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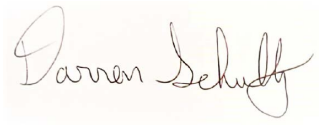
Foreshore 2022 Monitoring Report Below Area 2 - Eastern Impounding Basin, Parkland Burnaby Refinery, Burnaby, BC

Parkland Refining (BC) Ltd.

Project number: 60679830

June 14, 2022

Quality information

Prepared by	Reviewed by	Verified by
		
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
Draft for Client Review	May 16, 2022				
Final	June 14, 2022				

Distribution List

# Hard Copies	PDF Required	Association / Company Name
1	1	Parkland Refining (B.C.) Ltd.
0	1	Ministry of the Environment and Climate Change Strategy
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EXECUTIVE SUMMARY

AECOM Canada Ltd. (AECOM) has prepared this Foreshore Monitoring Report on behalf of Parkland Refining (B.C.) Ltd. (Parkland) for the Burnaby Refinery. The report summarizes the results of porewater quality monitoring and inspections conducted between January and March 2022 along the Foreshore area of Burrard Inlet located down slope from the Eastern Impounding Basin (EIB), Area 2 of the Parkland Burnaby Refinery (hereafter referred to as "the Foreshore Site"). This report fulfills reporting requirements in accordance with the Foreshore Passive Treatment System (FPTS) Monitoring and Maintenance Plan (MMP) and meets condition 43 in Permit 16-180 issued by the Vancouver Fraser Port Authority (VFPA). The report also fulfills conditions established by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) and the VFPA in letters provided on April 25, 2018; May 19, 2020; and January 4, 2021 (ENV 2018a; ENV 2020a; VFPA 2021).

The objectives of the program were to:

1. Monitor for the presence of non-aqueous phase liquid (NAPL) and associated contaminants of concern (COCs) in Site porewater[1] monitoring wells.
2. Assess the performance of the FPTS's remedial treatment cells and oleophilic biobarrier (OBB).
3. Maintain the integrity of the Eastern and Western portions of the FPTS by inspecting the protective rip rap and cobbles, repairing or replacement of monitoring wells, and by managing vegetation as required in the FPTS MMP.

Non-Aqueous Phase Liquids and Sheens

Non-aqueous phase liquids (NAPL) and sheen observations in porewater wells have been collected at the Foreshore Site since 2011. Eleven select porewater wells were monitored for NAPL in January 2022. Thirty-two porewater wells were monitored for NAPL[2] in March 2022. The concrete protector of one Up Gradient Well (PW17-31) was obstructed by a wooden platform and the well was unable to be monitored or sampled in 2022. During the March 2022 monitoring event, none of the gauged porewater wells associated with the FPTS contained an observable sheen, or a measurable thickness of NAPL (**Table 1**).

Standards and Contaminants of Concern

Analytical results for porewater samples collected in March 2022 were compared to Risk-Based Management Targets (RBMTs) for contaminants of concern (COCs) associated with the dissolved phase porewater in the vicinity of the former NAPL seeps. The RBMTs were accepted by ENV (formerly referred to as the Ministry of Environment [MoE]) in their letter dated August 28, 2014 (MoE 2014). SLR Consulting Canada Ltd. (SLR) derived RBMTs for the following COCs: benzene, ethylbenzene, toluene, xylenes (BTEX), benzo(a)pyrene, naphthalene, volatile petroleum hydrocarbons in water (VPH_w), light extractable petroleum hydrocarbons in water ($LEPH_w$), copper, and zinc.

Water Quality Results

Concentration data for dissolved phase COCs in porewater have been collected since September 2011 in the former NAPL seep area. Porewater samples were collected from 32 porewater wells located on the Foreshore Site during the annual sampling event, as set out in the amended FPTS Monitoring and Maintenance Plan (AECOM 2019b). The annual sampling event was completed in March 2022. The analytical results from the event are presented in **Tables 2 to 5** and **Figures 2 to 5** of this report. Data collected since the FPTS was installed are also presented in **Graphs 1 to 8**. Analytical results from porewater samples collected at the Site from post FPTS construction (2017-2021) are included in **Appendix A**.

[1] The term porewater for post FPTS construction is generally used in this report to include water collected from all four types of Site monitoring wells: Up Gradient, Performance, Sentry, and Compliance Wells

[2] As per ENV Protocol 16, NAPL is considered to be present if a thickness greater than 2 mm is measured in a monitoring well. BC ENV, 2021. Protocol 16. Determining the Presence and Mobility of Nonaqueous Phase Liquids and Odorous Substances (Version 3.0). Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/p16_jan_2021_revisions_final_signed.pdf

During the 2022 FPTS sampling event, the analytical results from all COCs were compared to their applicable RBMTs:

- Concentrations of BTEX, LEPHw, VPHw, benzo(a)pyrene, naphthalene, dissolved copper, and dissolved zinc were below their applicable RBMTs for all samples collected from 31 porewater wells.
- One Up Gradient Well (PW17-16) contained a concentration of LEPHw (320 micrograms per litre [µg/L] above its RBMT (300 µg/L); concentrations of remaining parameters were below their applicable RBMTs.

Inspection of the Foreshore Passive Treatment System

The FPTS was visually inspected during quarterly inspection events in January and March 2022. The layer of cobbles above the oleophilic biobarrier (OBB) surface was observed to be 0.4 meters deep. The thickness of rip rap was observed to be a minimum of 1.4 meters in depth. Two small exposures of geogrid were observed along the contact point between the rip rap and cobble layer along the northern extent of the Western FPTS in March 2022. These exposures were observed embedded underneath the northern extent of the newly laid rip rap and are not considered to compromise the effectiveness of the FPTS. Vegetation was observed on top of the Eastern and Western FPTS near the southern boundary of the Foreshore Site. Some small weeds were observed on top of the treatment cells in January and March 2022, but the roots were too shallow to cause damage, attempts were made to remove them from the surface of FPTS at the time of inspection. Some overhanging vegetation from the Canadian Pacific Rail (CPR) Right of Way (ROW) is encroaching on the FPTS and may need to be cut in the future. Most Sentry and Compliance Wells are covered in barnacles and seaweed. Significant damage to monitoring wells was not observed. Inspections indicate there are no significant deficiencies in the FPTS since it was constructed in 2017.

Conclusions and Recommendations

Since the construction of the FPTS, monitoring data indicate that the FPTS is operating as designed for mitigating the migration of COCs to ecological receptors and waters of Burrard Inlet based on:

- The absence of sheens or measurable NAPL within the Up Gradient, Performance, Sentry, and Compliance Wells of the FPTS.
- Concentrations of dissolved phase COCs in all samples analyzed were below their applicable RBMTs, except for one; a concentration of LEPHw marginally above the applicable RBMT was observed in one Up Gradient Well (PW17-16) in March 2022.

Based on the data collected post-construction of the FPTS, AECOM recommends continuing annual sampling of the FPTS in 2023. Recommendations for reductions in inspections and sampling will be provided in a revised 2022 MMP yet to be submitted under separate cover to ENV for their review and approval.

Table of Contents

EXECUTIVE SUMMARY iv
1. INTRODUCTION 11
2. BACKGROUND AND SITE DESCRIPTION 11
2.1 Background 11
2.2 FPTS Construction 14
2.3 FPTS Maintenance 15
2.4 Site Setting 15
2.4.1 Geology 15
2.4.2 Tidal Effects 16
2.4.3 Hydrogeology 16
2.4.4 Regional Climate Conditions 16
3. REGULATORY CONTEXT 17
3.1 Risk-Based Management Targets (RBMTs) 17
4. OBJECTIVES 17
5. SCOPE OF WORK 18
5.1 Sampling Schedule 18
5.1.1 NAPL Monitoring 18
6. RESULTS 18
6.1 Field Monitoring Results 19
6.2 Porewater Analytical Semi-Annual Results 19
6.2.1 Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons 19
6.2.1.1 Up Gradient Wells 19
6.2.1.2 Performance Wells (OCP and ACP) 19
6.2.1.3 Sentry Wells 19
6.2.1.4 Compliance Wells 20
6.2.2 Metals Analysis 20
7. INSPECTION OF THE FPTS 20
8. DISCUSSION 20
8.1 Distribution of Exceedances 20
8.2 Concentration Trends Over Time 21
8.2.1 Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons 21
8.2.2 Dissolved Metals 26
8.3 Status of the FPTS 27
9. SUMMARY 27
10. RECOMMENDATIONS 28
11. STATEMENT OF QUALIFICATIONS AND LIMITATIONS 30
12. REFERENCES 31
Monitoring and Sampling Methodologies 39

Figures (within text)

Figure A: Wells included in Graph 4 and Cross section A-A' (Figure 5), a north-south transect through the Eastern FPTS 22
Figure B: Wells included in Graph 5, an east-west transect through Performance (OC) Wells 23
Figure C: Wells included in Graph 6, an east-west transect through Performance (AC) Wells 24
Figure D: Wells included in Graph 7, an east-west transect through Sentry Wells 25

Figure E: Wells included in Graph 8, an east-west transect through Compliance Wells 26

Figures (at back of report)

Figure 1. Site Map and Foreshore Sampling Locations
Figure 2. Water Analytical Results for Petroleum Hydrocarbons – 2022
Figure 3. Water Analytical Results for Polycyclic Aromatic Hydrocarbons – 2022
Figure 4. Water Analytical Results for Dissolved Metals – 2022
Figure 5. Cross Section A –A' Eastern FPTS Water Analytical Results for Petroleum Hydrocarbons and Dissolved Copper, 2022

Tables (within text)

Table A: Historical Investigations and Remedial Actions at the Foreshore Site 12
Table B. Foreshore Passive Treatment System Monitoring Wells 14
Table C. Total Precipitation Recorded at Area 1 Eton Street (Burnaby North) Air Quality and Rainfall Station, T024 (Metro Vancouver 2022) 16
Table D. Summary of the Objectives and Results from the 2022 Foreshore Monitoring Program 27

Tables (at back of report)

Table 1. Porewater Monitoring Data (2022), Foreshore Post FPTS Construction, Parkland Burnaby Refinery
Table 2. Concentrations of Petroleum Hydrocarbon Parameters in Porewater Samples (2022), Foreshore Post FPTS Construction, Parkland Burnaby Refinery
Table 3. Concentrations of Polycyclic Aromatic Hydrocarbon Parameters in Porewater Samples (2022), Foreshore Post FPTS Construction, Parkland Burnaby Refinery
Table 4. Concentrations of Dissolved Metals in Porewater Samples (2022), Foreshore Post FPTS Construction, Foreshore Parkland Burnaby Refinery
Table 5. Field and Porewater Quality Parameters (2022), Foreshore Post FPTS Construction, Foreshore Parkland Burnaby Refinery
Table 6. Foreshore Passive Treatment System Inspections (2022), Post FPTS Construction, Foreshore Parkland Burnaby Refinery

Graphs

Graph 1. Average LEPHw Concentrations in Samples Collected from (A) Up Gradient Monitoring Wells, (B) Performance (Organoclay) Monitoring Wells, (C) Performance (Activated Carbon) Monitoring Wells, (D) Sentry Monitoring Wells, and (E) Compliance Monitoring Wells
Graph 2. Average VPHw Concentrations in Upgradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells
Graph 3. Average Benzene Concentrations in Upgradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells
Graph 4. Concentrations of Benzene, VPHw and LEPHw in Porewater Wells (PW17-16, PW17-17, PW17-18, PW17-19 and PW17-20)
Graph 5. Concentrations of Benzene, VPHw and LEPHw in Performance (OC) Wells (PW17-05, PW17-17, PW17-22 and PW17-27)
Graph 6. Concentrations of Benzene, VPHw and LEPHw in Performance (AC) Wells (PW17-6, PW17-18, PW17-23 and PW17-28)
Graph 7. Concentrations of Benzene, VPHw and LEPHw in Select Sentry Wells (PW17-02, PW17-10, PW17-14, and PW17-32)
Graph 8. Concentrations of Benzene, VPHw and LEPHw in Compliance Wells (PW17-03, PW17-08, PW17-11, PW17-12, PW17-15, PW17-20, PW17-25, PW17-30, and PW17-33)

Appendices

Appendix A. Post FPTS Construction Water Analytical Tables, 2017-2021
Appendix B. Monitoring and Sampling Methodologies
Appendix C. Regulatory Context
Appendix D. Analytical Laboratory Reports
Appendix E. Quality Assurance and Quality Control Summary
Appendix F. Photographic Log of FPTS Inspections

REPORT ACRONYMS

ACP	Activated Carbon Performance
AECOM	AECOM Canada Ltd.
ALS	ALS Laboratories
BC	British Columbia
BCELM	BC Environmental Laboratory Manual
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CBP	Contingency Biodegradation Points
CEPA	Canadian Environmental Protection Act
Chevron	Chevron Canada Limited
CMA	Canada Marine Act
COC	Contaminants of Concern
CPR	Canadian Pacific Railway
CSR	Contaminated Sites Regulation
CSR AW	CSR Aquatic Life Standard
DO	Dissolved Oxygen
DQO	Data quality objective
DSI	Detailed Site Investigation
DTP	Depth to Product
DTW	Depth to Water
EAZ	Ecologically Active Zone
EIB	Eastern Impoundment Basin
EMA	Environmental Management Act
ENV	BC Ministry of Environment and Climate Change Strategy
ESA	Eastern Seep Area
FPTS	Foreshore Passive Treatment System
HASP	Health and Safety Plan
HHERA	Human Health and Ecological Risk Assessment
HWR	Hazardous Waste Regulation
IRA	Interim Remedial Action
LCS	Laboratory control sample
$LEPH_w/HEPH_w$	Light/Heavy Extractable Petroleum Hydrocarbons in Water
m	metre
m/s	metres per second
mg/L	milligrams per litre
mL/min	millilitres per minute
mm	millimeter
MS	Matrix Spike
mV	millivolts
NAPL	Non-aqueous phase liquid
MMP	Monitoring and Maintenance Plan
MT	Metric Tonnes
OBB	Oleophilic biobarrier
OCP	Organoclay Performance
ORP	Oxidation Reduction Potential
PAHs	Polycyclic Aromatic Hydrocarbons
Parkland	Parkland Refining (B.C.) Ltd.
PHCs	Petroleum Hydrocarbons
PCOC	Potential Contaminants of Concern
POV	Port of Vancouver
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RBMT	Risk-Based Management Targets
RCM	Reactive Core Mat
RDL	Reported Detection Limit
RIB	Remote Impounding Basin

ROW	Right of way
RPD	Relative Percent Difference
SLR	SLR Consulting Canada Ltd.
SOP	Standard Operating Procedure
TD	Total Depth of the Well
TDS	Total Dissolved Solids
µg/L	micrograms per litre
URS	URS Canada Inc.
USL	Updated Screening Level
VFPA	Vancouver Fraser Port Authority
VPH_w	Volatile Petroleum Hydrocarbons in Water
WQG	Water Quality Guidelines
WSA	Western Seep Area

1. INTRODUCTION

AECOM Canada Ltd. (AECOM) has prepared this Foreshore Monitoring Report on behalf of Parkland Refining (B.C.) Ltd. (Parkland) Burnaby Refinery. The report summarizes the results of porewater quality monitoring and inspections conducted between January and March 2022 along the Foreshore area of Burrard Inlet located down slope from the Eastern Impounding Basin (EIB), Area 2 of the Parkland Burnaby Refinery (hereafter referred to as "the Foreshore Site") (**Figure 1**).

This report fulfills reporting requirements in accordance with the Foreshore Passive Treatment System (FPTS) Monitoring and Maintenance Plan (MMP) (AECOM 2017c), and to meet condition 43 in Permit 16-180 issued by the Vancouver Fraser Port Authority (VFPA 2017). Condition 43 in Permit 16-180 states "*The applicant shall provide VFPA all future environmental monitoring data and reports that are related to the Project until such time that environmental monitoring at the Project site is completed. Monitoring data and reports shall include, at minimum, monitoring as detailed in "Section 8: Performance Verification Plan" of the Applicant's Foreshore Remedial Action Plan dated October 27, 2016, within 30 days of each monitoring period. The Application shall also make monitoring reports available to Aboriginal groups and the BC MoE".* On January 22, 2018, Spencer Chaisson of VFPA responded to Leslie Southern of AECOM and confirmed that Condition 43 of Permit 16-180 has been modified to only require reporting on an annual basis, within 90 business days of the last sampling event of the year.

The FPTS was installed at the Foreshore Site between July 10 through October 30, 2017 and was designed and constructed to be the final remedial action to address any free-phase and dissolved phase hydrocarbon and sheens along the Foreshore of Burrard Inlet. The multicomponent FPTS is comprised of a larger eastern section and a smaller western section. The FPTS consists of permeable subsurface treatment cells for the mitigation of free-phase non-aqueous phase liquid (NAPL) and dissolved phase hydrocarbons in porewater and contains an oleophilic biobarrier (OBB) for the prevention of sheens. In September 2021, maintenance of the FPTS was completed with the placement of rock material (**refer to Section 2.3**).

In total, 33 porewater monitoring wells were installed and sampled from 2017 through 2021 and twelve surface water sample locations were sampled in 2017 and 2018 at the Foreshore Site to assess the performance of the FPTS (AECOM 2017b; AECOM 2019a; AECOM 2020a). In 2022, 32 porewater monitoring wells were sampled; one well (PW17-31) was not monitored or sampled as it was inaccessible.

The post-construction FPTS monitoring program is detailed in the amended Foreshore MMP (AECOM 2019b).

A request for approval to modify the frequency of sampling and inspections of the FPTS along with a revised 2022 MMP will be submitted to ENV for their review and approval under separate cover.

2. BACKGROUND AND SITE DESCRIPTION

2.1 Background

Table A below presents a timeline of historical investigations and remedial actions associated with the Foreshore Site, in addition to amendments to the FPTS MMP (AECOM 2019b).

