylbenzene	100-41-4	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Toluene	108-88-3	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	227 µg/L	200 µg/L	113	60.0	140	----
		Xylene, o-	95-47-6	E611A	110 µg/L	100 µg/L	110	60.0	140	----
Hydrocarbons (QCLot: 1124989)										
VA23C0175-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5700 µg/L	6310 µg/L	90.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1019345

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☒ NO
	Copy of Invoice with Report ☐ YES ☒ NO
Company:	Parkland Refining (B.C.) Ltd.
Contact:	Christopher Boys

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	5737161
LSD:	Burnaby Refinery
ALS Lab Work Order # (ALS use only):	C0183

Reports / Recipients

Select Report Format: ☒ PDF ☒ EXCEL ☒ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☒ YES ☐ NO ☐ N/A

☒ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: johnny.au@aecom.com

Email 2: alberto.garciespinosa@aecom.com

Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: christopher.boys@parkland.ca

Email 2: johnny.au@aecom.com

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt Sampler: RS + AGE

Turnaround Time (TAT) Requested

☒ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/MTBE/VPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	A2-9C	29-Aug-23	12:55	GW	4	X	X	X			

Environmental Division
Vancouver
Work Order Reference
VA23C0183

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

include raymund.sampaga@aecom.com to invoice recipient list - BC CSR.

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
			14				

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug-29, 2023	16:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RC	Aug 29	4:30 pm

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**.

AUG 2020 FRONT

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C0187**	Page	: 1 of 6
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:00
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:26
Sampler	: RS+AGE		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Robert Nguyen	Analsyt	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
RRV	*Reported result verified by repeat analysis.*

Analytical Results

Sub-Matrix: **Groundwater**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-9A	G2-9B	Equipment Blank	----	----
					Client sampling date / time	29-Aug-2023 11:39	29-Aug-2023 11:32	29-Aug-2023 15:30	----	----
						VA23C0187-001	VA23C0187-002	VA23C0187-003	--------	--------
						Result	Result	Result	----	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	600	µg/L		----	----	<600	----	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	1.0	µg/L		----	----	<1.0	----	----
Antimony, dissolved	7440-36-0	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Arsenic, dissolved	7440-38-2	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Barium, dissolved	7440-39-3	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Beryllium, dissolved	7440-41-7	E421/VA	0.020	µg/L		----	----	<0.020	----	----
Bismuth, dissolved	7440-69-9	E421/VA	0.050	µg/L		----	----	<0.050	----	----
Boron, dissolved	7440-42-8	E421/VA	10	µg/L		----	----	<10	----	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0050	µg/L		----	----	<0.0050	----	----
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		----	----	<50	----	----
Cesium, dissolved	7440-46-2	E421/VA	0.010	µg/L		----	----	<0.010	----	----
Chromium, dissolved	7440-47-3	E421/VA	0.50	µg/L		----	----	<0.50	----	----
Cobalt, dissolved	7440-48-4	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Copper, dissolved	7440-50-8	E421/VA	0.20	µg/L		----	----	<0.20	----	----
Iron, dissolved	7439-89-6	E421/VA	10	µg/L		----	----	<10	----	----
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		----	----	<0.050	----	----
Lithium, dissolved	7439-93-2	E421/VA	1.0	µg/L		----	----	<1.0	----	----
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		----	----	<5.0	----	----
Manganese, dissolved	7439-96-5	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.050	µg/L		----	----	<0.050	----	----
Nickel, dissolved	7440-02-0	E421/VA	0.50	µg/L		----	----	<0.50	----	----
Phosphorus, dissolved	7723-14-0	E421/VA	50	µg/L		----	----	<50	----	----
Potassium, dissolved	7440-09-7	E421/VA	50	µg/L		----	----	<50	----	----
Rubidium, dissolved	7440-17-7	E421/VA	0.20	µg/L		----	----	<0.20	----	----
Selenium, dissolved	7782-49-2	E421/VA	0.050	µg/L		----	----	<0.050	----	----
Silicon, dissolved	7440-21-3	E421/VA	50	µg/L		----	----	<50	----	----
Silver, dissolved	7440-22-4	E421/VA	0.010	µg/L		----	----	<0.010	----	----
Sodium, dissolved	7440-23-5	E421/VA	50	µg/L		----	----	<50	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-9A	G2-9B	Equipment Blank	----	----
					Client sampling date / time	29-Aug-2023 11:39	29-Aug-2023 11:32	29-Aug-2023 15:30	----	----
						VA23C0187-001	VA23C0187-002	VA23C0187-003	--------	--------
						Result	Result	Result	----	----
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421/VA	0.20	µg/L		----	----	<0.20	----	----
Sulfur, dissolved	7704-34-9	E421/VA	500	µg/L		----	----	<500	----	----
Tellurium, dissolved	13494-80-9	E421/VA	0.20	µg/L		----	----	<0.20	----	----
Thallium, dissolved	7440-28-0	E421/VA	0.010	µg/L		----	----	<0.010	----	----
Thorium, dissolved	7440-29-1	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Tin, dissolved	7440-31-5	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Titanium, dissolved	7440-32-6	E421/VA	0.30	µg/L		----	----	<0.30	----	----
Tungsten, dissolved	7440-33-7	E421/VA	0.10	µg/L		----	----	<0.10	----	----
Uranium, dissolved	7440-61-1	E421/VA	0.010	µg/L		----	----	<0.010	----	----
Vanadium, dissolved	7440-62-2	E421/VA	0.50	µg/L		----	----	<0.50	----	----
Zinc, dissolved	7440-66-6	E421/VA	1.0	µg/L		----	----	<1.0	----	----
Zirconium, dissolved	7440-67-7	E421/VA	0.30	µg/L		----	----	<0.30	----	----
Dissolved metals filtration location	----	EP421/VA	-	-		----	----	Field	----	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		1.90	6.60	<0.50	----	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	----	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		0.68	<0.40	<0.40	----	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	----	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		0.68	<0.50	<0.50	----	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	----	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	----	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	----	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	----	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	----	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	----	----

Analytical Results

Sub-Matrix: **Groundwater** (Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-9A	G2-9B	Equipment Blank	----	----
					Client sampling date / time	29-Aug-2023 11:39	29-Aug-2023 11:32	29-Aug-2023 15:30	----	----
						VA23C0187-001	VA23C0187-002	VA23C0187-003	--------	--------
						Result	Result	Result	----	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		90.9	87.0	92.8	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		90.0	88.6	102	----	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		86.4	85.7	87.0	----	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		95.6	96.4	95.8	----	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	----	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	----	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.031	0.022	0.011 RRV	----	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		0.051	<0.050	<0.050	----	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	<0.020	----	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		0.044	<0.010	<0.010	----	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	<0.050	----	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	----	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		0.044	<0.030	<0.030	----	----