Table A: Historical Investigations and Remedial Actions at the Foreshore Site

Date	Historical Investigations and Remedial Actions
April 2010	Chevron Canada Limited (Chevron) first observed NAPL seeps on the north, downward slope of the Parkland (formerly Chevron) Burnaby Refinery (Refinery) towards the Burrard Inlet. The seeps were immediately reported by Chevron to the Provincial Emergency Program (now Emergency Management BC).
June 2010 and April 2011	A preliminary Site Investigation (PSI) and a Detailed Site Investigation (DSI) were performed at the Foreshore Site. The investigations determined that the NAPL seeps emanated from the sediment near the contact between the overlaying beach sand and underlying colluvium, near the high tide line at the base of the CPR ROW slope.
February and March 2011	Two Interim Remedial Action (IRA) Barriers comprised of a sand-organoclay mixture and a CETCO Reactive Core Mat (RCM) were constructed and installed in the Western Seep Area (WSA) and Eastern Seep Area (ESA).
March and April 2012	The Eastern IRA Barrier was refurbished by extending the sand-organoclay down slope into the former RCM anchor trench.
September 2013	Chevron (then-owner of the Parkland Burnaby Refinery), AECOM, SLR, and The British Columbia Ministry of Environment and Climate Change Strategy (ENV) determined that the two areas of concern on the Foreshore Site down slope of the EIB in Area 2 of the Refinery, would be dealt with through two projects: 1. Project 1 covers the Foreshore Non-aqueous phase liquids (NAPL) former Seep Area. 2. Project 2 covers the Foreshore outside of the former Seep Area.
February 2015 – 2017	1. After development of the original 2012 MMP, amendments were requested to the sampling frequency and of the monitoring program (URS 2014a) to ENV. The amendments included the following: 2. Reduction of bi-monthly NAPL monitoring to monthly for the remainder of 2014 and quarterly in 2015; 3. Reduction of porewater sampling in the Project 1 Area to 62 monitoring wells; 4. Elimination of porewater sampling in the Project 2 Area (except for monitoring well P18-4.5S); 5. Discontinuation of surface water sample collection from the Reference Area; and 6. Elimination of ambient air monitoring on the Foreshore Site.
February 2015	Amendments to the MMP were approved by ENV and carried forward into the 2017 monitoring program, prior to construction of the FPTS.
December 2016	ENV agreed that concentrations of zinc in porewater from the lone Project 2 Area monitoring well P18-4.5S

Date	Historical Investigations and Remedial Actions
	were attributed to a buried metal object and the well was removed from the 2017 monitoring program.
April 2018	ENV established six new conditions for the FPTS MMP which are outlined below: 1. Monitoring for the presence of NAPL must be completed in all porewater wells. 2. Porewater samples from the French drains (otherwise known as contingency biodegradation points [CBP]) within the barriers must be collected and analyzed for contaminants of concern (COCs) to verify that they are not acting as preferential pathways for contaminant migration. 3. Any changes to the sampling frequency or termination of parts or the whole of the sampling program requires the approval of ENV. 4. Notification of exceedances of COCs above RBMTs in Compliance Wells and the following Up Gradient and Sentry Wells (PW17-01, PW17-02, PW17-9, PW17-10, PW17-13, PW17-14, PW17-31, and PW17-32) must be provided to ENV in writing within 30 days. Exceedances of Protocol 11 Upper Cap Concentrations (ENV 2021) require immediate verbal and written notification to ENV. 5. Include in the Foreshore Annual Monitoring Reports: a. A summary of remedial activities undertaken during the reporting period; b. Assessment of overall remediation progress, including evaluation in comparison to the remediation plan and schedule; c. Interpretation of current and cumulative results from the monitoring program, including groundwater, surface water, soil, etc., as appropriate; and d. Supporting documentation (e.g. analytical reports, tables and figures, records of inspection, maintenance of treatment works, etc.). 6. Submit an annual summary report from the date of the completion of the remediation works (October 31st).

Date	Historical Investigations and Remedial Actions
2019	Regarding condition No. 2, the collection of porewater samples from the French drains (i.e. CBPs) was discontinued in 2019.
2020	Regarding condition No. 4, following recommendations made by AECOM in the Foreshore 2019 Annual Monitoring Report, ENV agreed to reduce the frequency of porewater sampling at the Foreshore Site from semi-annual to annual in 2020.
2021	Regarding condition No. 6, ENV agreed to coordinate annual reporting to coincide with the VFPA reporting requirements (ENV, 2018b).

2.2 FPTS Construction

Construction of the FPTS was performed from July 10 through October 30, 2017. The FPTS construction followed the ENV supported Foreshore Remedial Action Plan (AECOM 2016c) and in accordance with the Construction Environmental Management Plan (AECOM 2017a).

In summary, the FPTS consists of a larger Eastern section (60 m) and a smaller Western section (20 m) and consists of the following components:

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

In total, 33 porewater wells, divided into four distinct types (Up Gradient Wells, Performance Wells, Sentry Wells, and Compliance Wells), were installed at the Foreshore Site in 2017 to assess the performance of the FPTS (AECOM 2017b). Up Gradient wells are located up gradient of the treatment system, Performance Wells are located within the two treatment cells. Performance Wells are further subdivided into Organoclay Performance (OCP) Wells and Activated Carbon Performance (ACP) Wells; Sentry Wells are located down and cross slope of the treatment cells, and Compliance Wells are located down slope of the FPTS. The wells are presented in **Table B** and on **Figure 1**.

Table B. Foreshore Passive Treatment System Monitoring Wells

Well Type	Well Name
Up Gradient Wells (8)	PW17-01, PW17-04, PW17-09, PW17-13, PW17-16, PW17-21, PW17-26, and PW17-31
Performance Wells (8) OCP (4) ACP (4)	 PW17-05, PW17-17, PW17-22, and PW17-27 PW17-06, PW17-18, PW17-23, and PW17-28
Sentry Wells (8)	PW17-02, PW17-07, PW17-10, PW17-14, PW17-19, PW17-24, PW17-29, and PW17-32
Compliance Wells (9)	PW17-03, PW17-08, PW17-11, PW17-12, PW17-15, PW17-20, PW17-25, PW17-30, and PW17-33

2.3 FPTS Maintenance

On September 27, 2021, maintenance of the FPTS was completed by the placement of 170 metric tonnes (MT) of rock material comprised of 110 MT of rip rap (24'' x 36'') and 60 MT of filter rock (4'' x 9''). The objectives of the maintenance were to cover the exposed portions of geogrid and geotextile materials, and cover the exposed bases of concrete well protectors of monitoring wells and Contingency Biodegradation Points (CBP). The maintenance was completed under VFPA Project Permit 21-076.

Fraser River Pile & Dredge Inc. was directed by AECOM staff on the placement of rock material within the FPTS. Rip rap was placed at the contact point between the existing rip rap and cobble interface in both the Western and Eastern FPTS to cover exposed geogrid and geotextile materials. Filter rock was placed around nine concrete well protectors (PW17-1, CBP-2, PW17-6, CBP-6, PW17-31, CBP-8, PW17-18, PW17-23, and CBP-16) previously observed to have exposed concrete well protector bases as well as around three Sentry Wells (PW17-19, PW17-24, and PW17-29).

After the maintenance was completed, the October 15, 2021 inspection indicated that all exposed concrete protector bases and areas of exposed geogrid and geotextile layers previously observed were covered, except for one small area approximately 0.67 m x 0.05 m in size located at the western extent of the Eastern FPTS. AECOM covered this exposure with cobbles by hand during the inspection event. The work was documented in the 2021 Foreshore Passive Treatment System Maintenance and Inspection Memo (AECOM, 2022).

2.4 Site Setting

2.4.1 Geology

The Foreshore Site is located on the southern intertidal foreshore of Burrard Inlet, north of Area 2 of the Burnaby Refinery (**Figure 1**). The former NAPL seeps were located at the base of a north facing benched slope. The upper portion of the slope (Upper Bench) is located within the Refinery fence and is the northern berm of the EIB. The topography north of the fence line drops sharply but flattens out in the vicinity of the Refinery property line (Lower Bench). The topography continues to drop past the Lower Bench to a pair of CPR railway tracks. There is a steep downward embankment north of the railway tracks onto the Foreshore. The intertidal zone then slopes more gently down into the inlet. The area is further described below.

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

Along the Lower Bench, a layer of fine-grained sand with some gravel and silt colluvium (loose bodies of sediment that have been deposited or built up at the bottom of a slope) overlies a grey to brown sandy silt till layer encountered at depths between 2 and 5 metres below ground surface (m bgs) (URS 2011a).

An approximately 4 m high, steeply sloping embankment (described above) leading up to the railroad, covered with rip rap facing along the lower portions, comprises the southern boundary of the Foreshore Site. The rip rap material is commonly boulders 0.25 to 0.75 m in diameter with scattered pieces up to 2 m in length. Beneath the rip rap, the sediments appeared to be a mixture of the fill, colluvium, and till. The DSI determined the surficial geology of the Foreshore Site to be composed of fine to coarse beach sand, underlain by weathered colluvium, colluvium, and till (URS 2011a).

2.4.2 Tidal Effects

The local tide fluctuates from approximately 0.5 to 4.5 m above the local datum. During low tides of 0.5 m, approximately 25 m of Foreshore is exposed while during high tides, the entire Foreshore is submerged. A tidal study completed as part of the DSI (URS 2011a) determined that the porewater elevations parallel the tidal patterns and that mixing was occurring between saline surface water and porewater. A second tidal study was completed in June 2013 (URS 2014b). The results of the June 2013 study agreed with the previous DSI tidal study and noted that porewater generally flows north into Burrard Inlet and is tidally influenced.

2.4.3 Hydrogeology

Porewater on the Foreshore is derived from groundwater flow from up gradient areas, rain infiltration, marine surface water infiltration, and the intermixing of marine surface water through tidal fluctuations. On 1 November 2017, the ENV released Version 2 of Technical Guidance 15[3], which defines subsurface water in the vicinity of the Foreshore Site as follows:

- Groundwater: subsurface water laterally above the highwater mark (upland zone and dilution zone).
- Porewater EAZ and Porewater: subsurface water laterally below the high-water mark (aquatic receiving environment).

Previous reports referred to groundwater and porewater differently. The Foreshore 2013 Second Semi-Annual report (URS 2015) was the first report to be consistent with ENV Technical Guidance 15 and this current report follows these current definitions. The term porewater for post FPTS construction is generally used in this report to include water collected from all four types of Site monitoring wells: Up Gradient Wells, Performance Wells, Sentry Wells, and Compliance Wells. As per ENV Procedure 8, Definitions and Acronyms for Contaminated Sites, porewater is defined as “the interstitial water within sediment”.

Given that no hydrological barrier separates the upper porewater EAZ from the lower porewater, these two units are considered one hydrostratigraphic unit, and results in this report are not discussed separately.

2.4.4 Regional Climate Conditions

The total precipitation for the area was taken from the Area 1 Eton St Metro Vancouver (Burnaby North) Air Quality and Rainfall Station (T024), located at 49.2875º N, 123.0080º W, at 70 metres above mean sea level and approximately 1.7 kilometres to the west southwest of the Foreshore Site. Approximate total precipitation in January through March 2022 is summarized in **Table C** below:

Table C. Total Precipitation Recorded at Area 1 Eton Street (Burnaby North) Air Quality and Rainfall Station, T024 (Metro Vancouver 2022)

Month	Total Precipitation (mm)
	2022
January	283.8
February	110.2
March	197.8

[3] BC ENV, 2017a. *Technical Guidance 15: Concentration Limits for the Protection of Aquatic Receiving Environments (Version 2), Figure 1*. Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg15.pdf

3. 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) updated to February 1, 2021. Federal environmental legislation applicable to Burrard Inlet adjacent to the Foreshore Site includes the *Canada Fisheries Act*. Although CSR standards are applicable to the Foreshore Site, site specific standards were developed through a risk assessment conducted in 2014. This risk assessment forms the basis for the development of the RBMTs applied at the Foreshore Site and discussed below.

3.1 Risk-Based Management Targets (RBMTs)

A Human Health and Ecological Risk Assessment (HHERA) was prepared for the Foreshore Site in February 2014 (SLR 2014a). This HHERA was used to determine Risk-Based Management Targets (RBMTs) for COCs associated with dissolved phase components in porewater associated with the NAPL seeps (SLR 2014b). The RBMTs were accepted by the ENV in their letter dated August 28, 2014 (MoE 2014).

The RBMTs were developed to be protective of aquatic plants and invertebrates at the community level and fish at the population level. The HHERA did not find any significant risk to human health; therefore, RBMTs were not developed for human receptors. SLR reviewed all potential contaminants of concern (PCOCs) for the Foreshore Site and derived RBMTs for the following COCs which were identified to be present at the Foreshore Site: PHC (benzene, toluene, ethylbenzene, xylenes [BTEX], volatile petroleum hydrocarbons in water [VPH_w], and light extractable petroleum hydrocarbons in water [$LEPH_w$]); PAHs (benzo(a)pyrene and naphthalene) and dissolved metals (copper and zinc). The HHERA only identified two metals as porewater COCs; therefore, for this report, the focus of the metals analysis is on copper and zinc.

For monitoring and sampling events completed in 2022, porewater samples were compared against their applicable RBMTs per the amended Foreshore Monitoring and Maintenance Plan (AECOM 2019b).

The focus of post construction monitoring is on the water quality reported from Compliance Wells. Further information on the regulatory context of the Foreshore Site is presented in **Appendix C**.

4. OBJECTIVES

Objectives for the Foreshore Site monitoring program in 2022 were in accordance with the amended Foreshore MMP (AECOM 2019b) and to meet condition 43 in Permit 16-180 issued by the VFPA (refer to Section 7 in VFPA 2017). The monitoring program also fulfills conditions established by ENV and the VFPA in letters provided on April 25, 2018; May 19, 2020; and January 4, 2021 (ENV 2018a; ENV 2020a; VFPA 2021) (refer to Section 2 of this report). In addition to the annual sampling event and inspection completed in March 2022, one quarterly inspection of the FPTS was completed in January 2022 to check the integrity of the FPTS.

Between January to March 2022, the post-construction objectives were:

- Monitor for the presence of NAPL and associated COCs in Site monitoring wells;
- Assess the performance of the FPTS's remedial treatment cells and OBB; and,
- Maintain the integrity of the FPTS by checking and, where needed, replacing the protective rip rap and cobbles, repairing or replacement of monitoring wells, and by managing vegetation as required.

5. SCOPE OF WORK

The scope of work for the monitoring programs in 2022, in accordance with the amended Foreshore MMP (AECOM 2019b), was as follows:

- Update the Foreshore Site Health and Safety Plan (HASP) based on existing HASPs and specific work area conditions.
- Ensure all required authorizations are obtained and followed.
- Inspect components of the FPTS, including the protective rip rap, protective cobbles, monitoring wells and vegetation, and make repairs as necessary.
- Inspect and gauge 12 select Site porewater monitoring wells during quarterly site inspections on the Foreshore Site.
- Record field observations of colour, clarity, pH, temperature, electrical conductivity, salinity, total dissolved solids (TDS), oxidation reduction potential (ORP), dissolved oxygen (DO), and turbidity.
- Collect porewater samples during one annual sampling event (March 2022) for chemical analysis for COCs: BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, naphthalene, dissolved copper, and dissolved zinc.
- Compare analytical results to RBMTs.
- Prepare this report.

The scope of work was completed by Mr. Justin Becker, E.I.T., Mr. Darren Schultz, Mr. Raymund Sampaga, and Mr. Jaime Cabrera Melendez. The report was prepared by Mr. Darren Schultz. Senior reviews of this report were conducted by Ms. Leslie Southern, P.Ag. and Ms. Bonnie Marks, M.A.Sc., P.Eng., CSAP.

5.1 Sampling Schedule

The annual sampling event was completed in March 2022. During the 2022 event, 32 of the 33 porewater monitoring wells in the former NAPL seep areas associated with the FPTS were sampled. One porewater well (PW17-31) was not monitored or sampled due to a large wooden platform lodged over the concrete cover preventing access.

5.1.1 NAPL Monitoring

In January 2022 in conjunction with the quarterly inspection of the FPTS, 11 select monitoring wells were monitored for NAPL; one Up Gradient Well (PW17-21) was not monitored as the interface probe used would not fit into the 1” diameter monitoring well. During the annual sampling event in March 2022, 32 monitoring wells were monitored for NAPL.

6. RESULTS

The data shown in this report represents monitoring and sampling events completed between January and March 2022 and are presented in **Tables 1 to 5** and **Figures 2 to 5**. Data collected since the FPTS was installed are also presented in **Graphs 1 to 8**. Porewater and surface water analytical data collected at the Foreshore Site post FPTS construction (2017-2021) are included in **Appendix A**. Methodologies are summarized in **Appendix B**.

6.1 Field Monitoring Results

During the monitoring completed between January and March 2022, none of the gauged wells associated with the FPTS contained a measurable thickness of NAPL[4]. Hydrocarbon films (NAPL with a thickness less than one millimetre) have not been observed in monitoring wells associated with the Foreshore Site since 2013.

Porewater monitoring data and observations are presented in **Table 1**; field parameters are presented in **Table 5**.

6.2 Porewater Analytical Semi-Annual Results

Porewater samples were collected from 32 of the 33 porewater monitoring wells associated with the Foreshore Site during the annual sampling event completed in March 2022.

Porewater samples were analyzed for BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, naphthalene, dissolved copper, and dissolved zinc. The reported analytical results are summarized on **Tables 2 to 5** and presented on **Figures 2 to 5**. Copies of the 2022 analytical laboratory reports are provided in **Appendix D**. 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 E.**

Porewater results were screened against the RBMTs. Data for the 2022 sampling event are discussed in the following subsections.