Analytical Results

Sub-Matrix: Groundwater (Matrix: Water)					Client sample ID	G2-9A	G2-9B	Equipment Blank	----	----
					Client sampling date / time	29-Aug-2023 11:39	29-Aug-2023 11:32	29-Aug-2023 15:30	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C0187-001	VA23C0187-002	VA23C0187-003	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons										
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.060	<0.060	<0.060	----	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		0.095	<0.065	<0.065	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		105	98.8	109	----	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		99.7	98.4	99.6	----	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		111	114	112	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C0187**	Page	: 1 of 7
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:00
PO	: 5737161	Issue Date	: 11-Sep-2023 07:26
C-O-C number	: ----		
Sampler	: RS+AGE		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
Equipment Blank	E421	29-Aug-2023	30-Aug-2023	180 days	1 days	✓	02-Sep-2023	180 days	4 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Equipment Blank	E601A	29-Aug-2023	07-Sep-2023	14 days	8 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-9A	E601A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-9B	E601A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Equipment Blank	E581.VH+F1	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G2-9A	E581.VH+F1	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G2-9B	E581.VH+F1	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
Equipment Blank	E641A	29-Aug-2023	07-Sep-2023	14 days	8 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-9A	E641A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
G2-9B	E641A	29-Aug-2023	07-Sep-2023	14 days	9 days	✓	07-Sep-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Equipment Blank	E611A	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-9A	E611A	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
G2-9B	E611A	29-Aug-2023	08-Sep-2023	14 days	10 days	✓	08-Sep-2023	14 days	10 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1111217	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1111217	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	2	12	16.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1121964	1	13	7.6	5.0	✓
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1111217	1	17	5.8	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1121965	2	12	16.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1124988	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1111217	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1124989	1	9	11.1	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23C0187**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Stephen Sumsion	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 29-Aug-2023 16:00
PO	: 5737161	Date Analysis Commenced	: 30-Aug-2023
C-O-C number	: ----	Issue Date	: 11-Sep-2023 07:26
Sampler	: RS+AGE 604-444-6400		
Site	: Burnby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Robert Nguyen	Analsyt	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1111217)											
VA23C0207-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0145	0.0146	0.536%	20%	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	0.00589	0.00588	0.103%	20%	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00292	0.00295	0.843%	20%	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0470	0.0469	0.228%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.056	0.058	0.002	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	0.0000072	0.0000084	0.0000011	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	19.3	18.6	3.77%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.00132	0.00130	1.79%	20%	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0390	0.0384	1.55%	20%	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	1.14	1.16	1.18%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.00759	0.00760	0.232%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00570	0.00567	0.593%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	7.83	7.85	0.238%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00987	0.00961	2.72%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	0.000598	0.000639	6.66%	20%	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	1.11	1.10	0.157%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	19.1	19.2	0.599%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.325	0.320	1.79%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	15.7	15.9	1.25%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1111217) - continued											
VA23C0207-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	0.000032	0.000031	0.000001	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00062	0.00062	0.000006	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000268	0.000261	2.84%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1124988)											
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1124989)											
VA23C0072-023	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1111217)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1111217) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 1124988)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1121964)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1124989)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1124065)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1111217)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	98.1	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	99.3	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	101	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	99.9	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	100	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	96.5	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	98.9	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	99.3	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	100	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	95.5	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	97.7	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.2	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	98.8	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	103	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	97.2	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	97.7	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	98.0	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	102	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	97.2	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	101	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	99.5	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	97.3	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	97.8	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	103	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	97.3	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	98.3	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	100	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	90.9	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	107	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	102	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	98.0	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	98.0	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1111217) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	94.2	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	102	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	101	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	97.7	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	98.5	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	94.6	80.0	120	----
Volatile Organic Compounds (QCLot: 1124988)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	105	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	112	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	108	70.0	130	----
Hydrocarbons (QCLot: 1121964)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	112	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	109	70.0	130	----
Hydrocarbons (QCLot: 1124989)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	94.9	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	125	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	123	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1121965) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	108	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	120	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	120	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1124065)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	120	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	123	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	119	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	115	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	123	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	102	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1111217)										
VA23C0207-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.194 mg/L	0.2 mg/L	97.1	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0196 mg/L	0.02 mg/L	98.1	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0393 mg/L	0.04 mg/L	98.2	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00887 mg/L	0.01 mg/L	88.7	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.089 mg/L	0.1 mg/L	88.7	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00392 mg/L	0.004 mg/L	97.9	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00973 mg/L	0.01 mg/L	97.3	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0386 mg/L	0.04 mg/L	96.6	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0190 mg/L	0.02 mg/L	95.0	70.0	130	----
		Iron, dissolved	7439-89-6	E421	1.91 mg/L	2 mg/L	95.4	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0200 mg/L	0.02 mg/L	99.8	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0932 mg/L	0.1 mg/L	93.2	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0192 mg/L	0.02 mg/L	96.3	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0195 mg/L	0.02 mg/L	97.6	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0392 mg/L	0.04 mg/L	98.1	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	9.66 mg/L	10 mg/L	96.6	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0188 mg/L	0.02 mg/L	93.9	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0388 mg/L	0.04 mg/L	97.0	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	9.72 mg/L	10 mg/L	97.2	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00388 mg/L	0.004 mg/L	97.0	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	20.5 mg/L	20 mg/L	102	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0420 mg/L	0.04 mg/L	105	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00386 mg/L	0.004 mg/L	96.6	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1111217) - continued										
VA23C0207-002	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0210 mg/L	0.02 mg/L	105	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0383 mg/L	0.04 mg/L	95.6	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0200 mg/L	0.02 mg/L	99.9	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00383 mg/L	0.004 mg/L	95.6	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0974 mg/L	0.1 mg/L	97.4	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.397 mg/L	0.4 mg/L	99.3	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0410 mg/L	0.04 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 1124988)										
FJ2302204-001	Anonymous	Benzene	71-43-2	E611A	103 µg/L	100 µg/L	103	60.0	140	----
		Ethylbenzene	100-41-4	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Styrene	100-42-5	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Toluene	108-88-3	E611A	111 µg/L	100 µg/L	111	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	227 µg/L	200 µg/L	113	60.0	140	----
		Xylene, o-	95-47-6	E611A	110 µg/L	100 µg/L	110	60.0	140	----
Hydrocarbons (QCLot: 1124989)										
VA23C0175-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5700 µg/L	6310 µg/L	90.3	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: johnny.au@aecom.com
Email 2: alberto.garciaespinosa@aecom.com
Email 3: raymund.sampaga@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: johnny.au@aecom.com

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

Project Information

ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~570404~~ 5737161
LSD:	Burnaby Refinery

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#:
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (ALS use only):

ALS Contact: Dean Watt

Sampler: RS + AGE

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (F)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	G2-9A	29-Aug-23	11:39	GW	4	X		X	X				
	G2-9B	↓	11:32	↓	4	X		X	X				
	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~X~~		~~X~~	~~X~~				
	Equipment Blank	29-Aug-23	15:30	GW	5	X		X	X	X			

Environmental Division
Vancouver
Work Order Reference
VA23C0187

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Include raymund.sampaga@aecom.com to invoice recipient list.
BC CSR
Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
14°	

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Raymund Sampaga	Aug-29, 2023	16:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
PC	Aug 29	4:30 Pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

CERTIFICATE OF ANALYSIS

Work Order	: **VA23B9829**	Page	: 1 of 10
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 24-Aug-2023 17:15
PO	: 5737161	Date Analysis Commenced	: 28-Aug-2023
C-O-C number	: ----	Issue Date	: 05-Sep-2023 12:55
Sampler	: AGE, RS		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
µg/L	micrograms per litre

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
DLQ	*Detection Limit raised due to co-eluting interference. Mass Spectrometry qualifier ion ratio did not meet acceptance criteria.*

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-11A	G2-11B	MW11-3S	MW11-4S	DUP-06
					Client sampling date / time	24-Aug-2023 09:15	24-Aug-2023 09:35	24-Aug-2023 10:42	24-Aug-2023 10:26	24-Aug-2023 10:26
						VA23B9829-001	VA23B9829-002	VA23B9829-003	VA23B9829-004	VA23B9829-005
						Result	Result	Result	Result	Result
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	600	µg/L		----	----	35600	48000	51500
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	1.0	µg/L		----	----	8.3	9.8	10.1
Antimony, dissolved	7440-36-0	E421/VA	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Arsenic, dissolved	7440-38-2	E421/VA	0.10	µg/L		----	----	0.48	0.50	0.54
Barium, dissolved	7440-39-3	E421/VA	0.10	µg/L		----	----	42.8	32.8	35.2
Beryllium, dissolved	7440-41-7	E421/VA	0.020	µg/L		----	----	<0.020	<0.020	<0.020
Bismuth, dissolved	7440-69-9	E421/VA	0.050	µg/L		----	----	<0.050	<0.050	<0.050
Boron, dissolved	7440-42-8	E421/VA	10	µg/L		----	----	24	30	30
Cadmium, dissolved	7440-43-9	E421/VA	0.0050	µg/L		----	----	0.0437	0.113	0.118
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		----	----	10600	13100	13800
Cesium, dissolved	7440-46-2	E421/VA	0.010	µg/L		----	----	<0.010	0.026	0.027
Chromium, dissolved	7440-47-3	E421/VA	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Cobalt, dissolved	7440-48-4	E421/VA	0.10	µg/L		----	----	0.12	10.7	11.2
Copper, dissolved	7440-50-8	E421/VA	0.20	µg/L		----	----	0.35	21.2	22.4
Iron, dissolved	7439-89-6	E421/VA	10	µg/L		----	----	69	36	37
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		----	----	<0.050	<0.050	<0.050
Lithium, dissolved	7439-93-2	E421/VA	1.0	µg/L		----	----	<1.0	<1.0	<1.0
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		----	----	2210	3720	4140
Manganese, dissolved	7439-96-5	E421/VA	0.10	µg/L		----	----	20.6	1510	1560
Molybdenum, dissolved	7439-98-7	E421/VA	0.050	µg/L		----	----	<0.050	0.085	0.087
Nickel, dissolved	7440-02-0	E421/VA	0.50	µg/L		----	----	0.71	7.71	8.22
Phosphorus, dissolved	7723-14-0	E421/VA	50	µg/L		----	----	<50	<50	<50
Potassium, dissolved	7440-09-7	E421/VA	50	µg/L		----	----	1290	1320	1400
Rubidium, dissolved	7440-17-7	E421/VA	0.20	µg/L		----	----	1.27	3.67	3.87
Selenium, dissolved	7782-49-2	E421/VA	0.050	µg/L		----	----	0.066	0.075	0.095
Silicon, dissolved	7440-21-3	E421/VA	50	µg/L		----	----	5820	4300	4410
Silver, dissolved	7440-22-4	E421/VA	0.010	µg/L		----	----	<0.010	<0.010	<0.010
Sodium, dissolved	7440-23-5	E421/VA	50	µg/L		----	----	72800	174000	181000

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-11A	G2-11B	MW11-3S	MW11-4S	DUP-06
					Client sampling date / time	24-Aug-2023 09:15	24-Aug-2023 09:35	24-Aug-2023 10:42	24-Aug-2023 10:26	24-Aug-2023 10:26
						VA23B9829-001	VA23B9829-002	VA23B9829-003	VA23B9829-004	VA23B9829-005
						Result	Result	Result	Result	Result
Dissolved Metals										
Strontium, dissolved	7440-24-6	E421/VA	0.20	µg/L		----	----	166	172	183
Sulfur, dissolved	7704-34-9	E421/VA	500	µg/L		----	----	14400	20300	19700
Tellurium, dissolved	13494-80-9	E421/VA	0.20	µg/L		----	----	<0.20	<0.20	<0.20
Thallium, dissolved	7440-28-0	E421/VA	0.010	µg/L		----	----	<0.010	0.023	0.023
Thorium, dissolved	7440-29-1	E421/VA	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Tin, dissolved	7440-31-5	E421/VA	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Titanium, dissolved	7440-32-6	E421/VA	0.30	µg/L		----	----	<0.30	<0.30	<0.30
Tungsten, dissolved	7440-33-7	E421/VA	0.10	µg/L		----	----	<0.10	<0.10	<0.10
Uranium, dissolved	7440-61-1	E421/VA	0.010	µg/L		----	----	<0.010	0.027	0.030
Vanadium, dissolved	7440-62-2	E421/VA	0.50	µg/L		----	----	<0.50	<0.50	<0.50
Zinc, dissolved	7440-66-6	E421/VA	1.0	µg/L		----	----	1.2	7.3	7.8
Zirconium, dissolved	7440-67-7	E421/VA	0.30	µg/L		----	----	<0.30	<0.30	<0.30
Dissolved metals filtration location	----	EP421/VA	-	-		----	----	Field	Field	Field
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		1.27	0.55	<0.50	<0.50	<0.50
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	0.84	0.46	<0.40	<0.40
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	<0.30
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	0.84	<0.50	<0.50	<0.50
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	<100
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	<250
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-11A	G2-11B	MW11-3S	MW11-4S	DUP-06
					Client sampling date / time	24-Aug-2023 09:15	24-Aug-2023 09:35	24-Aug-2023 10:42	24-Aug-2023 10:26	24-Aug-2023 10:26
						VA23B9829-001	VA23B9829-002	VA23B9829-003	VA23B9829-004	VA23B9829-005
						Result	Result	Result	Result	Result
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		83.2	85.8	81.9	88.6	86.2
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		78.9	93.6	87.0	84.9	90.9
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		101	102	102	103	101
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		105	105	104	105	105
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		0.015	<0.010	<0.010	<0.010	<0.010
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		0.013	0.010	<0.010	0.013	0.011
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.016	0.026	0.024	0.018	0.016
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.065 DLQ	<0.065 DLQ	<0.050	<0.065 DLCI	<0.060 DLCI
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	<0.020
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		<0.030	<0.030	<0.030	<0.030	<0.030