As previously mentioned, one Up Gradient Well (PW17-31) was not sampled during the annual event due to a large wooden platform lodged over the concrete protector preventing access, refer to Photos 3 and 4 included in **Appendix F**.

6.2.1 Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons

6.2.1.1 Up Gradient Wells

Concentrations of BTEX, VPHw, LEPHw, benzo(a)pyrene, and naphthalene in porewater samples collected from the six Up Gradient Wells located within the Eastern and Western FPTS treatment cells. Concentrations were below their respective RBMTs except for one well, PW17-16, which had a LEPHw concentration of 330 µg/L marginally above the RBMT of 300 µg/L. One Up Gradient Well, PW17-31, could not be sampled due to a wooden platform obstructing access. However, the down slope wells (PW17-32 and PW17-33) did not contain concentrations above the reportable detection limit (RDL) of either petroleum hydrocarbons or polycyclic aromatic hydrocarbons.

6.2.1.2 Performance Wells (OCP and ACP)

Concentrations of BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, and naphthalene in all porewater samples collected from the eight OCP and ACP Wells located within the Eastern and Western FPTS treatment cells were below their respective RBMTs.

6.2.1.3 Sentry Wells

Concentrations of BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, and naphthalene in all porewater samples collected from the eight Sentry Wells located cross and down slope of the Eastern and Western FPTS treatment cells were below their respective RBMTs.

[4] As per ENV Protocol 16, NAPL is considered to be present if a thickness greater than 2 mm is measured in a monitoring well. BC ENV, 2021. Protocol 16. Determining the Presence and Mobility of Nonaqueous Phase Liquids and Odorous Substances (Version 3.0). Victoria, BC. p16_jan_2021_revisions_final_signed.pdf (gov.bc.ca)

6.2.1.4 Compliance Wells

Concentrations of BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, and naphthalene in all porewater samples collected from the nine Compliance Wells located in between, cross and down slope of the Eastern and Western FPTS were below their applicable RBMTs.

6.2.2 Metals Analysis

All porewater samples collected in 2022 from the 32 porewater wells contained concentrations of dissolved zinc and copper below their applicable RBMTs.

7. INSPECTION OF THE FPTS

The FPTS was inspected during two quarterly inspection events completed on the following dates:

- January 24, 2022
- March 7, 2022

A detailed table of the inspection results has been included as **Table 6** and a photographic log has been included as **Appendix F**.

As part of the 2022 FPTS inspection on January 24, one test pit was advanced within the cobble mat of the Eastern FPTS which revealed sand overlying cobbles to a depth of 0.4 m below grade, where the liner was encountered.

During the most recent inspection, conducted on March 7, 2022, two small exposures of geogrid, approximately 0.48 m and 0.61 m in length, were observed along the contact point between the rip rap and cobble layer along the northern extent of the Western FPTS (refer to Photos 5 and 6 within **Appendix F**). These exposures were observed embedded underneath the northern extent of the newly laid rip rap and are not considered to compromise the effectiveness of the FPTS.

Vegetation was observed on top of the barrier near Up Gradient Wells. Some small weeds were observed on top of the treatment cells in January, but roots were too shallow to cause damage. Attempts were made to remove vegetation encroaching on the FPTS at the time of inspections. Some overhanging vegetation from the Canadian Pacific Rail Right of Way is encroaching on the FPTS and may need to be cut in the future. Most Sentry and Compliance Wells are covered in barnacles and seaweed. Significant damage to monitoring wells was not observed.

The rip rap and cobble mat of the FPTS are anticipated to shift over time because of tidal action. Overall, the inspections indicated that there were no significant deficiencies associated with either the Eastern or Western FPTS. No significant concerns were noted during these inspections and the FPTS is performing as designed.

8. DISCUSSION

8.1 Distribution of Exceedances

For FPTS sampling events completed between 2017 and 2022, an exceedance refers to concentrations of BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, naphthalene, dissolved copper, or dissolved zinc above their applicable RBMTs.

There was one exceedance of LEPHw in a sample collected from Up Gradient Well PW17-16, during the March 2022 FPTS sampling event. The concentration of LEPHw decreased in the down slope OCP Well PW17-17,and concentrations were below the RDL in the remaining wells along this transect, including ACP Well (PW17-18), and Sentry and Compliance Wells (PW17-19 and PW17-20), respectively. The

same trend is observed for VPHw. The majority of concentrations of remaining PCOCs were less than the RDL. Refer to **Figure 2**. Overall, this indicates that the treatment system is effective in addressing dissolved phase hydrocarbons in porewater and is operating as designed.

8.2 Concentration Trends Over Time

8.2.1 Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons

The reported concentrations of LEPHw, VPHw, and benzene have been plotted over time on **Graphs 1 to 8** to demonstrate their trends. For graphs displaying average concentrations, the number of samples used in the calculation of average concentrations for each sampling event is represented by “n” on each graph. Data has been plotted from porewater wells within each of the monitoring areas of the current FPTS, including:

- (A) Up Gradient Wells,
- (B) OCP Wells,
- (C) ACP Wells,
- (D) Sentry Wells, and,
- (E) Compliance Wells

Graphs 1A through 1E demonstrate that the concentration of $LEPH_w$, averaged across each well type, was below the applicable RMBT for all 14 sampling events between November 2017 and March 2022.

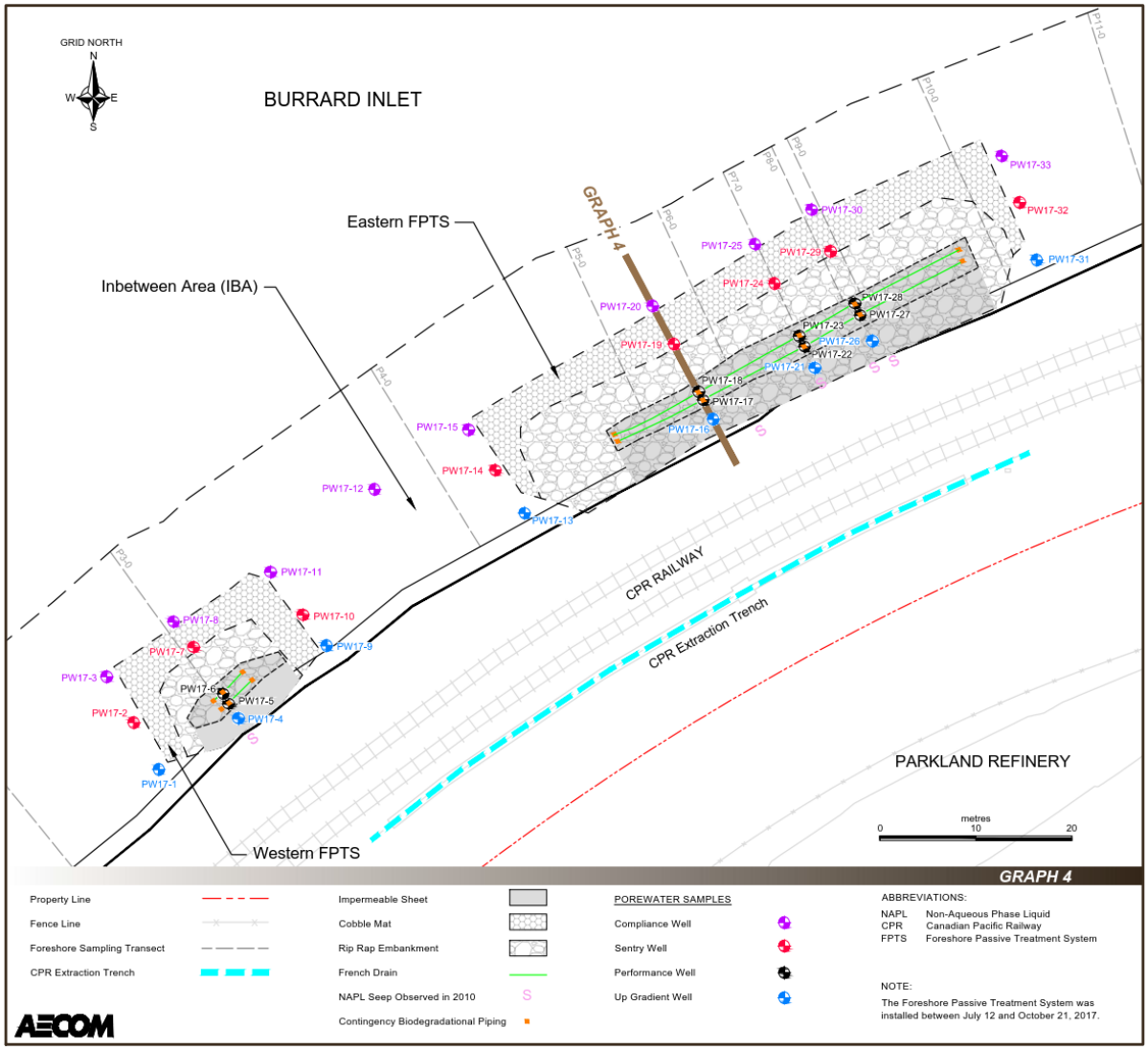
Graph 2 demonstrates that detectable concentrations of VPH_w in porewater were only present in Up Gradient Wells from January 2018 to March 2022 and OCP Wells from March through December 2018, June 2019, December 2019, March 2021, and March 2022. This indicates that the FPTS is effective at removing VPH_w from porewater, as concentrations of VPH_w above the RDL were not observed in wells down slope of the FPTS and concentrations of VPH_w generally decrease with travel through the FPTS.

Graph 3 indicates that average concentrations of benzene in porewater generally decrease after porewater has been transported through the FPTS, from Up Gradient to Sentry and Compliance Wells. During the last four sampling events, the average concentration of benzene have been higher in Sentry Wells compared to OCP Wells. At this time, it is unclear why benzene concentrations are higher in OCP and Sentry Wells compared to Up Gradient Wells, however, the concentrations observed are significantly lower than the applicable RBMT for benzene. For the first time since 2018, Up Gradient Wells have a higher average of benzene concentration in comparison to OCP Wells; average concentrations in both types of well continue to show a downward trend since 2018.

No detectable concentrations of benzene were reported in any porewater sample collected from an ACP Well. The lack of concentrations of benzene above its RDL from porewater samples collected from ACP Wells and from the Compliance Wells indicate that the activated carbon is efficient at the adsorption of benzene from porewater and the overall trend indicates that the FPTS is performing as designed.

Graph 4 presents concentrations of benzene, $LEPH_w$, and VPH_w in samples collected from porewater wells along a north-south transect through the Eastern FPTS, from Up Gradient Well PW17-16 to Compliance Well PW17-20, as shown in **Figure A** below.

Figure A: Wells included in Graph 4 and Cross section A-A' (Figure 5), a north-south transect through the Eastern FPTS

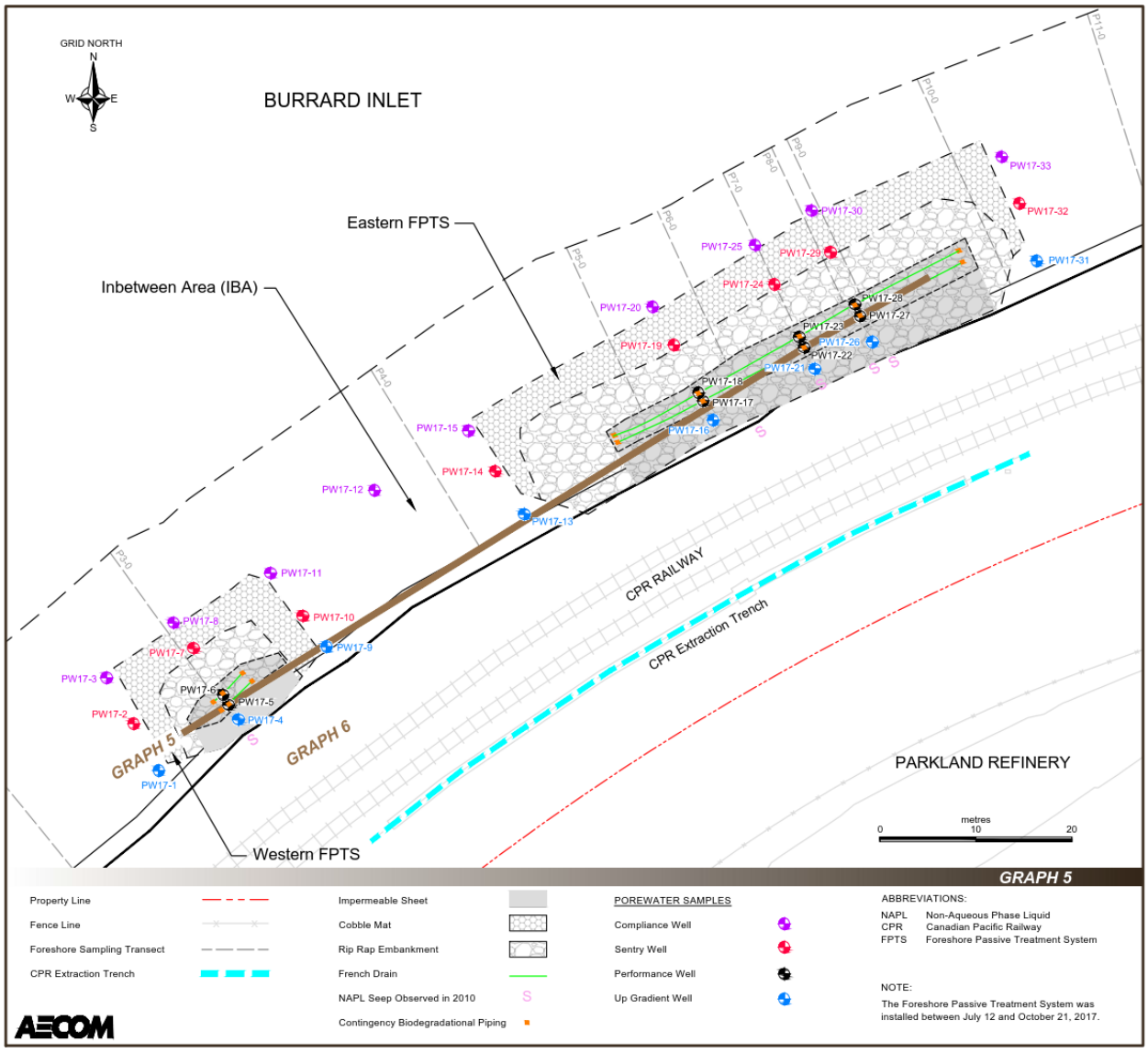


Graph 4 indicates a general decrease in concentrations of benzene and VPHw and LEPHw from the Up Gradient Well (PW17-16) to the down slope Compliance Well (PW17-20) since 2017. The samples with the highest concentration of benzene reported in March 2022 collected from this transect were from Up Gradient Well PW17-16 (3.41 µg/L) and Sentry Well PW17-19 (3.9 µg/L). Historically, higher benzene concentrations have been observed in porewater samples collected from Sentry Well PW17-19 in sampling events completed during winter and spring.

The graph illustrates that only $LEPH_w$ has exceeded the RBMT in Up Gradient Well PW17-16 in 2018, 2019, and 2022, with the highest reported concentration observed in April 2018. Reported concentrations of benzene, VPHw, and LEPHw were below their respective RBMTs in porewater samples collected from all other wells suggesting that the FPTS is efficient at addressing dissolved phase petroleum hydrocarbons in porewater.

Graph 5 presents concentrations of benzene, VPH_w, and $LEPH_w$ in samples collected from OCP Wells along a west-east transect (PW17-5, PW17-17, PW17-22, and PW17-27) through the Western and Eastern FPTS, as shown in **Figure B** below.

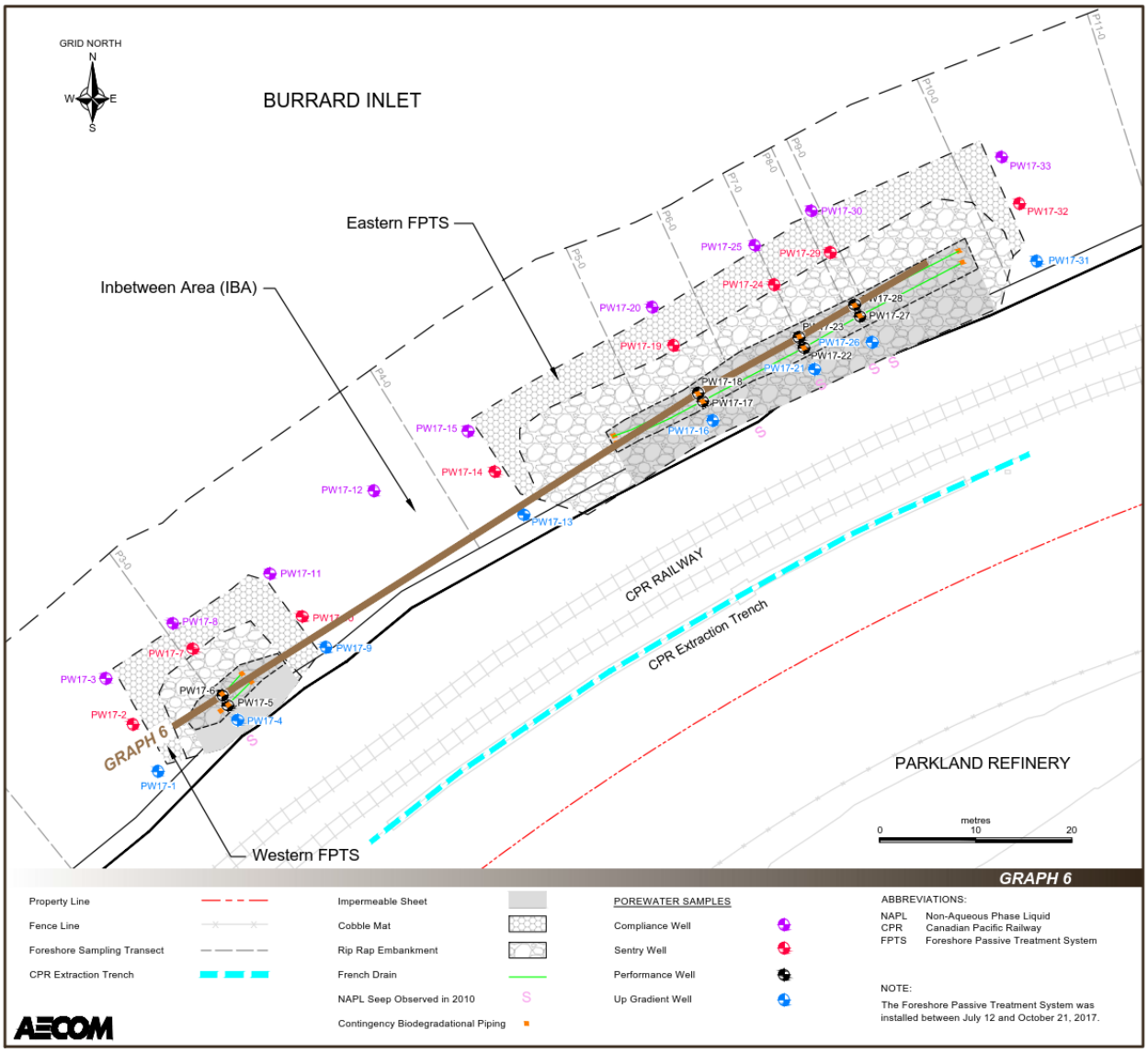
Figure B: Wells included in Graph 5, an east-west transect through Performance (OC) Wells



Graph 5 demonstrates that there were elevated concentrations of benzene and VPH_w in porewater samples collected from OCP Well PW17-17, with the highest concentrations occurring in samples collected in June 2018. Concentrations of VPHw and benzene in PW17-17 exhibit a generally downward trend since that time. Concentrations of benzene, VPHw, and LEPHw have not been reported above their respective RDLs from the Western FPTS since 2017.