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	G2-11A	G2-11B	MW11-3S	MW11-4S	DUP-06
					Client sampling date / time	24-Aug-2023 09:15	24-Aug-2023 09:35	24-Aug-2023 10:42	24-Aug-2023 10:26	24-Aug-2023 10:26
						VA23B9829-001	VA23B9829-002	VA23B9829-003	VA23B9829-004	VA23B9829-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.071	<0.071	<0.060	<0.071	<0.066
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		<0.077	<0.077	<0.065	<0.077	<0.072
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		118	126	107	130	112
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		105	102	92.4	115	98.5
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		116	115	100	125	106

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	WS2-D	MW3	MW5	U4-1	----
					Client sampling date / time	24-Aug-2023 14:03	24-Aug-2023 15:56	24-Aug-2023 14:54	24-Aug-2023 14:55	----
						VA23B9829-006	VA23B9829-007	VA23B9829-008	VA23B9829-009	--------
						Result	Result	Result	Result	----
Physical Tests										
Hardness (as CaCO3), dissolved	----	EC100/VA	600	µg/L		----	668000	104000	47700	----
Dissolved Metals										
Aluminum, dissolved	7429-90-5	E421/VA	1.0	µg/L		----	<1.0	66.8	2.0	----
Antimony, dissolved	7440-36-0	E421/VA	0.10	µg/L		----	<0.10	0.11	<0.10	----
Arsenic, dissolved	7440-38-2	E421/VA	0.10	µg/L		----	0.30	0.17	<0.10	----
Barium, dissolved	7440-39-3	E421/VA	0.10	µg/L		----	27.1	49.4	9.22	----
Beryllium, dissolved	7440-41-7	E421/VA	0.020	µg/L		----	<0.020	0.094	<0.020	----
Bismuth, dissolved	7440-69-9	E421/VA	0.050	µg/L		----	<0.050	<0.050	<0.050	----
Boron, dissolved	7440-42-8	E421/VA	10	µg/L		----	21	17	<10	----
Cadmium, dissolved	7440-43-9	E421/VA	0.0050	µg/L		----	0.0090	0.242	0.0274	----
Calcium, dissolved	7440-70-2	E421/VA	50	µg/L		----	97600	33400	8040	----
Cesium, dissolved	7440-46-2	E421/VA	0.010	µg/L		----	0.015	0.017	<0.010	----
Chromium, dissolved	7440-47-3	E421/VA	0.50	µg/L		----	<0.50	<0.50	<0.50	----
Cobalt, dissolved	7440-48-4	E421/VA	0.10	µg/L		----	0.49	7.70	<0.10	----
Copper, dissolved	7440-50-8	E421/VA	0.20	µg/L		----	<0.20	1.93	0.37	----
Iron, dissolved	7439-89-6	E421/VA	10	µg/L		----	17600	11	<10	----
Lead, dissolved	7439-92-1	E421/VA	0.050	µg/L		----	<0.050	<0.050	<0.050	----
Lithium, dissolved	7439-93-2	E421/VA	1.0	µg/L		----	1.3	1.2	1.2	----
Magnesium, dissolved	7439-95-4	E421/VA	5.0	µg/L		----	103000	5020	6720	----
Manganese, dissolved	7439-96-5	E421/VA	0.10	µg/L		----	2370	601	0.78	----
Molybdenum, dissolved	7439-98-7	E421/VA	0.050	µg/L		----	<0.050	<0.050	<0.050	----
Nickel, dissolved	7440-02-0	E421/VA	0.50	µg/L		----	1.44	5.30	0.98	----
Phosphorus, dissolved	7723-14-0	E421/VA	50	µg/L		----	53	<50	<50	----
Potassium, dissolved	7440-09-7	E421/VA	50	µg/L		----	3820	2570	852	----
Rubidium, dissolved	7440-17-7	E421/VA	0.20	µg/L		----	1.66	2.39	<0.20	----
Selenium, dissolved	7782-49-2	E421/VA	0.050	µg/L		----	0.090	0.085	0.122	----
Silicon, dissolved	7440-21-3	E421/VA	50	µg/L		----	15600	13900	10400	----
Silver, dissolved	7440-22-4	E421/VA	0.010	µg/L		----	<0.010	<0.010	<0.010	----
Sodium, dissolved	7440-23-5	E421/VA	50	µg/L		----	38300	35900	7200	----
Strontium, dissolved	7440-24-6	E421/VA	0.20	µg/L		----	758	384	64.2	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WS2-D	MW3	MW5	U4-1	----
					Client sampling date / time	24-Aug-2023 14:03	24-Aug-2023 15:56	24-Aug-2023 14:54	24-Aug-2023 14:55	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9829-006	VA23B9829-007	VA23B9829-008	VA23B9829-009	--------
						Result	Result	Result	Result	----
Dissolved Metals										
Sulfur, dissolved	7704-34-9	E421/VA	500	µg/L		----	64800	18900	6070	----
Tellurium, dissolved	13494-80-9	E421/VA	0.20	µg/L		----	<0.20	<0.20	<0.20	----
Thallium, dissolved	7440-28-0	E421/VA	0.010	µg/L		----	<0.010	0.033	<0.010	----
Thorium, dissolved	7440-29-1	E421/VA	0.10	µg/L		----	<0.10	<0.10	<0.10	----
Tin, dissolved	7440-31-5	E421/VA	0.10	µg/L		----	<0.10	<0.10	<0.10	----
Titanium, dissolved	7440-32-6	E421/VA	0.30	µg/L		----	<0.30	<0.30	<0.30	----
Tungsten, dissolved	7440-33-7	E421/VA	0.10	µg/L		----	<0.10	<0.10	<0.10	----
Uranium, dissolved	7440-61-1	E421/VA	0.010	µg/L		----	0.116	0.080	<0.010	----
Vanadium, dissolved	7440-62-2	E421/VA	0.50	µg/L		----	<0.50	<0.50	<0.50	----
Zinc, dissolved	7440-66-6	E421/VA	1.0	µg/L		----	1.5	20.8	1.8	----
Zirconium, dissolved	7440-67-7	E421/VA	0.30	µg/L		----	<0.30	<0.30	<0.30	----
Dissolved metals filtration location	----	EP421/VA	-	-		----	Field	Field	Field	----
Volatile Organic Compounds [Fuels]										
Benzene	71-43-2	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Ethylbenzene	100-41-4	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A/VA	0.50	µg/L		2.86	<0.50	<0.50	<0.50	----
Styrene	100-42-5	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Toluene	108-88-3	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	----
Xylene, m+p-	179601-23-1	E611A/VA	0.40	µg/L		<0.40	<0.40	<0.40	0.81	----
Xylene, o-	95-47-6	E611A/VA	0.30	µg/L		<0.30	<0.30	<0.30	<0.30	----
Xylenes, total	1330-20-7	E611A/VA	0.50	µg/L		<0.50	<0.50	<0.50	0.81	----
Hydrocarbons										
EPH (C10-C19)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	----
EPH (C19-C32)	----	E601A/VA	250	µg/L		<250	<250	<250	<250	----
VHw (C6-C10)	----	E581.VH+F1/VA	100	µg/L		<100	<100	<100	<100	----
HEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	----
LEPHw	----	EC600A/VA	250	µg/L		<250	<250	<250	<250	----
VPHw	----	EC580A/VA	100	µg/L		<100	<100	<100	<100	----
Hydrocarbons Surrogates										

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WS2-D	MW3	MW5	U4-1	----
					Client sampling date / time	24-Aug-2023 14:03	24-Aug-2023 15:56	24-Aug-2023 14:54	24-Aug-2023 14:55	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9829-006	VA23B9829-007	VA23B9829-008	VA23B9829-009	--------
						Result	Result	Result	Result	----
Hydrocarbons Surrogates										
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A/VA	1.0	%		86.5	90.1	84.3	87.8	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1/VA	1.0	%		91.6	80.9	85.5	89.7	----
Volatile Organic Compounds Surrogates										
Bromofluorobenzene, 4-	460-00-4	E611A/VA	1.0	%		101	97.2	101	100	----
Difluorobenzene, 1,4-	540-36-3	E611A/VA	1.0	%		104	104	104	103	----
Polycyclic Aromatic Hydrocarbons										
Acenaphthene	83-32-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Acenaphthylene	208-96-8	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Acridine	260-94-6	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Anthracene	120-12-7	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benz(a)anthracene	56-55-3	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(a)pyrene	50-32-8	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(b+j+k)fluoranthene	n/a	E641A/VA	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	----
Benzo(g,h,i)perylene	191-24-2	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Chrysene	218-01-9	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A/VA	0.0050	µg/L		<0.0050	<0.0050	<0.0050	<0.0050	----
Fluoranthene	206-44-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Fluorene	86-73-7	E641A/VA	0.010	µg/L		<0.010	<0.010	0.014	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	0.016	----
Methylnaphthalene, 2-	91-57-6	E641A/VA	0.010	µg/L		0.017	0.016	0.012	0.050	----
Naphthalene	91-20-3	E641A/VA	0.050	µg/L		<0.050	<0.050	<0.050	0.106	----
Phenanthrene	85-01-8	E641A/VA	0.020	µg/L		<0.020	<0.020	<0.020	<0.020	----
Pyrene	129-00-0	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
Quinoline	91-22-5	E641A/VA	0.050	µg/L		<0.050	<0.050	<0.050	<0.050	----
B(a)P total potency equivalents [B(a)P TPE]	----	E641A/VA	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	----
PAHs, high molecular weight (BC AWQ)	n/a	E641A/VA	0.030	µg/L		<0.030	<0.030	<0.030	<0.030	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)					Client sample ID	WS2-D	MW3	MW5	U4-1	----
					Client sampling date / time	24-Aug-2023 14:03	24-Aug-2023 15:56	24-Aug-2023 14:54	24-Aug-2023 14:55	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23B9829-006	VA23B9829-007	VA23B9829-008	VA23B9829-009	--------
						Result	Result	Result	Result	----
Polycyclic Aromatic Hydrocarbons										
PAHs, low molecular weight (BC AWQ)	n/a	E641A/VA	0.060	µg/L		<0.060	<0.060	<0.060	0.106	----
PAHs, total (EPA 16)	n/a	E641A/VA	0.065	µg/L		<0.065	<0.065	<0.065	0.106	----
Polycyclic Aromatic Hydrocarbons Surrogates										
Chrysene-d12	1719-03-5	E641A/VA	0.1	%		114	124	101	128	----
Naphthalene-d8	1146-65-2	E641A/VA	0.1	%		94.9	105	97.6	112	----
Phenanthrene-d10	1517-22-2	E641A/VA	0.1	%		99.6	113	100.0	118	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23B9829**	Page	: 1 of 10
Client	: **AECOM Canada Ltd.**	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 330 - 3292 Production Way Burnaby BC Canada V5A 4R4	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 444 6593	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 24-Aug-2023 17:15
PO	: 5737161	Issue Date	: 05-Sep-2023 12:55
C-O-C number	: ----		
Sampler	: AGE, RS		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) DUP-06	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-3S	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW11-4S	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW3	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) MW5	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) U4-1	E421	24-Aug-2023	28-Aug-2023	180 days	4 days	✓	29-Aug-2023	180 days	5 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-06	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11A	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11B	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3S	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-4S	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW3	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) MW5	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) U4-1	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D	E601A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) DUP-06	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G2-11A	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
G2-11B	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-3S	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW11-4S	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW3	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
MW5	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
U4-1	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
WS2-D	E581.VH+F1	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-06	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11A	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) G2-11B	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-3S	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW11-4S	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW3	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) MW5	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) U4-1	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) WS2-D	E641A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-06	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-11A	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) G2-11B	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW11-3S	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW11-4S	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW3	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) MW5	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) U4-1	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) WS2-D	E611A	24-Aug-2023	02-Sep-2023	14 days	9 days	✓	02-Sep-2023	14 days	9 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	1117137	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1105708	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1117136	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	1116781	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	1117137	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1105708	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1116782	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1117136	1	19	5.2	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	1116781	1	12	8.3	5.0	✓
BTEX by Headspace GC-MS	E611A	1117137	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1105708	1	20	5.0	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	1116782	1	13	7.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1117136	1	19	5.2	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	1117137	1	19	5.2	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	1105708	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	1117136	1	19	5.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Vancouver	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
VH and F1 by Headspace GC-FID	E581.VH+F1 ALS Environmental - Vancouver	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law. Analytical methods for CCME Petroleum Hydrocarbons (PHCs) are validated to comply fully with the Reference Method for the Canada-Wide Standard for PHC. Unless qualified, all required quality control criteria of the CCME PHC method have been met, including response factor and linearity requirements.
BC PHCs - EPH by GC-FID	E601A ALS Environmental - Vancouver	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A ALS Environmental - Vancouver	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A ALS Environmental - Vancouver	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Vancouver	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A ALS Environmental - Vancouver	Water	BC MOE Lab Manual (LEPH and HEPH)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 ALS Environmental - Vancouver	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Vancouver	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Vancouver	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **VA23B9829**	Page	: 1 of 12
Client	: AECOM Canada Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Johnny Au	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704333/15402	Date Samples Received	: 24-Aug-2023 17:15
PO	: 5737161	Date Analysis Commenced	: 28-Aug-2023
C-O-C number	: ----	Issue Date	: 05-Sep-2023 12:55
Sampler	: AGE, RS 604 444 6593		
Site	: ----		
Quote number	: AECOM/Parkland		
No. of samples received	: 9		
No. of samples analysed	: 9		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1105708)											
KS2303181-001	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	0.0022	0.0025	0.0003	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	0.00044	0.00045	0.000008	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	0.0270	0.0266	1.69%	20%	----
		Beryllium, dissolved	7440-41-7	E421	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	0.325	0.330	1.40%	20%	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	21.0	20.7	1.26%	20%	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	0.000084	0.000081	0.000002	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	0.470	0.476	1.34%	20%	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	0.0024	0.0024	0.00004	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	10.4	10.5	1.80%	20%	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	0.132	0.133	0.859%	20%	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	0.00808	0.00829	2.60%	20%	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	1.28	1.34	4.00%	20%	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	8.49	8.64	1.74%	20%	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	0.00874	0.00871	0.296%	20%	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	17.2	17.8	3.75%	20%	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	271	274	1.12%	20%	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	0.416	0.420	0.859%	20%	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	14.2	14.8	3.86%	20%	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 1105708) - continued											
KS2303181-001	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	0.00076	0.00077	0.00001	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	0.000334	0.000339	1.48%	20%	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 1117137)											
KS2303193-002	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 1117136)											
KS2303193-002	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1105708)						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 1105708) - continued						
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Volatile Organic Compounds (QCLot: 1117137)						
Benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	<0.50	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	<0.50	----
Styrene	100-42-5	E611A	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611A	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	<0.30	----
Hydrocarbons (QCLot: 1116781)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 1117136)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1116782)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1116782) - continued						
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1105708)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	2 mg/L	99.7	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	1 mg/L	108	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	1 mg/L	104	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.25 mg/L	100	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.1 mg/L	93.0	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	1 mg/L	102	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	1 mg/L	92.9	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.1 mg/L	104	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	50 mg/L	96.5	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.25 mg/L	100	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.25 mg/L	101	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.5	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	1 mg/L	100	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.5 mg/L	102	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.25 mg/L	96.7	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	50 mg/L	109	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.25 mg/L	102	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.25 mg/L	101	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	10 mg/L	97.5	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	50 mg/L	100	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.1 mg/L	101	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	1 mg/L	105	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	10 mg/L	107	80.0	120	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.1 mg/L	99.9	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	50 mg/L	110	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	50 mg/L	89.0	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.1 mg/L	95.4	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	1 mg/L	105	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.1 mg/L	99.9	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.5 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 1105708) - continued									
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.25 mg/L	98.6	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.1 mg/L	97.0	80.0	120	----
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0.005 mg/L	98.5	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.5 mg/L	101	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	99.5	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.1 mg/L	99.7	80.0	120	----
Volatile Organic Compounds (QCLot: 1117137)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	96.0	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	111	70.0	130	----
Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	0.5	µg/L	100 µg/L	99.5	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	103	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	107	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	107	70.0	130	----
Hydrocarbons (QCLot: 1116781)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	104	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 1117136)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	76.1	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 1116782)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	128	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	126	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	121	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	125	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	127	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	130	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	124	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 1116782) - continued									
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	121	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	126	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	115	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	128	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	124	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	121	60.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1105708)										
KS2303181-002	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.203 mg/L	0.2 mg/L	101	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0212 mg/L	0.02 mg/L	106	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0207 mg/L	0.02 mg/L	104	70.0	130	----
		Barium, dissolved	7440-39-3	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.0382 mg/L	0.04 mg/L	95.6	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.00929 mg/L	0.01 mg/L	92.9	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.097 mg/L	0.1 mg/L	96.9	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00407 mg/L	0.004 mg/L	102	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.0104 mg/L	0.01 mg/L	104	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0394 mg/L	0.04 mg/L	98.6	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0193 mg/L	0.02 mg/L	96.5	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		Iron, dissolved	7439-89-6	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0186 mg/L	0.02 mg/L	93.1	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0930 mg/L	0.1 mg/L	93.0	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0204 mg/L	0.02 mg/L	102	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0383 mg/L	0.04 mg/L	95.7	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	10.1 mg/L	10 mg/L	101	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	ND mg/L	4 mg/L	ND	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0442 mg/L	0.04 mg/L	110	70.0	130	----
		Silicon, dissolved	7440-21-3	E421	ND mg/L	10 mg/L	ND	70.0	130	----
		Silver, dissolved	7440-22-4	E421	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	19.5 mg/L	20 mg/L	97.5	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.0395 mg/L	0.04 mg/L	98.8	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.00375 mg/L	0.004 mg/L	93.8	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 1105708) - continued										
KS2303181-002	Anonymous	Thorium, dissolved	7440-29-1	E421	0.0208 mg/L	0.02 mg/L	104	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0402 mg/L	0.04 mg/L	100	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.0187 mg/L	0.02 mg/L	93.6	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.00378 mg/L	0.004 mg/L	94.6	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0992 mg/L	0.1 mg/L	99.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.377 mg/L	0.4 mg/L	94.2	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.0409 mg/L	0.04 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 1117137)										
KS2303193-003	Anonymous	Benzene	71-43-2	E611A	93.5 µg/L	100 µg/L	93.5	60.0	140	----
		Ethylbenzene	100-41-4	E611A	107 µg/L	100 µg/L	107	60.0	140	----
		Methyl-tert-butyl ether [MTBE]	1634-04-4	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
		Styrene	100-42-5	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Toluene	108-88-3	E611A	99.8 µg/L	100 µg/L	99.8	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	206 µg/L	200 µg/L	103	60.0	140	----
		Xylene, o-	95-47-6	E611A	104 µg/L	100 µg/L	104	60.0	140	----
Hydrocarbons (QCLot: 1117136)										
KS2303193-004	Anonymous	VHw (C6-C10)	----	E581.VH+F1	6880 µg/L	6310 µg/L	109	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Johnny Au
Phone:	604-444-6400
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☑ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	Parkland Refinery (B.C.) Ltd.
Contact:	Christopher Boys