Graph 6 presents concentrations of benzene, VPH_w, and $LEPH_w$ in samples collected from ACP Wells along a west-east transect (PW17-6, PW17-18, PW17-23, and PW17-28), as shown in **Figure C** below.

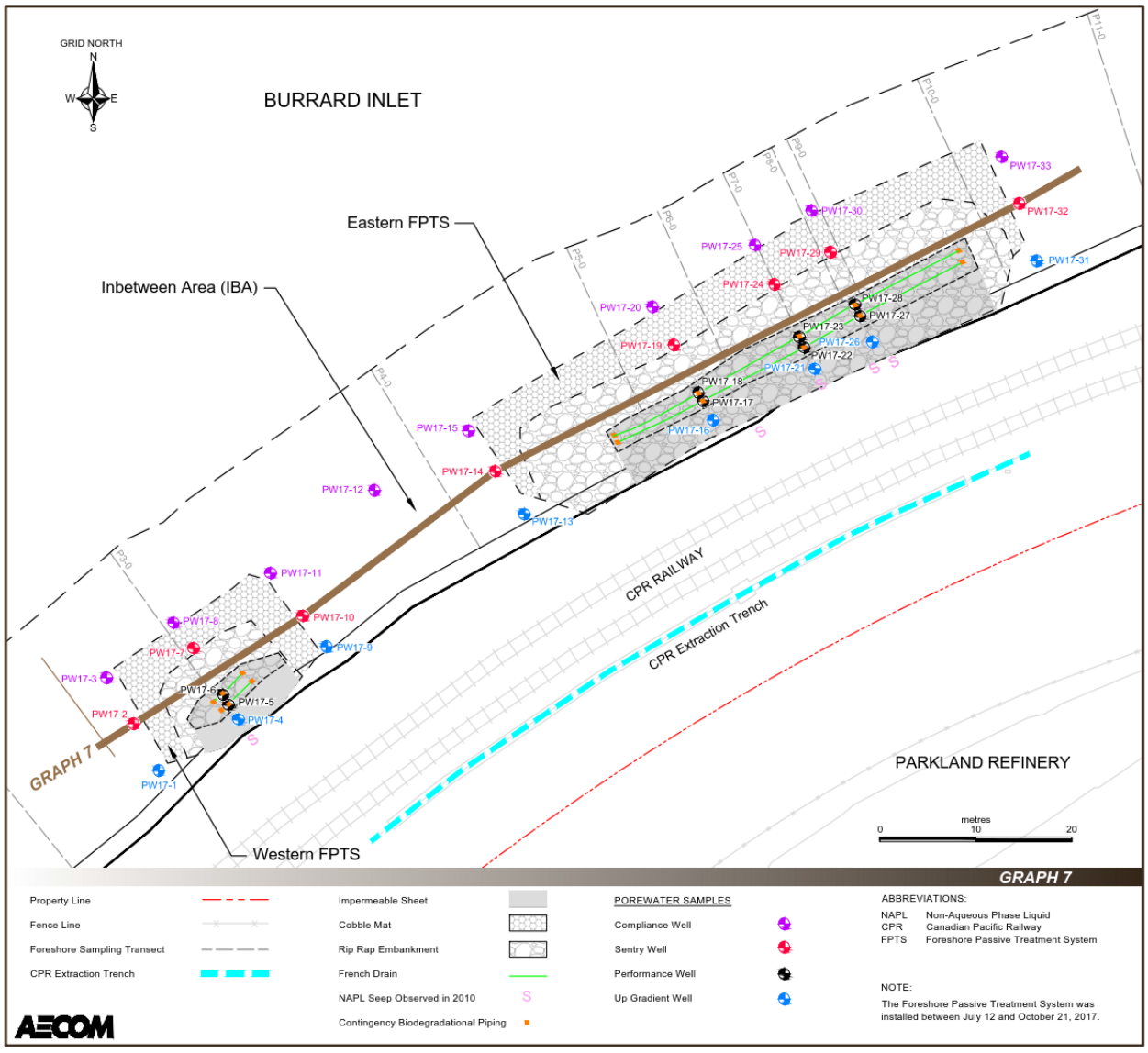
Figure C: Wells included in Graph 6, an east-west transect through Performance (AC) Wells



Graph 6 illustrates that there were no concentrations of benzene, VPH_w, and $LEPH_w$ above their respective RDLs in porewater samples collected from ACP Wells between November 2017 and March 2022. This suggests that the activated carbon is efficient at the adsorption of PHCs across both the Western and Eastern FPTS.

Graph 7 presents concentrations of benzene, VPH_w and $LEPH_w$ in samples collected from Sentry Wells (PW17-2, PW17-10, PW17-14, and PW17-32) along a west-east transect, as shown in **Figure D** below.

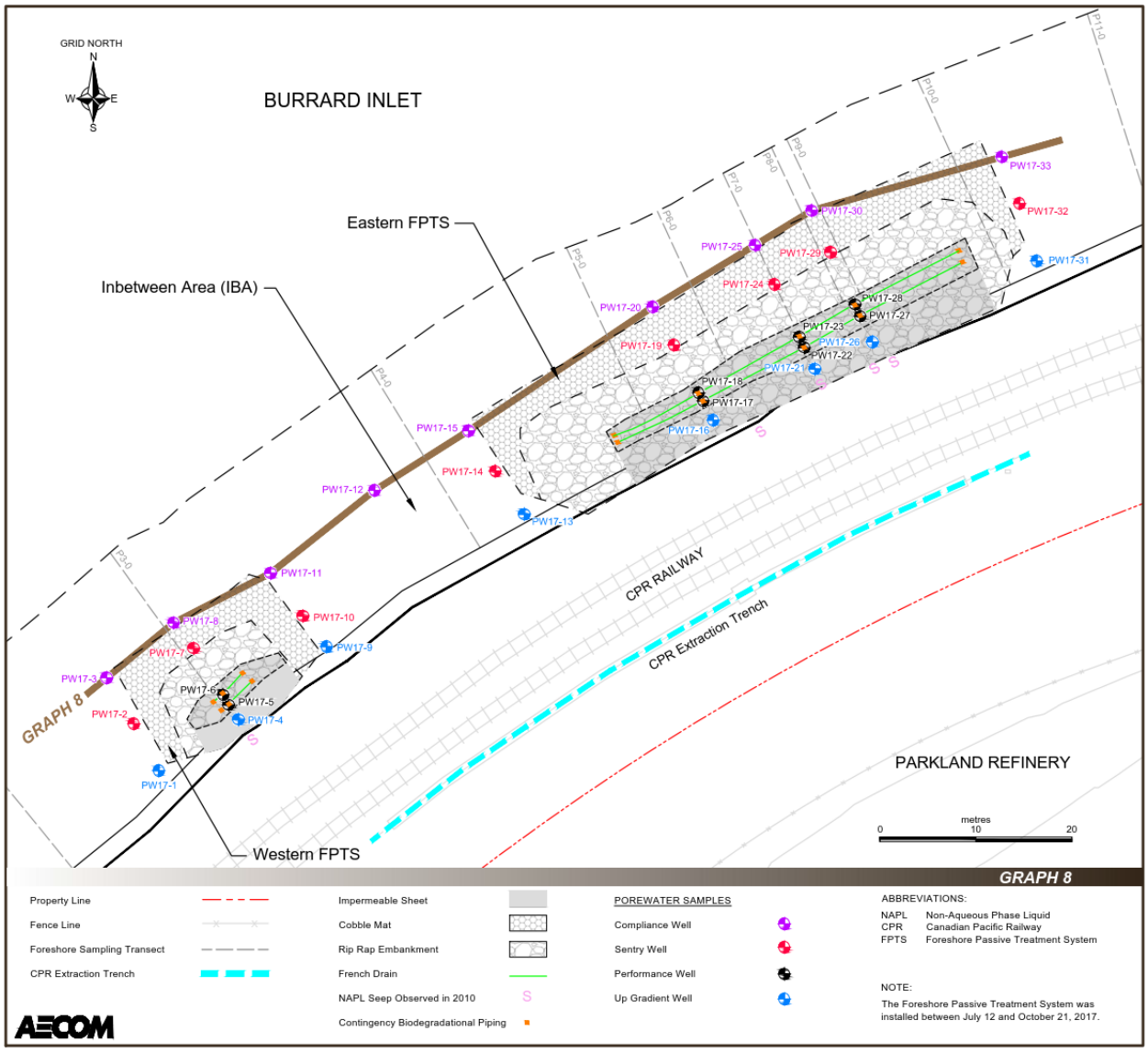
Figure D: Wells included in Graph 7, an east-west transect through Sentry Wells



Graph 7 illustrates that there have been no detectable concentrations of benzene, VPH_w, and $LEPH_w$ above their respective RDLs in porewater samples collected from any of the graphed Sentry Wells between November 2017 and March 2022, with the exception of $LEPH_w$ in one sample collected from PW17-10 located on the east end of the Western FPTS in December 2018. This sample contained a concentration of $LEPH_w$ above its RBMT. A separate bottle, containing a porewater sample from the same sampling event, was analyzed at the laboratory and contained a concentration of $LEPH_w$ below its RDL. There is no trend associated with this reportable concentration $LEPH_w$ and further analysis of the sample indicated the $LEPH_w$ was likely from either field or laboratory cross-contamination and not representative of porewater conditions on the Foreshore Site (AECOM, 2019a).

Graph 8 presents concentrations of benzene, VPH_w, and $LEPH_w$ in samples collected from Compliance Wells (PW17-3, PW17-8, PW17-11, PW17-12, PW17-15, PW17-20, PW17-25, PW17-30, and PW17-33) along a west-east transect, as shown in **Figure E** below.

Figure E: Wells included in Graph 8, an east-west transect through Compliance Wells



Graph 8 illustrates that there were no concentrations of VPH_w or $LEPH_w$ above their respective RDLs in porewater samples collected from any of the Compliance Wells between November 2017 and March 2022. Detectable concentrations of benzene have not been reported above their applicable RDLs in any Compliance Wells, with the exception of three samples collected from one Compliance Well (PW17-30) in November 2017 (0.63 µg/L), December 2017 (0.55 µg/L), and April 2018 (32.5 µg/L), which were far below the applicable RBMT (2,100 µg/L) and, therefore, does not indicate a deficiency in the Eastern FPTS. Detectable concentrations of benzene have not been reported in PW17-30 in subsequent samples collected between June 2018 and March 2022.

8.2.2 Dissolved Metals

All porewater samples collected in 2022 from the 32 porewater wells contained concentrations of dissolved zinc and copper below their applicable RBMTs.

AECOM assessed the concentration of dissolved metals in porewater samples collected at the Foreshore Site since 2017. Previously reported elevated dissolved copper concentrations detected in the January,

February, or September 2018 sampling events were determined to likely be associated with contamination resulting from field filtering samples, or contamination during sample preparation and dilution at the laboratory (AECOM 2019a).

Since then, none of the porewater samples collected have contained concentrations of dissolved copper or dissolved zinc above their RBMTs (6.2 and 90 µg/L, respectively). In 2022, detectable concentrations of dissolved copper ranged from 0.31 to 1.83 µg/L and detectable concentrations of dissolved zinc ranged from 1.0 to 16.6 µg/L. The concentrations of dissolved copper and dissolved zinc observed in 2022 was considerably less than the concentrations observed prior to the FPTS construction, which ranged from 0.2 to 35.9 µg/L and 1.0 to 7,400 µg/L, respectively.

8.3 Status of the FPTS

Since construction of the FPTS, monitoring data indicates that the FPTS is operating as designed for mitigating the migration of COCs to ecological receptors and waters of Burrard Inlet based on:

- The absence of sheens or measurable NAPL within the Up Gradient, Performance, Sentry, and Compliance Wells of the FPTS;
- Concentrations of dissolved phase COCs in all samples analyzed were below their applicable RBMTs, except for one; a concentration of LEPHw marginally above the applicable RBMT was observed in one Up Gradient Well (PW17-16) in March 2022;
- The elevated dissolved copper concentrations detected in porewater in select 2018 sampling events were not observed in subsequent sampling events completed in 2019through 2022. Previous elevated dissolved copper concentrations are considered anomalous and do not appear to be related to the FPTS or Refinery operations; and,
- The monitoring and sampling program completed in 2022 confirms that RBMTs have been in all Sentry and Compliance Wells.

9. SUMMARY

This 2022 monitoring report summarizes monitoring activities conducted between January through March 2022 along the Foreshore Site.

Table D below summarizes the objectives and results from the monitoring activities conducted on the Foreshore Site between January and March 2022.

Table D. Summary of the Objectives and Results from the 2022 Foreshore Monitoring Program

Objective	Result
Monitor for the presence of NAPL and associated COCs in Site monitoring wells	During monitoring events between January and March 2022, none of the porewater wells contained an observable sheen or measurable thickness of NAPL.
	One exceedance of the LEPHw RBMT was observed during the 2022 monitoring activity in one Up Gradient Well (PW17-16).
	The $LEPH_w$ exceedances in the porewater sample collected from Up Gradient Well PW17-16 have been observed sporadically since 2018. These exceedances do not indicate a lack of performance in the FPTS, as PW17-16 is located up slope of the FPTS. $LEPH_w$ was not above its RDL in any of the Sentry and Compliance Wells, which provides evidence that the treatment system worked effectively in 2022. All available evidence suggests that the FPTS continued to function as designed from January to March 2022.

Objective	Result
	Concentrations of dissolved copper above the RBMT in PW17-05, PW17-11, PW17-15, PW17-16, PW17-24, PW17-26, PW17-27, and PW17-28 detected during the January, February, and September 2018 sampling events have not been observed since. This supports the conclusion that the exceedances were determined to likely be associated with contamination resulting from field filtering samples or contamination during sample preparation and dilution at the laboratory.
Assess the performance of the FPTS's remedial treatment cells and OBB	Since December 2019, detectable concentrations of PHCs and PAHs have not been reported above the RDLs in any of the Compliance Wells. This trend demonstrates that the treatment system is operating as designed. The reported concentrations of COCs were below RBMTs in all samples collected in 2022.
Maintain the integrity of the FPTS by checking and, where needed, replacing the protective rip rap and cobbles, repairing or replacement of monitoring wells, and by managing vegetation as required.	All visual inspections of the FPTS indicated that there were no significant deficiencies, including rip rap thickness; thickness of cobbles above the OBB surface; vegetation growing above the treatment cells or OBB; and significant damage to monitoring wells (some minor chips to well casing and lids observed). Inspections completed in 2022 documented three exposures of the geogrid fabric and geotextile at the contact point between the rip rap and cobble interface of the Eastern and Western FPTS. This is significantly less since the addition of rock material in September 2021 along the treatment cell barrier and against the concrete protective well casings.

Fourteen sampling events have been completed since construction of the FPTS in 2017. Since 2017, only two wells have reported concentrations above their RBMTs: 1) Up Gradient Well PW17-16, the only well in which the RBMT for LEPHw (300 µg/L) was exceeded (January, February, March, April and December 2018, December 2019, and March 2022), with an average concentration of 311 µg/L and a maximum of 490 µg/L; and 2) Performance Well PW17-5 contained a concentration of dissolved copper reported above its RBMT (6.2 µg/L) in September 2018, with an average concentration of 3.10 µg/L and a maximum of 15.8 µg/L[5].

Since 2017, detectable concentrations of LEPHw, BTEX, VPHw, benzo(a)pyrene, and/or naphthalene have been found in nineteen (19) porewater wells associated with the Foreshore Site, but at concentrations well below their RBMTs. Concentrations of dissolved copper and/or zinc have been detected in 31 monitoring wells since April 2018[5], but below their RBMTs, with the one exception previously noted in PW17-5**.** In 2022, concentrations of LEPHw, BTEX, VPHw, and PAHs were not detected above the RDLs in any of the Compliance Wells; detectable concentrations of dissolved zinc was reported in only one of the nine Compliance Wells, but below the applicable RBMT. The treatment system is effective in addressing dissolved phase hydrocarbons in porewater and is operating as designed.

10. RECOMMENDATIONS

Based on the data collected post-construction of the FPTS, AECOM recommends continuing annual sampling of the FPTS in 2023 and then reducing the frequency of sampling to biennial (every two years) in 2025; the sampling frequency will be further reduced to quinquennial (every five years), based on the following:

[5] Additional exceedances of dissolved copper were observed between December 2017 and March 2018. However, the elevated dissolved copper concentrations in porewater and surface water samples collected between December 2017 and March 2018 did not appear to be related to the FPTS or Refinery operations, but were likely associated with contamination resulting from field filtering samples, or to contamination during sample preparation and dilution at the laboratory(AECOM, 2019a). The average concentration calculated for PW17-5 includes only samples collected after March 2018.

- The absence of sheens or measurable LNAPL within all 33 monitoring wells associated with the FPTS.
- Since 2017 concentrations of COCs have remained below the applicable RBMTs in all 33 monitoring wells - with exceptions noted previously in two wells (dissolved copper in PW17-5 in 2018 and LEPHw in PW17-16 between 2018 and 2019 and 2022).
- Concentrations of petroleum hydrocarbons (PHCs[6]) have not been reported above the laboratory RDL in five (PW17-01, PW17-04, PW17-09, PW17-13, and PW17-31) of the eight Up Gradient Wells. Of the remaining three Up Gradient Wells, a concentration of VPHw has been detected only once in PW17-26 (January 2018) above its RDL. Concentrations of benzene have been reported sporadically in PW17-21 above its RDL between 2018 and 2020. Concentrations of PHCs have decreased in well PW17-16 since April 2018. Detectable concentrations of benzo(a)pyrene and/or naphthalene have only been reported in two Up Gradient Wells; twice in PW17-01 in April 2018 and December 2020, and once in PW17-16) in January 2018.
- Between 2017 and 2022 detectable concentrations of benzene and VPHw have been detected in only two Sentry Wells (PW17-19 and PW17-29) associated with the Eastern FPTS. Detectable concentrations of PHCs have not been reported in any of the remaining Sentry Wells since 2017. Detectable concentrations of benzo(a)pyrene and naphthalene have only been reported once in two Sentry Wells (PW17-14 and PW17-19) in December and April 2018, respectively.

Based on inspections of the FPTS completed since they were constructed, AECOM recommends continuing annual sampling in 2023. Recommendations for reductions in inspections and sampling will be provided in a revised 2022 MMP yet to be submitted under separate cover to ENV for their review and approval.

[6] PHCs include benzene, toluene, ethylbenzene, xylenes, volatile and light extractable petroleum hydrocarbons in water.

11. STATEMENT OF QUALIFICATIONS AND LIMITATIONS

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

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

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the “Limitations”);
- represents AECOM’s professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

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

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

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM’s professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

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

12. REFERENCES

AECOM 2015. Pond 3 Investigation, Area 2, Chevron Burnaby Refinery, Burnaby, B.C. AECOM, October 5, 2015.

AECOM 2016a. Dissolved Zinc Concentrations in Foreshore Monitoring Well P18-4.5S, Chevron Burnaby Refinery, Burnaby, B.C. AECOM, April 5, 2016.

AECOM 2016b. Foreshore 2014 Annual Monitoring Report (January – December 2014) Below Area 2 Eastern Impounding Basin, Chevron Burnaby Refinery, Burnaby, British Columbia, July 13, 2016.

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

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

AECOM, 2017b. Foreshore Passive Treatment System Construction Report, Parkland Burnaby Refinery, Burnaby, BC. AECOM, December 21, 2017.

AECOM, 2017c. Foreshore Passive Treatment System Monitoring and Maintenance Plan, Down Slope from the Eastern Impounding Basin, Area 2, Parkland Burnaby Refinery, Burnaby, BC. Appendix K of the Foreshore Passive Treatment System Construction Report, Parkland Burnaby Refinery, Burnaby, BC. AECOM, December 21, 2017.

AECOM, 2019a. Foreshore 2018 Annual Monitoring Report (January – December 2018) Below Area 2 Eastern Impounding Basin, Parkland Refinery, Burnaby, British Columbia. AECOM, April 25, 2019.

AECOM, 2019b. Addendum to Foreshore Passive Treatment System Monitoring and Maintenance Plan Down Slope of Area 2, Parkland Burnaby Refinery, Burnaby, B.C. AECOM, December 12, 2019.

AECOM, 2020a. Foreshore 2019 Annual Monitoring Report (January – December 2019) Below Area 2 Eastern Impounding Basin, Parkland Refinery, Burnaby, British Columbia. AECOM, April 22, 2020.

AECOM, 2020b. 2020 Foreshore Monitoring and Sampling Program – Change Order # 1 - Revised Scope of Work, Burnaby, British Columbia. AECOM, July 20, 2020.

AECOM, 2021. Foreshore 2020 and 2021 Monitoring Report (January 2020– March 2021) Below Area 2 Eastern Impounding Basin, Parkland Refinery, Burnaby, British Columbia. AECOM, May 14, 2021.

AECOM, 2022. 2021 Foreshore Passive Treatment System Maintenance and Inspection Memo, Parkland Refinery, Burnaby, British Columbia. AECOM, January 26, 2022

BC Ministry of Environment (MoE), 2013. Email from Lizzy Moss of the MoE to Celine Totman of SLR regarding approval of SLR's Foreshore derived USLs. September 4, 2013.

BC Ministry of Environment (MoE), 2014. Letter from Lizzy Mos of the MoE to Christopher Boys of Chevron regarding approval of SLRs Foreshore derived RBMTs. August 28, 2014.

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

BC Ministry of Environment (MoE), 2016a. Email from Lavinia Zanini of the MoE to Christopher Boys of Chevron Re: Chevron Refinery projects with MoE and the discontinuation of P18-4.5S. December 22, 2016.

BC Ministry of Environment (ENV), 2016b. Question #36 from the BC MoE Questions and Answers webpage accessed February 17, 2016. http://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/contaminated-sites/cs_q-a.pdf

BC Ministry of Environment and Climate Change Strategy (ENV), 2018a. Letter from Lavinia Zanini of ENV to Chris Boys of Parkland Burnaby Refinery regarding the Foreshore Passive Treatment System Construction Report and Monitoring and Maintenance Plan. April 25, 2018.

BC Ministry of Environment and Climate Change Strategy (ENV), 2018b. Email from Lavinia Zanini of ENV to Chris Boys of Parkland Burnaby Refinery regarding the Foreshore Passive Treatment System Construction Report and Monitoring and Maintenance Plan. May 25, 2018.

BC Ministry of Environment and Climate Change Strategy (ENV), 2018c. Email Correspondence between Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Christopher Boys of the Parkland Burnaby Refinery, regarding Parkland Refinery Foreshore Well Decommissioning, June 21, 2018.

BC Ministry of Environment and Climate Change Strategy (ENV), 2018d. Email Correspondence between Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Christopher Boys of the Parkland Burnaby Refinery, December 7, 2018.

BC Ministry of Environment and Climate Change Strategy (ENV), 2019a. Email Correspondence between Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Christopher Boys of the Parkland Burnaby Refinery, February 25, 2019.

BC Ministry of Environment and Climate Change Strategy (ENV), 2019b. Email Correspondence between Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Christopher Boys of the Parkland Burnaby Refinery, November 25, 2019.

BC Ministry of Environment and Climate Change Strategy (ENV), 2020a. Email Correspondence between Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Christopher Boys of the Parkland Burnaby Refinery, May 19, 2020.

BC Ministry of Environment (ENV), 2020b. British Columbia Environmental Laboratory Manual. Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a-2020.pdf

BC Ministry of Environment (ENV), 2021. Protocol 11. Upper Cap Concentrations for Substances Listed in the Contaminated Sites Regulation. Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/p11_jan_2021_revisions_final_signed.pdfInlailawatash Limited Partnership (Inlailawatash), 2019. Parkland Refinery Foreshore Wells Decommissioning Archaeological Monitoring. Inlailawatash, September 12, 2019.

Metro Vancouver, 2022. Daily Rainfall Summaries. E-mail correspondence between Justin Becker (AECOM) and Metro Vancouver lwsflow.monitoring.data.requests@metrovancouver.org, April 29, 2022.

Parkland, 2018a. Email Correspondence between Christopher Boys of the Parkland Burnaby Refinery and Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV) and Spencer Chaisson of the Vancouver Fraser Port Authority (VFPA) regarding Parkland Refinery Foreshore Well Decommissioning, June 15, 2018.

Parkland, 2018b. Email Correspondence between Christopher Boys of the Parkland Burnaby Refinery and Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV), November 28, 2018.

Parkland, 2019a. Email Correspondence between Christopher Boys of the Parkland Burnaby Refinery and Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV), January 30, 2019.

Parkland, 2019b. Email Correspondence between Christopher Boys of the Parkland Burnaby Refinery and Lavinia Zanini of the BC Ministry of Environment and Climate Change Strategy (ENV), May 9, 2019.

SLR (SLR Consulting Canada), 2011. Interim Ecological Risk Assessment, Final Problem Formulation Report, Foreshore Adjacent to East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC. SLR Consulting Canada, November 2011.

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

SLR (SLR Consulting Canada), 2014b. Human Health and Ecological Risk Assessment of Seep Area Foreshore Down Slope of the East Impounding Basin, Chevron Burnaby Refinery, Burnaby BC. Vancouver, BC. SLR Consulting Canada, February 27, 2014.

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

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

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

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

URS, 2014a. Second Amendment to the Frequency of Monitoring and Sampling on the Foreshore, Area 2, Chevron Burnaby Refinery, Burnaby, BC. URS Canada Inc., November 10, 2014.

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

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

VFPA (Vancouver Fraser Port Authority), 2017. Vancouver Fraser Port Authority, Project and Environmental Review Report and Permit 16-180, Chevron Canada Limited, Chevron Refinery Foreshore Final Remedy, 5201 Penzance Drive, Burnaby. May 24, 2017.

VFPA (Vancouver Fraser Port Authority), 2018. Email correspondence between Spencer Chaisson of the Vancouver Fraser Port Authority and Chris Boys of the Parkland Burnaby Refinery. VFPA, June 18, 2018.

VFPA (Vancouver Fraser Port Authority), 2019. Vancouver Fraser Port Authority, Project and Environmental Review Foreshore Well Decommissioning – Burnaby, B.C. Permit 19-109. VFPA, June 7, 2019.

VFPA (Vancouver Fraser Port Authority), 2021. Email correspondence between Spencer Chaisson of the Vancouver Fraser Port Authority and Chris Boys of the Parkland Burnaby Refinery. VFPA, January 4, 2021.

Figures

BURRARD INLET

Eastern FPTS

Western FPTS

Toe of Slope (High Tide Line)

Top of Slope

Low Tide Line

CPR RAILWAY

CPR Extraction Trench

PARKLAND REFINERY

COAST GUARD WEIR

P12-0 P11-0 P10-0 P9-0 P8-0 P7-0 P6-0 P5-0 P4-0 P3-0 P2-0 P1-0

PW17-1 PW17-2 PW17-3 PW17-4 PW17-5 PW17-6 PW17-7 PW17-8 PW17-9 PW17-10 PW17-11 PW17-12 PW17-13 PW17-14 PW17-15 PW17-16 PW17-17 PW17-18 PW17-19 PW17-20 PW17-21 PW17-22 PW17-23 PW17-24 PW17-25 PW17-26 PW17-27 PW17-28 PW17-29 PW17-30 PW17-31 PW17-32 PW17-33

CBP-1 CBP-2 CBP-3 CBP-4 CBP-5 CBP-6 CBP-7 CBP-8 CBP-9 CBP-10 CBP-11 CBP-12 CBP-13 CBP-14 CBP-15 CBP-16

SOURCE: GOOGLE EARTH IMAGE (2016)

LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- CPR Extraction Trench
- Impermeable Sheet
- Cobble Mat
- Rip Rap Embankment
- French Drain
- NAPL Seep Observed in 2010 (S)
- Contingency Biodegradational Piping

POREWATER SAMPLES

- Compliance Well
- Sentry Well
- Performance Well
- Up Gradient Well
- ENV Requires Notifications[3]

ABBREVIATIONS:

COC	Contaminants of Concern
CPR	Canadian Pacific Railway
ENV	BC Ministry of Environment & Climate Change Strategy
NAPL	Non-Aqueous Phase Liquid
RBMT	Risk-Based Management Targets

NOTES:

1. The Foreshore Passive Treatment System (FPTS) was installed between July 12 and October 21, 2017.
2. The FPTS was upgraded with additional material on September 27, 2021.
3. BC ENV requires written notification within 30 days of exceedances of COCs above RBMTs in select wells.
4. BC ENV requires immediate verbal and written notification of COCs above Upper Cap Concentrations (Protocol 11) in all wells.

GRID NORTH

N W E S

metres 0 10 20

AECOM

SITE MAP AND FORESHORE SAMPLING LOCATIONS

Foreshore 2022 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2022	60679830	SGC	0	FIGURE 1

FILE NAME: C:\Users\georgiana.stegariu\AECOM Directory\Parkland Burnaby Refinery - CAD Support - General\2021 Foreshore Upgrade\Figures\Figures 11.25.2021\F03 - Site Map and Foreshore Sampling Locations (Post-Maintenance) 2021-11-25 - 60653584.dwg

GRID NORTH

N

W E

S

BURRARD INLET

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-20	8-Mar-22	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-19	7-Mar-22	0.87-1.15	<250	<100	3.90	<0.50	<0.50	<0.75
PW17-18	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-17	8-Mar-22	0.64-1.00	250	140	1.83	<0.50	<0.50	<0.75
PW17-16	8-Mar-22	0.45-0.75	330	280	3.41	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-15	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-14	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-12	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-11	8-Mar-22	0.74-1.10	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-10	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-03	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-25	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-24	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-23	9-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-22	9-Mar-22	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-21	8-Mar-22	0.45-0.75	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-33	8-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-32	7-Mar-22	0.85-1.15	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-31	7-Mar-22	0.85-1.15	NS	NS	NS	NS	NS	NS

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-30	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-29	8-Mar-22	0.85-1.15	<250	<100	6.99	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-28	9-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-27	9-Mar-22	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-26	9-Mar-22	0.45-0.75	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-08	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-07	8-Mar-22	0.70-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-06	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.50

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-05	8-Mar-22	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.50

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-04	8-Mar-22	0.45-0.75	<250	<100	<0.50	<0.50	<0.50	<0.50

Inbetween Area (IBA)

Eastern Seep Area (ESA)

Western Seep Area (WSA)

PW17-33 PW17-32 PW17-31 PW17-30 PW17-29 PW17-28 PW17-27 PW17-26 PW17-25 PW17-24 PW17-23 PW17-22 PW17-21 PW17-20 PW17-19 PW17-18 PW17-17 PW17-16 PW17-15 PW17-14 PW17-13 PW17-12 PW17-11 PW17-10 PW17-9 PW17-8 PW17-7 PW17-6 PW17-5 PW17-4 PW17-3 PW17-2 PW17-1

CBP-16 CBP-15 CBP-14 CBP-12 CBP-13 CBP-11 CBP-10 CBP-9 CBP-8 CBP-7 CBP-6 CBP-5 CBP-4 CBP-2 CBP-1 CBP-3

P12-0 P11-0 P10-0 P9-0 P8-0 P7-0 P6-0 P5-0 P4-0 P3-0 P2-0 P1-0

Toe of Slope (High Tide Line)

Top of Slope

CPR RAILWAY

CPR Extraction Trench

Low Tide Line

PARKLAND REFINERY

COAST GUARD WLK

ABBREVIATIONS:

NAPL	Non-Aqueous Phase Liquid
CPR	Canadian Pacific Railway
FPTS	Foreshore Passive Treatment System
RBMT	Risk Based Management Target
LEPHw	Light Extractable Petroleum Hydrocarbons in Water
VPHw	Volatile Petroleum Hydrocarbons in Water
B	Benzene
T	Toluene
E	Ethylbenzene
X	Xylenes
ug/L	micrograms per litre
<	Sample concentration less than the reported detection limit indicated

LEGEND:

Property Line

Fence Line

Foreshore Sampling Transect

CPR Extraction Trench

Impermeable Sheet

Cobble Mat

Rip Rap Embankment

French Drain

NAPL Seep Observed in 2010 (S)

Contingency Biodegradational Piping

POREWATER SAMPLES

Compliance Well	PW17-8
Sentry Well	PW17-7
Performance Well	PW17-6
Up Gradient Well	PW17-4
Not Sampled	NS

Sample concentration less than applicable RBMTs

Sample concentration greater than applicable RBMTs

Monitoring Well Not Sampled

NOTE:
1. The well symbol has been colour coded to identify exceedances in the most recent sampling event.

All units in µg/L	LEPHw	VPHw	B	E	T	X
RBMT	300	1500	2100	320	770	330

Colour coding of symbols is based on the most recent lab result. SLR derived Risk Based Management Targets (RBMTs) that were accepted by the ENV on August 28, 2014. Details regarding the RBMTs, and associated correspondence are included in Appendix C of this report.