Project Information	
ALS Account # / Quote #:	
Job #:	60704333 / 15402
PO / AFE:	~~5,70161~~ 5737161
LSD:	Burnaby Refinery

ALS Lab Work Order # (ALS use only): BAR29

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	johnny.au@aecom.com
Email 2	alberto.garciaespinosa@aecom.com
Email 3	raymund.sampaga@aecom.com

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	christopher.boys@parkland.ca
Email 2	johnny.au@aecom.com

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Contact: Dean Watt **Sampler:** RS + AGE

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm
For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	BTEX/Styrene/VPH/MTBE (P)	EPH (P)	PAHs (including total PAHs) (P)	LEPH/HEPH (P)	Dissolved Metals(including hardness) (F)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
1	G2-11A	24-Aug-23	9:15	GW	4	X		X	X				
2	G2-11B		9:35		4	X		X	X				
3	MW11-35		10:42		5	X		X	X	X			
4	MW11-45		10:26		5	X		X	X	X			
5	DUP-06		10:26		5	X		X	X	X			
6	WS2-D		14:03		4	X		X	X				
7	MW3		15:56		5	X		X	X	X			
8	MW5		14:54		5	X		X	X	X			
9	MW4-1		14:55		5	X		X	X	X			

Environmental Division
Vancouver
Work Order Reference
VA23B9829

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Include raymund.sampaga@aecom.com to invoice recipient list.
Are samples for human consumption/ use? ☐ YES ☑ NO	BC CSR Do not test for Mercury (dissolved metals)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				7			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: Aug-24, 2023	Time: 17:15	Received by:	Date:	Time:	Received by: AS	Date: 08/24/23	Time: 5:18 PM

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WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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.**

Appendix D Quality Assurance and Quality Control Summary

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To confirm the integrity and reliability of the data, AECOM field staff followed pre-existing QA/QC protocols during the execution of the 2023 PMP. The procedures have resulted in a dataset that achieves the project objectives. The method, summary of data, and evaluation are described in this appendix.