PINK BACKGROUND = FPTS TREATMENT CELL SAMPLE

0 10 20 metres

AECOM

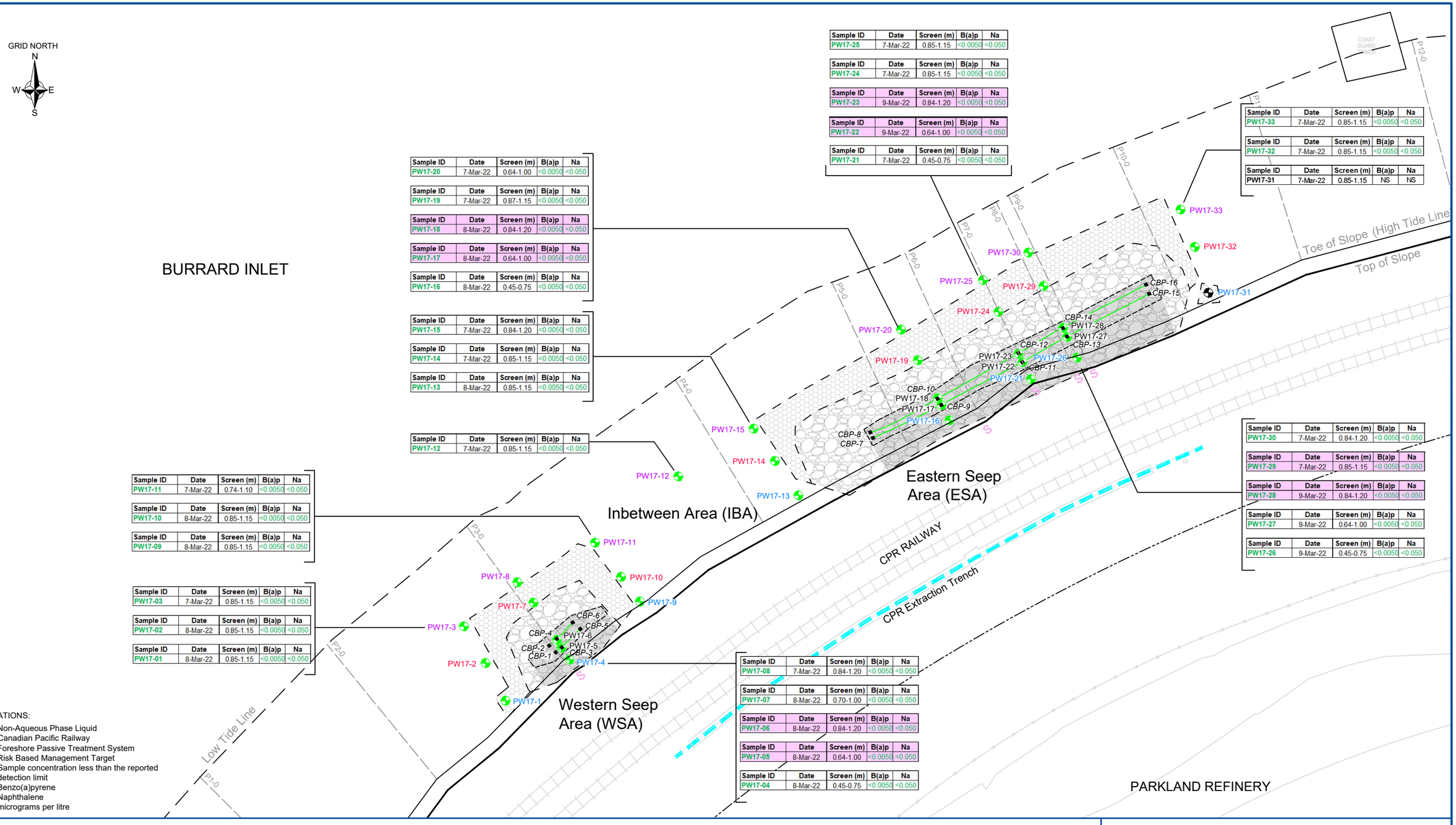
WATER ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS - 2022

Foreshore 2022 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2022	60679830	NT/GS	0	FIGURE 2

FILE NAME: C:\Users\georgiana.stegaru\AECOM Directory\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG02 - Water Analytical Results for PHC (2022) 2022-05-10 - 60679830.dwg



ABBREVIATIONS:

NAPL	Non-Aqueous Phase Liquid
CPR	Canadian Pacific Railway
FPTS	Foreshore Passive Treatment System
RBMT	Risk Based Management Target
<	Sample concentration less than the reported detection limit
B(a)p	Benzo(a)pyrene
Na	Naphthalene
ug/L	micrograms per litre

LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- CPR Extraction Trench
- Impermeable Sheet
- Cobble Mat
- Rip Rap Embankment
- French Drain
- NAPL Seep Observed in 2010
- Contingency Biodegradational Piping

POREWATER SAMPLES

- Compliance Well — PW17-8
- Sentry Well — PW17-7
- Performance Well — PW17-6
- Up Gradient Well — PW17-4
- Not Sampled — NS

- Sample concentration less than applicable RBMTs
- Sample concentration greater than applicable RBMTs
- Monitoring Well Not Sampled

NOTE:
1. The well symbol has been colour coded to identify exceedances in the most recent sampling event.

All units in µg/L	B(a)p	Na
RBMT	0.28	44

Colour coding of symbols is based on the most recent lab result. SLR derived Risk Based Management Targets (RBMTs) that were accepted by the ENV on August 28, 2014. Details regarding the RBMTs, and associated correspondence are included in Appendix C of this report.

PINK BACKGROUND = FPTS TREATMENT CELL SAMPLE

metres: 0 — 10 — 20

AECOM

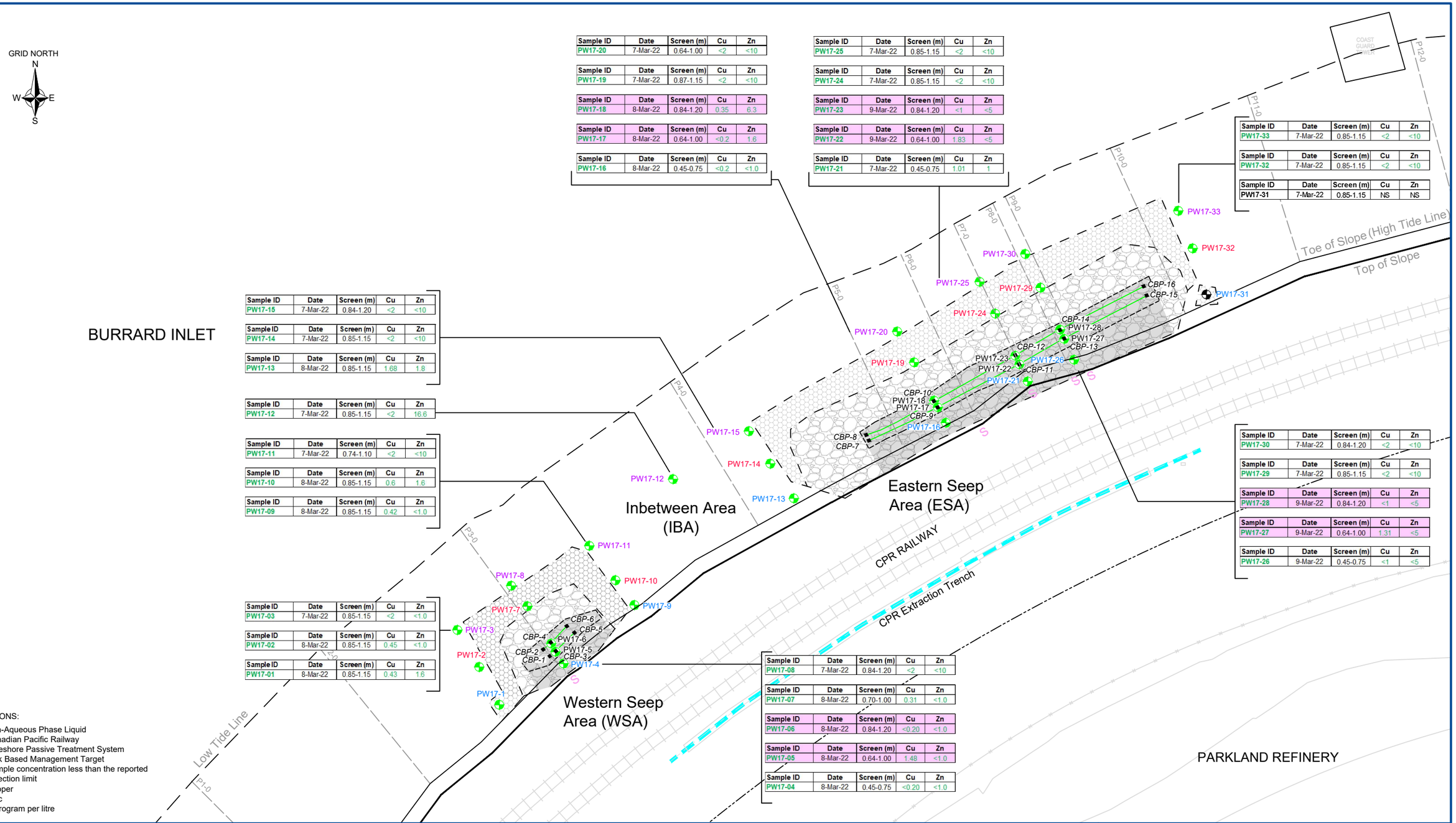
WATER ANALYTICAL RESULTS FOR POLYCYCLIC AROMATIC HYDROCARBONS - 2022

Foreshore 2022 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2022	60679830	NT/GS	0	FIGURE 3

FILE NAME: C:\Users\georgiana.stegariu\AECOM Directory\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG03 - Water Analytical Results for PAH (2022) 2022-05-10 - 60679830.dwg



ABBREVIATIONS:

NAPL	Non-Aqueous Phase Liquid
CPR	Canadian Pacific Railway
FPTS	Foreshore Passive Treatment System
RBMT	Risk Based Management Target
<	Sample concentration less than the reported detection limit
Cu	Copper
Zn	Zinc
ug/L	microgram per litre

LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- CPR Extraction Trench
- Impermeable Sheet
- Cobble Mat
- Rip Rap Embankment
- French Drain
- NAPL Seep Observed in 2010
- Contingency Biodegradational Piping

POREWATER SAMPLES

- Compliance Well PW17-8
- Sentry Well PW17-7
- Performance Well PW17-6
- Up Gradient Well PW17-4
- Not Sampled NS

- Sample concentration less than applicable RBMTs
- Sample concentration greater than applicable RBMTs
- Monitoring Well Not Sampled

NOTE:
1. The well symbol has been colour coded to identify exceedances in the most recent sampling event.

All units in µg/L	Cu	Zn
RBMT	6.2	90

Colour coding of symbols and sample ID is based on the most recent lab result. SLR derived Risk Based Management Targets (RBMTs) that were accepted by the ENV on August 28, 2014. Details regarding the RBMTs, and associated correspondence are included in Appendix C of this report.

PINK BACKGROUND = FPTS TREATMENT CELL SAMPLE

WATER ANALYTICAL RESULTS FOR DISSOLVED METALS - 2022

Foreshore 2022 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2022	60679830	NT/GS	0	FIGURE 4

AECOM

FILE NAME: C:\Users\georgiana.stegariu\AECOM Directory\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG04 - Water Analytical Results for Metals (2022) 2022-05-10 - 60679830.dwg

A
NORTH

A'
SOUTH

PINK BACKGROUND =
FPTS TREATMENT CELL SAMPLE

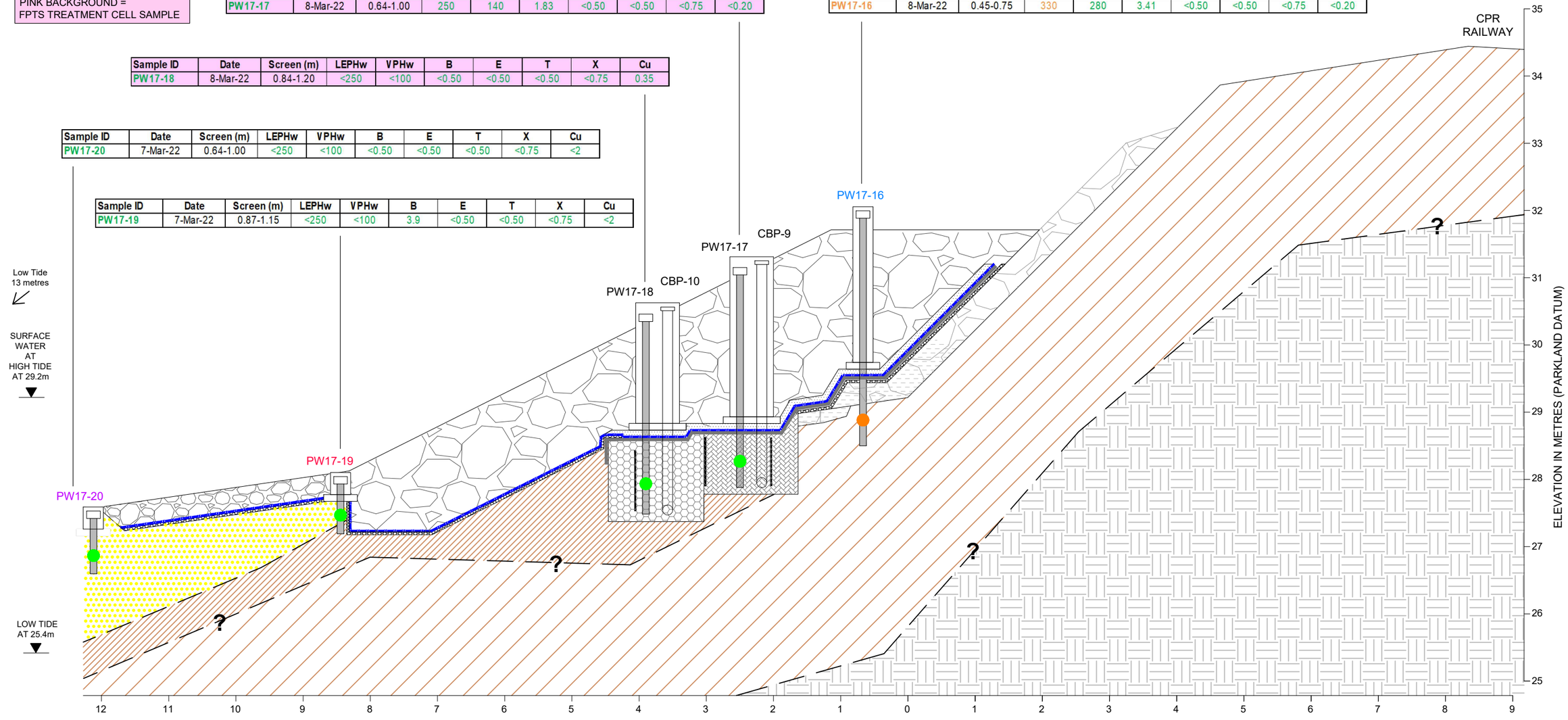
Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-17	8-Mar-22	0.64-1.00	250	140	1.83	<0.50	<0.50	<0.75	<0.20

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-16	8-Mar-22	0.45-0.75	330	280	3.41	<0.50	<0.50	<0.75	<0.20

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-18	8-Mar-22	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75	0.35

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-20	7-Mar-22	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75	<2

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-19	7-Mar-22	0.87-1.15	<250	<100	3.9	<0.50	<0.50	<0.75	<2



All units in µg/L	LEPHw	VPHw	B	E	T	X	Cu
RBMT	300	1500	2100	320	770	330	6.2

Colour coding of symbols is based on the most recent lab result. SLR derived Risk Based Management Targets (RBMTs) that were accepted by the MoE on August 28, 2014. Details regarding the RBMTs, and associated correspondence are included in Appendix C of this report.

NOTE:
1. Stratigraphic thickness extrapolated based on figures provided from URS, Detailed Site Investigation (URS, 2011a).
2. Samples were not collected from CBP-9 and CBP-10.

LEGEND

- Alluvium/colluvium
- Weathered alluvium/colluvium
- Beach Sand
- Till
- Sand, aquagate and powdered activated carbon
- Sand, aquagate and organoclay
- Sand-organoclay mixture
- Filter fabric
- Oleophilic biobarrier (OBB)
- Impermeable HDPE geomembrane
- Gravel
- Inferred stratigraphic boundary
- Baffle
- Cobbles
- Rip-Rap
- Monitoring Well
- Contingency Biodegradational Piping
- Compliance Well PW17-20
- Sentry Well PW17-19
- Performance Well PW17-18
- Up Gradient Well PW17-16
- Sample concentration less than applicable RBMTs
- Sample concentration greater than applicable RBMTs

ABBREVIATIONS:

CPR	Canadian Pacific Railway
B	Benzene
T	Toluene
E	Ethylbenzene
X	Xylenes
LEPHw	Light Extractable Petroleum Hydrocarbons in water
VPHw	Volatile Petroleum Hydrcarbons in water
Cu	Copper
ug/L	micrograms per litre
RBMT	Risk Based Management Target
FPTS	Foreshore Passive Treatment System
<	Sample concentration less than the reported detection limit indicated

GRID NORTH

N
W E
S

metres
0 2 4 6

AECOM

CROSS SECTION A-A' EASTERN FPTS
WATER ANALYTICAL RESULTS FOR
PETROLEUM HYDROCARBONS AND DISSOLVED COPPER
2022

Foreshore 2022 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2022	60679830	NT/GS	0	FIGURE 5

FILE NAME: C:\Users\georgiana.stegariu\AECOM Directory\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG05 - XS A-A Eastern FPTS WTR Analytical Results for PHC & CU (2022) 2022-05-10-60679830.dwg

Tables

TABLE 1
POREWATER MONITORING DATA 2022
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID	Date Sampled	Sample Time	Low Tide	Total Depth of Well (m from TOC)[2]	Top of Casing Elevation (TOC, mASL)[1]	Well Diameter (mm)	Screened Interval (m bgs)	Headspace Vapour Concentration (ppm unless otherwise noted)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Porewater Elevation (mASL) [1]	Observations
PW17-01	24-Jan-22	15:59	18:00	1.326	29.12	50	0.85-1.15	5	---	ND	0.773	28.35	---
PW17-01	08-Mar-22	13:51	16:00	1.322	29.12	50	0.85-1.15	10	---	ND	0.473	28.65	Clear
PW17-02	08-Mar-22	13:55	16:00	1.202	27.72	50	0.85-1.15	20	---	ND	0.467	27.25	Clear
PW17-03	07-Mar-22	16:09	15:00	1.339	27.24	50	0.85-1.15	5	---	ND	0.717	26.52	Cloudy
PW17-04	24-Jan-22	15:49	18:00	3.371	31.19	50	0.45-0.75	0	---	ND	2.916	28.27	---
PW17-04	08-Mar-22	14:11	16:00	3.373	31.19	50	0.45-0.75	ND	---	ND	2.948	28.24	Cloudy, light grey, DUP1
PW17-05	24-Jan-22	15:56	18:00	3.083	30.22	50	0.64-1.00	0	---	ND	2.091	28.13	---
PW17-05	08-Mar-22	14:41	16:00	3.079	30.22	50	0.64-1.00	ND	---	ND	2.123	28.10	Cloudy, Light brown
PW17-06	08-Mar-22	14:20	16:00	3.11	29.79	50	0.84-1.20	ND	---	ND	1.825	27.97	Cloudy Light Brown
PW 17-07	08-Mar-22	14:40	16:00	1.102	27.29	50	0.70-1.00	ND	---	ND	0.281	27.01	Clear
PW17-08	07-Mar-22	15:45	16:00	1.346	26.6	50	0.84-1.20	ND	---	ND	0.256	26.344	Cloudy
PW17-09	24-Jan-22	15:43	18:00	1.362	28.55	50	0.85-1.15	10	---	ND	0.451	28.10	---
PW17-09	08-Mar-22	13:30	16:00	1.364	28.55	50	0.85-1.15	15	---	ND	0.456	28.09	Silty
PW17-10	08-Mar-22	14:23	16:00	1.373	27.25	50	0.85-1.15	15	---	ND	0.191	27.06	Clear
PW17-11	07-Mar-22	16:11	15:00	1.445	26.72	50	0.74-1.10	5	---	ND	0.384	26.34	Cloudy Light Grey
PW17-12	07-Mar-22	16:20	15:00	1.446	27.03	50	0.85-1.15	ND	---	ND	0.734	26.30	Clear
PW17-13	24-Jan-22	15:39	18:00	1.315	28.9	50	0.85-1.15	5	---	ND	0.438	28.46	---
PW17-13	08-Mar-22	13:22	16:00	1.314	28.9	50	0.85-1.15	35	---	ND	0.420	28.48	Cloudy, light grey
PW17-14	07-Mar-22	15:50	15:00	1.378	27.83	50	0.85-1.15	15	---	ND	0.184	27.65	Cloudy
PW17-15	07-Mar-22	15:51	15:00	1.390	27.03	50	0.84-1.20	ND	---	ND	0.736	26.29	Cloudy; Light Grey
PW17-16	24-Jan-22	15:33	18:00	3.228	31.44	50	0.45-0.75	5	---	ND	2.645	28.80	---
PW17-16	08-Mar-22	15:17	16:00	3.262	31.44	50	0.45-0.75	ND	---	ND	2.808	28.63	Clear
PW17-17	24-Jan-22	15:36	18:00	3.188	30.73	50	0.64-1.00	0	---	ND	2.000	28.73	---
PW17-17	08-Mar-22	15:13	16:00	3.188	30.73	50	0.64-1.00	ND	---	ND	2.141	28.59	Cloudy, Light Orange
PW17-18	08-Mar-22	15:18	16:00	1.393	30.6	50	0.84-1.20	ND	---	ND	1.972	28.63	Cloudy, Light Orange
PW17-19	07-Mar-22	15:30	15:00	1.319	28.210	50	0.87-1.15	90	---	ND	0.449	27.76	Silty
PW17-20	07-Mar-22	15:20	15:00	1.477	27.58	50	0.64-1.00	15	---	ND	0.160	27.42	Clear
PW17-21	24-Jan-22	15:30	18:00	ND	31.38	20	0.45-0.75	0	---	NM	NM	NM	No sheen observed on surface water within well.
PW17-21	07-Mar-22	16:39	15:00	3.358	31.38	20	0.45-0.75	ND	---	NM	2.521	28.86	Clear
PW17-22	24-Jan-22	15:32	18:00	3.495	31.14	50	0.64-1.00	0	---	ND	2.344	28.80	---
PW17-22	09-Mar-22	14:25	16:00	3.515	31.14	50	0.64-1.00	ND	---	ND	2.554	28.59	Clear
PW17-23	09-Mar-22	14:34	16:00	3.207	30.58	50	0.84-1.20	ND	---	ND	2.007	28.57	Green cap off on arrival, Clear
PW17-24	09-Mar-22	15:18	16:00	1.339	28.12	50	0.85-1.15	15	---	ND	0.388	27.73	Cloudy, Light Orange/brown
PW17-25	07-Mar-22	15:11	15:00	1.268	27.430	50	0.85-1.15	25	---	ND	0.262	27.17	Clear
PW17-26	24-Jan-22	15:24	18:00	3.794	31.81	50	0.45-0.75	30	---	ND	2.907	28.90	---
PW17-26	09-Mar-22	13:40	16:00	3.780	31.81	50	0.45-0.75	ND	---	ND	3.061	28.75	DUP 3, Cloudy Orange
PW17-27	24-Jan-22	15:27	18:00	3.806	31.4	50	0.64-1.00	10	---	ND	2.573	28.83	---
PW17-27	09-Mar-22	14:45	16:00	3.782	31.4	50	0.64-1.00	ND	---	ND	2.803	28.60	Cloudy Light Grey
PW17-28	09-Mar-22	15:12	16:00	3.226	30.53	50	0.84-1.20	5	---	ND	1.908	28.62	Cloudy Light Grey
PW17-29	07-Mar-22	14:53	15:00	1.396	28.24	50	0.85-1.15	25	---	ND	0.634	27.61	Cloudy Light Grey
PW17-30	07-Mar-22	15:00	15:00	1.366	27.39	50	0.84-1.20	10	---	ND	0.192	27.20	Clear
PW17-31	24-Jan-22	15:17	18:00	1.263	29.31	50	0.85-1.15	5	---	ND	0.388	28.92	---

TABLE 1
POREWATER MONITORING DATA 2022
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID	Date Sampled	Sample Time	Low Tide	Total Depth of Well (m from TOC)[2]	Top of Casing Elevation (TOC, mASL)[1]	Well Diameter (mm)	Screened Interval (m bgs)	Headspace Vapour Concentration (ppm unless otherwise noted)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Porewater Elevation (mASL) [1]	Observations
PW17-31	07-Mar-22	NM	15:00	NM	29.31	50	0.85-1.15	NM	---	ND	NM	NM	Wooden platform on top of well, unable to access, well not monitored or sampled
PW17-32	07-Mar-22	14:04	15:00	1.346	27.58	50	0.85-1.15	60	---	ND	0.627	26.95	Cloudy, Light Grey
PW17-33	07-Mar-22	14:24	15:00	1.276	27.53	50	0.85-1.15	10	---	ND	0.597	26.93	Cloudy, Light Grey

Notes:
1 - Elevations are in Parkland Datum = Geodetic Datum + 91.52 feet.

Abbreviations:
m - metres
m bgs - metres below ground surface
mASL - metres above sea level
mg/L - milligrams per liter
mm - millimetres
ppm - parts per million
--- - no observations

Acronyms:
DTW - depth to water
FPTS - Foreshore Passive Treatment System
NA - not applicable
NM - not measured
ND - not detected
TOC - top of casing

TABLE 2
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Lithology of Screen Interval (Secondary)	Sample Date	Laboratory Report	LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]														5,000	15,000	10,000	25,000	20,000	3,000
RBMT[2]														300	1,500	2,100	320	770	330
Reported Detection Limit														250	100	0.5	0.5	0.5	0.75, 0.5 [3]
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
DUP1 (PW17-04)	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
QA/QC RPD												8-Mar-22		---	---	---	---	---	---
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	8-Mar-22	VA22A4771	**330.**	**280.**	**3.41**	<0.50	<0.50	<0.75
DUP - 2 (PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	8-Mar-22	VA22A4771	**320.**	**260.**	**3.72**	<0.50	<0.50	<0.75
QA/QC RPD												8-Mar-22		---	---	**9%**	---	---	---
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	NA	8-Mar-22	VA22A4771	**250.**	**140.**	**1.83**	<0.50	<0.50	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	NA	7-Mar-22	VA22A4673	<250	<100	**3.9**	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP - 3 (PW17-26)	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD												9-Mar-22		---	---	---	---	---	---
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	NA	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	7-Mar-22	VA22A4673	<250	<100	**6.99**	<0.50	<0.50	<0.75

TABLE 2
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25,000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Lithology of Screen Interval (Secondary)**	**Sample Date**	**Laboratory Report**					
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	---	NS	NS	NS	NS	NS	NS
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	7-Mar-22	VA22A4673	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	7-Mar-22	VA22A4673	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	9-Mar-22	VA22A4919	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-4	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	8-Mar-22	VA22A4771	---	<100	<0.50	<0.50	<0.50	<0.50
TRAVEL BLANK-5	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	NA	8-Mar-22	VA22A4771	---	<100	<0.50	<0.50	<0.50	<0.50

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.

1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances
2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.

BOLD Sample concentration is detected
SHADE Sample concentration greater than RBMT
SHADE Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres

Acronyms
AG - aquagate
C - Compliance well (Post-construction)
CS - well located cross slope
DL - detection limit
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
IBA - In between area
LEPHw - light extractable petroleum hydrocarbons in water
NA - not applicable
GC-MS/FID - Gas Chromotography - Mass Spectrometry / Flame Ionization Detection
NS - Not Sampled
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target
S - Sentry well (Post-construction)
U - Up gradient well (Post-construction)
VPHw - volatile petroleum hydrocarbons in water
W FPTS - Western Foreshore Passive Treatment System
QA/QC - Quality Assurance / Quality Control
RPD - Relative Percent Difference

TABLE 3
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
DUP-1 (PW17-04)	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
QA/QC RPD											8-Mar-22		---	---
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
DUP-2 (PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	<0.0050	<0.050
QA/QC RPD											8-Mar-22		---	---
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Mar-22	VA22A4919	<0.0050	<0.050
DUP-3 (PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Mar-22	VA22A4919	<0.0050	<0.050
QA/QC RPD											9-Mar-22		---	---
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	<0.0050	<0.050
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	---	NS	NS

TABLE 3
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<0.0050	<0.050

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.

1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances

2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.

3 - The Ministry of Environment and Climate Change Strategy (ENV) requires the co-reporting of PAHs when LEPH and HEPH calculations are required, consequently, LEPH and HEPH must be co-reported with the corresponding PAH results. Although these PAHs are not considered site specific contaminants of concern (COCs), they were analyzed to calculate LEPH and/or HEPH and were either not detected or detected below Updated Screening Levels (USLs). For the purpose of this monitoring report, these PAHs have not been tabulated; however, as it is an ENV requirement, the data has been included in the ALS laboratory reports provided in Appendix C.

BOLD	Sample concentration is detected
SHADE	Sample concentration greater than RBMT
SHADE	Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres
Acronyms
AG - aquagate
C - Compliance well (Post-construction)
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
IBA - In between area
NA - not applicable
NS - Not Sampled
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target
S - Sentry well (Post-construction)
U - Up gradient well (Post-construction)
W FPTS - Western Foreshore Passive Treatment System

TABLE 4
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2, 1, 2 [3]	1, 5, 10 [4]
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-01	Porewater	PW17-01	CRC ICPMS (HMI)	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	D	**0.43**	**1.6**
PW17-02	Porewater	PW17-02	CRC ICPMS (HMI)	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	D	**0.45**	<1.0
PW17-03	Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-04	Porewater EAZ	PW17-04	CRC ICPMS (HMI)	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	D	<0.20	<1.0
DUP-1 (PW17-04)	Porewater EAZ	PW17-04	CRC ICPMS (HMI)	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	D	<0.20	<1.0
QA/QC RPD										8-Mar-22			---	---
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS (HMI)	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	D	**1.48**	<1.0
PW17-06	Porewater	PW17-06	CRC ICPMS (HMI)	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	D	<0.20	<1.0
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS (HMI)	S	W FPTS	0.70-1.00	0.7	1	Beach sand	8-Mar-22	VA22A4771	D	**0.31**	<1.0
PW17-08	Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-09	Porewater	PW17-09	CRC ICPMS (HMI)	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	D	**0.42**	<1.0
PW17-10	Porewater	PW17-10	CRC ICPMS (HMI)	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	D	**0.6**	**1.6**
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	**16.6**
PW17-13	Porewater	PW17-13	CRC ICPMS (HMI)	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	D	**1.68**	**1.8**
PW17-14	Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS (HMI)	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	D	<0.20	<1.0
DUP-2 (PW17-16)	Porewater EAZ	PW17-16	CRC ICPMS (HMI)	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	VA22A4771	D	<0.20	<1.0
QA/QC RPD										8-Mar-22			---	---
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS (HMI)	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	D	<0.20	**1.6**
PW17-18	Porewater	PW17-18	CRC ICPMS (HMI)	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	D	**0.35**	**6.3**
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	D	<2	<10
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	7-Mar-22	VA22A4673	D	**1.01**	1.0
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	D	**1.83**	<5
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	D	<1	<5
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Mar-22	VA22A4919	D	<1	<5
DUP-3 (PW17-26)	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Mar-22	VA22A4919	D	<1	<5
QA/QC RPD										8-Mar-22			---	---
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	D	**1.31**	<5
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	D	<1	<5
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	D	<2	<10
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	---	D	NS	NS

TABLE 4
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2, 1, 2 [3]	1, 5, 10 [4]
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
PW17-33	Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<10
R-BLANK-2	NA	NA	CRC ICPMS (HMI)	NA	NA	NA	NA	NA	NA	8-Mar-22	VA22A4771	D	<0.20	<1.0

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.

1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances
2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.
3 - Reported Detection Limit varied between 0.2 µg/L, 1 µg/Land 2 µg/L.
4 - Reported Detection Limit varied between 1 µg/L, 5 µg/Land 10 µg/L.

BOLD	Sample concentration is detected
SHADE	Sample concentration greater than RBMT
SHADE	Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres

Acronyms
AG - aquagate
C - Compliance well (Post-construction)
CCME - Canadian Council of Ministers of the Environment (Updates to May 2008). Marine unless otherwise noted as FW (freshwater).
CRC ICPMS - Collision/Reaction Cells Inductively Coupled Plasma Mass Spectrometry
D - dissolved metals
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
HR ICPMS - High Resolution Inductively Coupled Plasma Mass Spectrometry
NBO - near bottom samples
NS - Not Sampled
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target
S - Sentry well (Post-construction)
SW - surface water samples
U - Up gradient well (Post-construction)
W FPTS - Western Foreshore Passive Treatment System

TABLE 4
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2, 1, 2 [3]	1, 5, 10 [4]
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		