Data Quality Assurance/Quality Control (QA/QC)

To ensure the integrity and defensibility of the data collected, rigorous QA/QC protocols were implemented for the collection, identification, storage, shipment, and documentation of the samples. Standard operating procedures (SOPs) for sample collection and storage, equipment decontamination, and sample chain of custody protocols were followed. Groundwater samples were collected using sampling techniques presented in **Appendix B**. The use of these methods confirmed the quality, soundness, and defensibility of the data obtained. The laboratory analytical data, once generated, was also proofed for inconsistencies and anomalies. Field duplicates, trip blanks, and equipment blanks were collected for QA/QC purposes.

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 indicates 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.

Travel Blanks

Travel blanks are samples of clean deionized and distilled (Reagent Grade Type II) water that is 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 travel blanks with detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination during transport.

Travel blanks prepared by ALS Environmental were submitted with each batch of samples submitted to the laboratory for analysis. The following describes the results of the travel blanks, by area. No concerns with the data were identified related to the Travel Blanks.

Area 2

A total of four travel blank samples were submitted with Area 2 groundwater samples during the 2023 PMP. The travel blanks were analyzed for BTEX/VPHw, VHwC6-C10, styrene, and MTBE. Concentrations for all samples were less than the RDLs.

The reported analytical results for the travel blanks are represented in the laboratory Certificates of Analysis provided in **Appendix C** and summarized in **Table 2-2**.

Area 1 and Area 3

A total of five travel blank samples were submitted with Area 1 and 3 groundwater samples during the 2023 PMP. The travel blanks were analyzed for BTEX/VPHw, VHw, styrene, and MTBE. Concentrations for all samples were less than the RDLs.

The reported analytical results for the travel blanks are presented in the laboratory Certificates of Analysis provided in **Appendix C** and summarized at the bottom of **Table 1-2**.

Equipment Blanks

Equipment blanks are samples taken by pouring clean deionized and distilled (Reagent Grade Type II) water, prepared in the laboratory, over the surface of the decontaminated interface probe used during the program, and into laboratory provided sample containers. The decontamination method used is the same as outlined in the SOP. These samples are transported and analyzed with the environmental samples to

the laboratory. The QA/QC review identifies equipment blanks with detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination due to equipment contamination.

Two equipment blanks were prepared and submitted, one for the wet season sampling event and one for the dry season sampling event, using deionized water provided by ALS. The equipment blanks were analyzed for BTEX/VPHw, styrene, VHwC6-C10, LEPHw/HEPHw, $EPHw_{C10-C19}$/$EPHw_{C19-C32}$, PAHs, and MTBE. Reported concentrations of all parameters were below the RDLs except for the sample collected during the dry sampling event where a detectible concentration of 2-methylnapthalene was reported. The reported concentration was 0.011 ug/L. The RDL for this parameter is 0.010 ug/L. Analytical results for the two equipment blanks are presented in the laboratory Certificates of Analysis provided in **Appendix C** and summarized in **Table 2-3**. This sample was collected on August 29, 2023, with two other samples collected that day. Parameters with concentrations above RDLs on that day were compared to the same parameters reported in G2-9A, and G2-9B and for this equipment blank, are summarized in **Table D-1** below:

Table D-1 Comparison Between Equipment Blanks of Concern and Wells Sampled on Same Day

Parameters above RDLs[1]	G2-9A	G2-9B	Equipment Blank
2-Methylnaphthalene	0.031	0.022	0.011

[1]All concentrations are in µg/L

Review and comparison of the sample parameters against the equipment blank results do not translate to detectible concentrations in samples collected on the same day and are unlikely to affect the dataset. At present 2-Methylnaphthalene is not regulated under the CSR standards applicable to the site. The remaining concentrations below the RDL in the equipment blanks demonstrate sufficient cleaning of monitoring equipment occurred between sampling stations for the parameters of concern. No concerns with the data were identified related to the three equipment blanks.

Analytical Data Interpretation

To confirm the quality of the laboratory analytical data, precision, accuracy, and completeness were considered.

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 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 (MS) 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:

$$RPD = \frac{(A - B)}{(\frac{A + B}{2})} * 100\%$$

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.

As part of the 2023 monitoring program, relative percent differences (RPDs) were calculated for BTEX/VPHw, Styrene, VHwC6-C10, LEPHw/HEPHw, $EPHw_{C10-C19}/_{EPHwC19-C32,}$ and PAHs in instances where the reported concentration of the parent and duplicate sample were five times the reported detection limit or greater. As a larger dataset, the average value was calculated using the absolute RPD numbers while individual results were calculated as positive/negative values for individual interpretation.

ENV has provided guidance indicating that field RPDs[7] within 1.5 times the laboratory RPDs as defined in the BC Environmental Laboratory Manual[8] are acceptable. Therefore, acceptable field RPDs of 45% or below are acceptable for organic parameters and metal parameters. For high variability metals, field RDPs of 60% are acceptable. High variability metals are defined in the BC Environmental Laboratory Manual and are listed below:

- Silver
- Aluminum
- Barium
- Mercury
- Potassium
- Molybdenum
- Sodium
- Lead
- Tin
- Strontium
- Titanium

The acceptable field RPDs listed above are acceptable for the PMP, without additional evaluation.

It should be noted that the data set is small for statistical purposes as most reported concentrations were less than the RDLs. The following describes duplicates collected in Area 2 as well as Area 1 and 3.

Area 2

RPDs are presented for duplicate samples in **Table 2-2** and **Table 2-3**.

[7] Question #36 from the BC MoE Questions and Answers webpage accessed February 27, 2019. http://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/contaminated-sites/cs_q-a.pdf

[8] BC ENV, 2020. British Columbia Environmental Laboratory Manual - Section A: Laboratory Quality Assurance / Quality Control: 2020. Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a-2020.pdf

A total of seven duplicate samples were collected and submitted along with the Area 2 parent samples during the 2023 PMP. Of the samples collected, a total of 39 organic parameters were suitable for RPD calculations. The average, median, maximum, and minimum RPDs of the field duplicates are presented in **Table D-2**, below:

Table D-2 Summary of RPD (%) of Organic Duplicate Analyses in Area 2

Sample Type	Average RPD (%)	Median RPD (%)	Maximum RPD (%)	Minimum RPD (%)
Groundwater Samples				
Organic Parameters (LEPHw/HEPHw, EPHw, VPHw, VHw, BTEX, MTBE, and PAHs)	9.6	10.0	18.7	1.3

The calculated RPD values of organic parameters were below 45% and indicate a good correlation for duplicate pairings for the analytical program. The maximum RPD was 18.67% and occurred during the dry sampling event for Naphthalene at G2-3C.

Area 1 and Area 3

RPDs are presented for duplicate samples in **Table 1-2** and **Table 1-3**.

A total of six duplicate samples were collected and submitted along with the Area 1 and 3 parent samples during the 2023 PMP. Of the samples collected, a total of 39 parameters were suitable for RPD calculation. The average, maximum, and minimum RPDs of the field duplicates are presented in **Table D-3** below:

Table D-3 Summary of RPD (%) of Duplicate Analyses in Areas 1 and 3

Sample Type	Average RPD (%)	Median RPD (%)	Maximum RPD (%)	Minimum RPD (%)
Groundwater Samples				
Organic Parameters (LEPHw/HEPHw, EPHw, VPHw, VHw, BTEX, Styrene, and PAHs)	4.7	3.2	43.7	0.3

The calculated RPD values of organic parameters were below 45% and indicate a good correlation for duplicate pairings for the analytical program. The maximum RPD was 43.68% and occurred during the dry sampling event for 2-methylnaphthalene at A3MW03-02.

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 reported value 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 (% REC) is calculated as:

$$\% REC = \frac{A}{B} * 100\%$$

where:

A = obtained value

B = true value

Analytical accuracy was determined in the laboratory by running MS samples or laboratory control samples. These samples were analyzed at a minimum rate of 5% for each analytical suite. The laboratory provided percent recoveries for most of the organic parameter analyses. The following describes the review of the percent recoveries provided by the laboratory with the certificates of analysis for samples collected from Area 2 as well as Area 1 and 3 monitoring wells:

Area 2: All reported laboratory control spike (LCS) sample recoveries and matrix control spike (MS) sample recoveries were within laboratory quality control (QC) limits. Sample surrogates were completed by ALS Environmental for each sample submitted from Area 2 in 2023. For the wet season sampling event, laboratory duplicate recoveries for U4-3, G2-10, MW3 and Trip Blank-6 were above the data quality objective limit of 30% for analyte VHw (C6-C10). Method blank recoveries for analyte dissolved nickel presented high level (>5x initial MB level) and non-detect results. These uncertainties are not anticipated to change the findings of this report.

The analytical results are sufficiently accurate for the purposes of this monitoring program.

Area 1 and 3: All reported laboratory control spike (LCS) sample recoveries and matrix control spike (MS) sample recoveries were within laboratory quality control (QC) limits. Sample surrogates were completed by ALS Environmental for each sample submitted from Area 1 and 3 in 2023. For the wet season sampling event, method blank recoveries for Travel Blank-2; a) exceeds the data quality objective limit of 0.5 and 0.2 ug/L for analytes 2-Methylphenol, 3-Methylphenol, 4-Methylphenol, and Phenol. Limits of Reporting were adjusted for samples with positive hits below 5x blank level. b) The preparation of Chlorinated Hydrocarbons exceeded holding times. However, this is due to a constraint in the ALS reporting system as the amber glass bottle without preservative was re-sampled at a later date and the sample date/time could not be updated within the same report. Therefore, the holding time exceedance is not valid, and the Chlorinated Hydrocarbon analysis results are considered reliable. For the dry season sampling event, sample surrogates completed for U07-10S were outside the data quality objective range of 70.0 – 130% for analyte Decachlorobiphenyl. The result was 36.6% and the uncertainty is not anticipated to change the findings of this report.

The analytical results are sufficiently accurate for the purposes of this monitoring program.

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:

$$Completeness = \frac{A}{B} * 100\%$$

where:

A = number of valid analytical results

B = total number of analytical results

No Area 1 and 3 or Area 2 samples from either sampling event were invalidated by ALS Environmental due to conditions on arrival at the laboratory. All samples were analyzed as indicated on the COAs that accompanied the samples.

Appendix E Perimeter Extraction System Components and Fluid Estimation

List of PES Components

System Component	Number of Components	Description
Pneumatic Pump	40	QED Environmental Systems AP4 / AP4+ / AP4 Ultra AutoPump
Air Compressor System		
1. Air Compressor	1	Ingersoll Rand UP6-30-125 operated at approximately 110 pounds per square inch (psi).
2. Dryer Unit	1	Ingersoll Rand Desiccant Dryer HL Series Model HP120PH00AA operated at a dew point of -40°F
Oil / Water Separator		
3. Oil / Water Separator	1	Ecologix Environmental System Oil Water Separator with HD Q-PAC coalescing plates. Single wall 12 gauge stainless steel construction.
4. NAPL Storage Container (Lube Cube)	1	Containment Solutions 60 gallon 10 gauge steel single wall construction.
5. Flow Meter	1	Area-Velocity Flow Meter – Model AVFM 5.0
Sequestering System		
1. Chemical Dosing Pump	1	LMI Milton Roy Chemical Metering Pump Model E731-312SI
2. Sequestering Agent	1	LineClear 50 Blended Phosphonate/Maleic Homopolymers/Stabilizer stored in a 275-gallon poly tote with a 360-gallon secondary containment spill pallet.
3. Line-Charging Pump	1	Oberdorfer Chemsteel Model R104 Stainless Steel Sealed Rotary Gear pump.
4. Pressure Compensating Drippers	40	Netafim Woodpecker Pressure Compensating (WPC) with CNL. Pressure range of 14.5 to 58 psi.

Total Fluid and Effluent Extraction Rate Methodology

Total fluid extraction rates were determined on a pump-by-pump basis as follows:

$$Total\ Fluid\ Extraction\ Rate\ (by\ well) = \frac{\#\ of\ pump\ cycles \times average\ volume\ per\ cycle}{elapsed\ time}$$

The number of pump cycles was recorded from the pump-dedicated cycle counter, along with the date and time, during each semi-monthly monitoring event and the average volume per cycle for each pump was re-evaluated quarterly.

The average pump volume per cycle was estimated as follows:

- Discharge total fluids collected by each pump into an empty 208 litre (L) drum.
- Record the cycle counter at the beginning and end of each test to determine the total number of pump cycles.
- Measure and calculate the volume of water within the drum.

- Divide the total volume in the drum by the number of pump cycles.

The above methodology was applied during each quarterly event to assess the total fluid and effluent extraction rate achieved at each active PES well.