TABLE 5
FIELD AND POREWATER QUALITY PARAMETERS (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

										pH	Temperature	Electrical Conductivity (µS/cm)	Salinity (ppt)	ORP	DO (mg/L)	Turbidity (NTU)	Total Dissolved Solids (g/L)
Applicable Standard										NS	NS	NS	NS	NS	NS	NS	---
Sample ID	**Matrix**	**Sample Location**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**								
PW17-01	Porewater	PW17-01	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	**6.47**	**8.39**	**11955**	**11.16**	**235.4**	**11.57**	**0.62**	**12.04**
PW17-02	Porewater	PW17-02	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	**6.77**	**8.09**	**18824**	**17.04**	**31.7**	**6.83**	**0.11**	**18.11**
PW17-03	Porewater	PW17-03	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**7.45**	**8.18**	**21590**	**19.70**	**42.1**	**8.12**	**3.02**	**20.68**
PW17-04	Porewater EAZ	PW17-04	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	**6.71**	**8.28**	**13979**	**12.10**	**61.0**	**0.25**	**80.2**	**13.72**
PW17-05	Porewater EAZ	PW17-05	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	**8.01**	**8.58**	**10521**	**7.67**	**5.69**	**7.09**	**16.8**	**9.51**
PW17-06	Porewater	PW17-06	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	**7.46**	**8.35**	**11727**	**9.97**	**15.4**	**5.50**	**0.37**	**11.08**
PW17-07	Porewater EAZ	PW17-07	S	W FPTS	0.70-1.00	0.7	1	Beach sand	8-Mar-22	**7.35**	**8.34**	**15159**	**12.84**	**35.0**	**6.86**	**1.07**	**14.12**
PW17-08	Porewater	PW17-08	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	**7.35**	**8.54**	**20410**	**18.34**	**44.2**	**7.04**	**16.5**	**19.35**
PW17-09	Porewater	PW17-09	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	**6.65**	**8.18**	**12390**	**10.98**	**34.9**	**9.80**	**108**	**12.07**
PW17-10	Porewater	PW17-10	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	**7.11**	**8.44**	**21760**	**19.62**	**32.5**	**5.57**	**0.36**	**20.62**
PW17-11	Porewater	PW17-11	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	7-Mar-22	**7.56**	**8.46**	**19148**	**16.68**	**192.2**	**7.09**	**4.44**	**17.92**
PW17-12	Porewater	PW17-12	C	IBA	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**7.67**	**8.11**	**21895**	**20.04**	**40.0**	**9.93**	**1.03**	**21.02**
PW17-13	Porewater	PW17-13	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	**6.84**	**7.39**	**7976**	**6.82**	**200.1**	**9.05**	**1.23**	**7.81**
PW17-14	Porewater	PW17-14	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**6.52**	**7.71**	**12054**	**10.62**	**-79.0**	**3.14**	**50.6**	**11.71**
PW17-15	Porewater	PW17-15	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	**7.53**	**8.16**	**20793**	**18.95**	**171.5**	**10.68**	**23.1**	**19.95**
PW17-16	Porewater EAZ	PW17-16	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	8-Mar-22	**6.83**	**7.90**	**1182**	**0.89**	**-68.2**	**4.01**	**5.04**	**1.11**
PW17-17	Porewater EAZ	PW17-17	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	**6.81**	**8.30**	**2100**	**1.82**	**30.3**	**3.32**	**386**	**2.08**
PW17-18	Porewater	PW17-18	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	**6.67**	**8.00**	**6400**	**5.33**	**16.3**	**4.75**	**28.8**	**6.17**
PW17-19	Porewater	PW17-19	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	7-Mar-22	**6.54**	**7.87**	**6515**	**5.43**	**-95.1**	**5.51**	**17.60**	**6.29**
PW17-20	Porewater EAZ	PW17-20	C	E FPTS	0.64-1.00	0.64	1	Beach sand	7-Mar-22	**6.60**	**7.98**	**10772**	**9.30**	**-108.7**	**2.87**	**13.20**	**10.36**
PW17-21	Porewater EAZ	PW17-21	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	7-Mar-22	**7.09**	**8.44**	**1222**	**0.99**	**34.6**	**7.55**	**4.86**	**1.16**
PW17-22	Porewater EAZ	PW17-22	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	**7.03**	**7.97**	**2714**	**1.80**	**180.3**	**9.63**	**1.13**	**2.71**
PW17-23	Porewater	PW17-23	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	**7.36**	**7.87**	**2287**	**1.78**	**-85.2**	**2.01**	**0.65**	**2.16**
PW17-24	Porewater	PW17-24	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**7.26**	**7.94**	**11448**	**9.61**	**145.1**	**6.80**	**2.49**	**10.85**
PW17-25	Porewater	PW17-25	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**7.87**	**7.97**	**13398**	**11.96**	**130.7**	**11.15**	**9.09**	**12.86**
PW17-26	Porewater EAZ	PW17-26	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Mar-22	**7.03**	**7.75**	**340**	**0.25**	**26.8**	**4.69**	**7.55**	**0.33**
PW17-27	Porewater EAZ	PW17-27	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	**7.64**	**7.49**	**1007**	**0.68**	**24.1**	**4.30**	**12.3**	**0.91**
PW17-28	Porewater	PW17-28	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	**8.02**	**7.09**	**800**	**0.62**	**25.1**	**8.68**	**11.3**	**0.79**
PW17-29	Porewater	PW17-29	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	7-Mar-22	**7.09**	**7.91**	**12316**	**10.81**	**71.2**	**4.84**	**3.75**	**11.91**
PW17-30	Porewater	PW17-30	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	**7.64**	**7.97**	**17030**	**15.55**	**155.0**	**5.60**	**0.77**	**16.62**
PW17-31	Porewater	PW17-31	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	NM	NM	NM	NM	NM	NM	NM	NM
PW17-32	Porewater	PW17-32	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**6.04**	**7.96**	**6245**	**5.17**	**90.0**	**6.23**	**49.6**	**0.04**
PW17-33	Porewater	PW17-33	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	**7.23**	**8.12**	**12054**	**10.32**	**98.3**	**1.61**	**1.51**	**11.43**

TABLE 5
FIELD AND POREWATER QUALITY PARAMETERS (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

										pH	Temperature	Electrical Conductivity (µS/cm)	Salinity (ppt)	ORP	DO (mg/L)	Turbidity (NTU)	Total Dissolved Solids (g/L)
Applicable Standard										NS	NS	NS	NS	NS	NS	NS	---
Sample ID	**Matrix**	**Sample Location**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**								

BOLD Sample concentration is detected

Abbreviations
µS/cm - microsiemens per centimetre
$CaCO^3$ - calcium carbonate
g/L - grams per litre
m - metres
mg/L - milligrams per litre
mm - millimetres
NTU - nephelometric turbidity units
ppt - parts per thousand

Acronyms
AG - Aquagate
C - Compliance well (Post-construction)
DO - dissolved oxygen
E FPTS - Eastern Foreshore Passive Treatment System
IBA - In between area
NA - not applicable
NS - no standard established for indicated parameter
OC - organoclay
NM - Not Monitored

TABLE 6
FORESHORE PASIVE TREATMENT SYSTEM INSPECTIONS (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Date	FPTS	Rip Rap layer maintained at 1.4m	Cobble layer above OBB surface layer maintained at 0.4m	Rip Rap or Cobble replacement Required	Vegetation present above treatment cells or OBB surface layer	Vegetation Removal Required	Damaged Monitoring Wells	Comments
24-Jan-22	Eastern	Yes	Yes	No	Weeds (small) growing on south side of barrier; Overhanging vegetation along southern side; No growth on top of tratment cells or OBB layer	No	No	Most wells outside barrier have barnacle and seaweed growth as well as minor chipping; CBP-8, PW17-18, PW17-28 minor chipping from rock placement; No concrete bases exposed. TP1: Sand from 0 - 0.15mbgs; Cobble from 0.15 - 0.40mbgs; Liner encountered
	Western	Yes	Yes	No	Some weeds on southern edge of barrier; Overhanging vegetation along southern side; No growth along treatment cells or OBB layer	No	No	Most wells outside barrier have barnacle and seaweed growth as well as minor chipping; PW17-6 and CBP-5 have minor chipping from rock placement; No concrete bases exposed.
07-Mar-22	Eastern	Yes	Yes	No	Weeds (small) growing on south side of barrier; No growth on top of treatment cells or OBB layer	No	No	All wells outside barrier have barnacle growth as well as minor chipping
	Western	Yes	Yes	No	Some weeds on southern edge of barrier; No growth along treatment cells or OBB layer	No	No	All wells outside barrier have barnacle growth as well as minor chipping

Notes

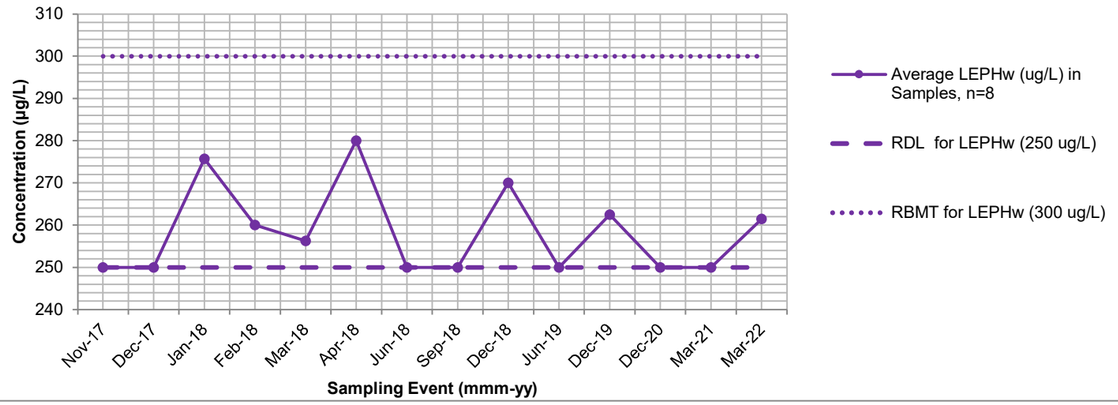
1. The FPTS was installed at the Foreshore Site between July 10 through October 30, 2017
2. Additonal rock material was added to the Foreshore Site on September 27, 2021

Abbreviations:

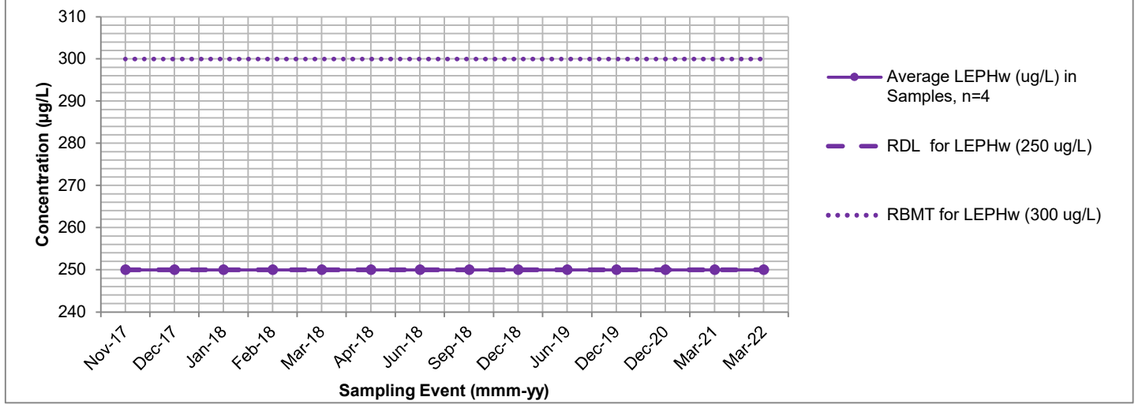
FPTS - Foreshore Passive Treatment System
NM - Not monitored
OBB - Oleophilic biobarrier
NA - Not applicable
m bgs - metres below grround surface

Graphs

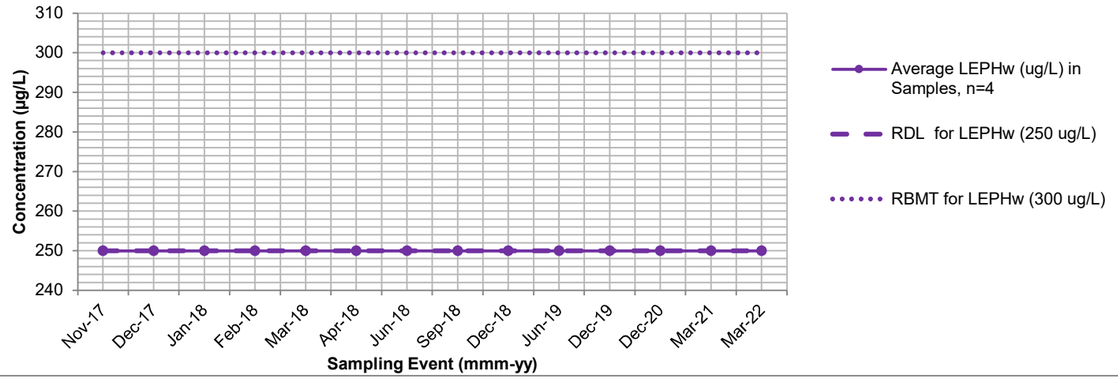
Graph 1A
Average LEPHw Concentrations in Samples Collected from Up Gradient Monitoring Wells



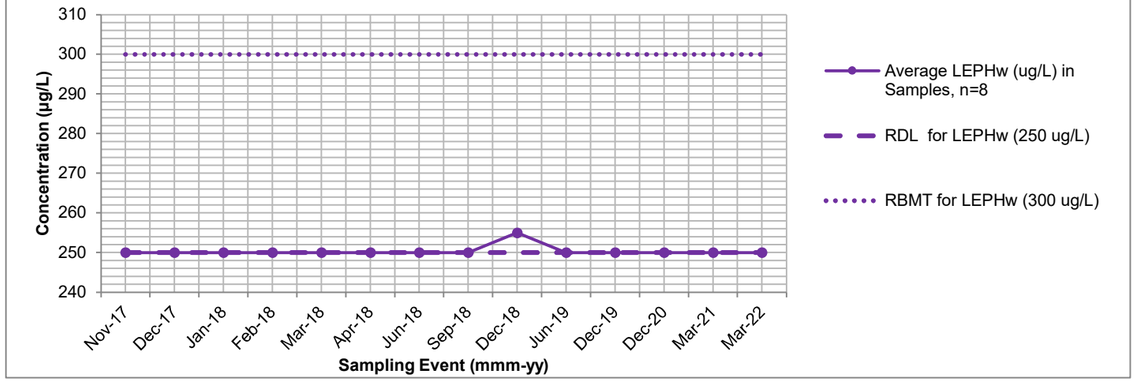
Graph 1B
Average LEPHw Concentrations in Samples Collected from OCP Monitoring Wells



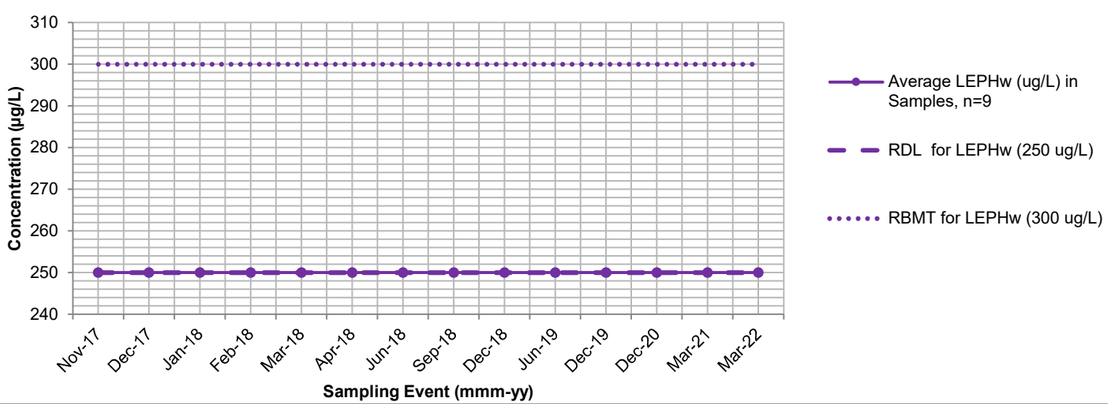
Graph 1C
Average LEPHw Concentrations in Samples Collected from ACP Monitoring Wells



Graph 1D
Average LEPHw Concentrations in Samples Collected from Sentry Monitoring Wells



Graph 1E
Average LEPHw Concentrations in Samples Collected from Compliance Monitoring Wells

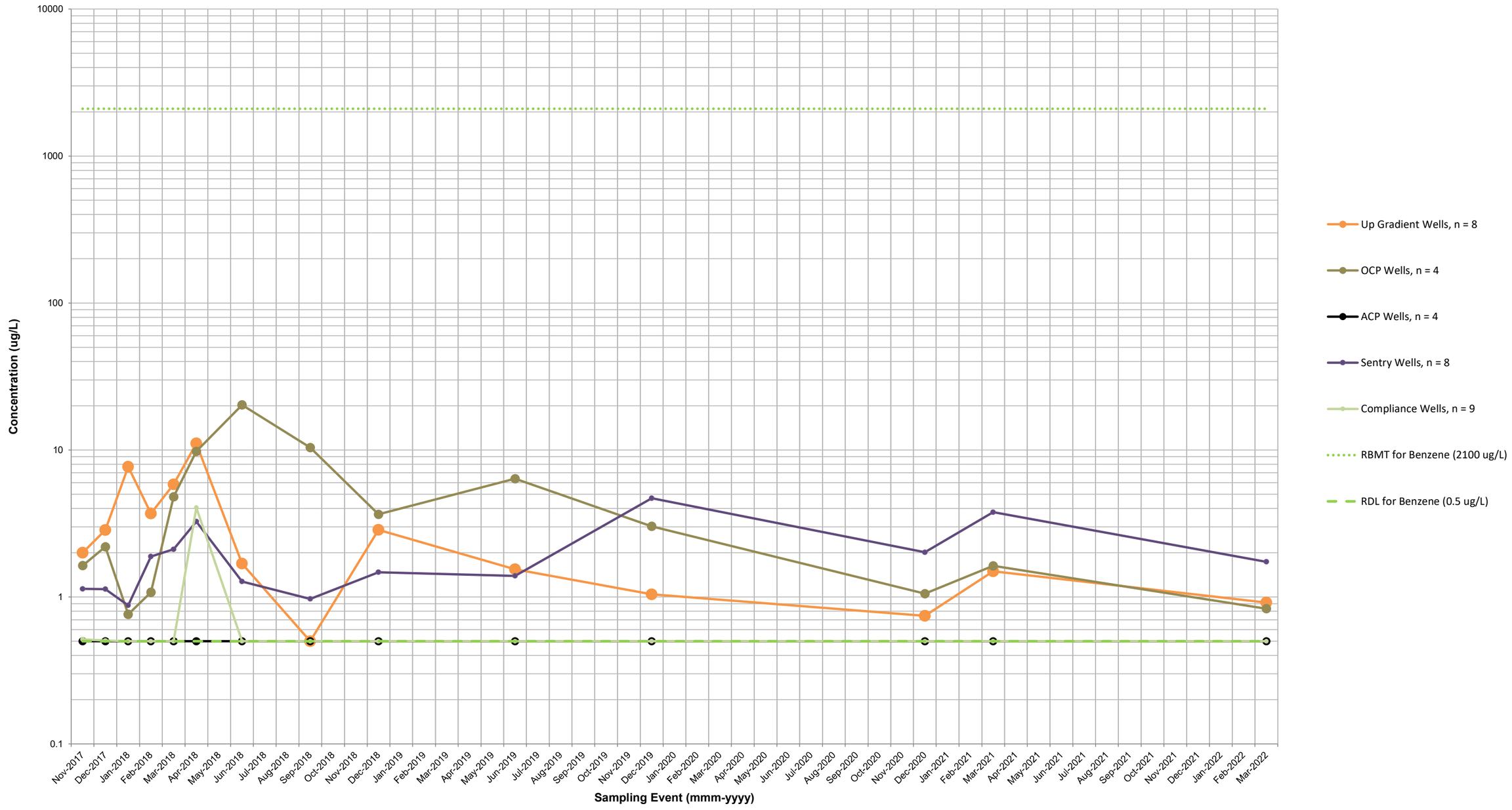


AECOM

Graph 2
Average VPHw Concentrations in Up Gradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells

AECOM

Graph 3
Average Benzene Concentrations in Up Gradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells

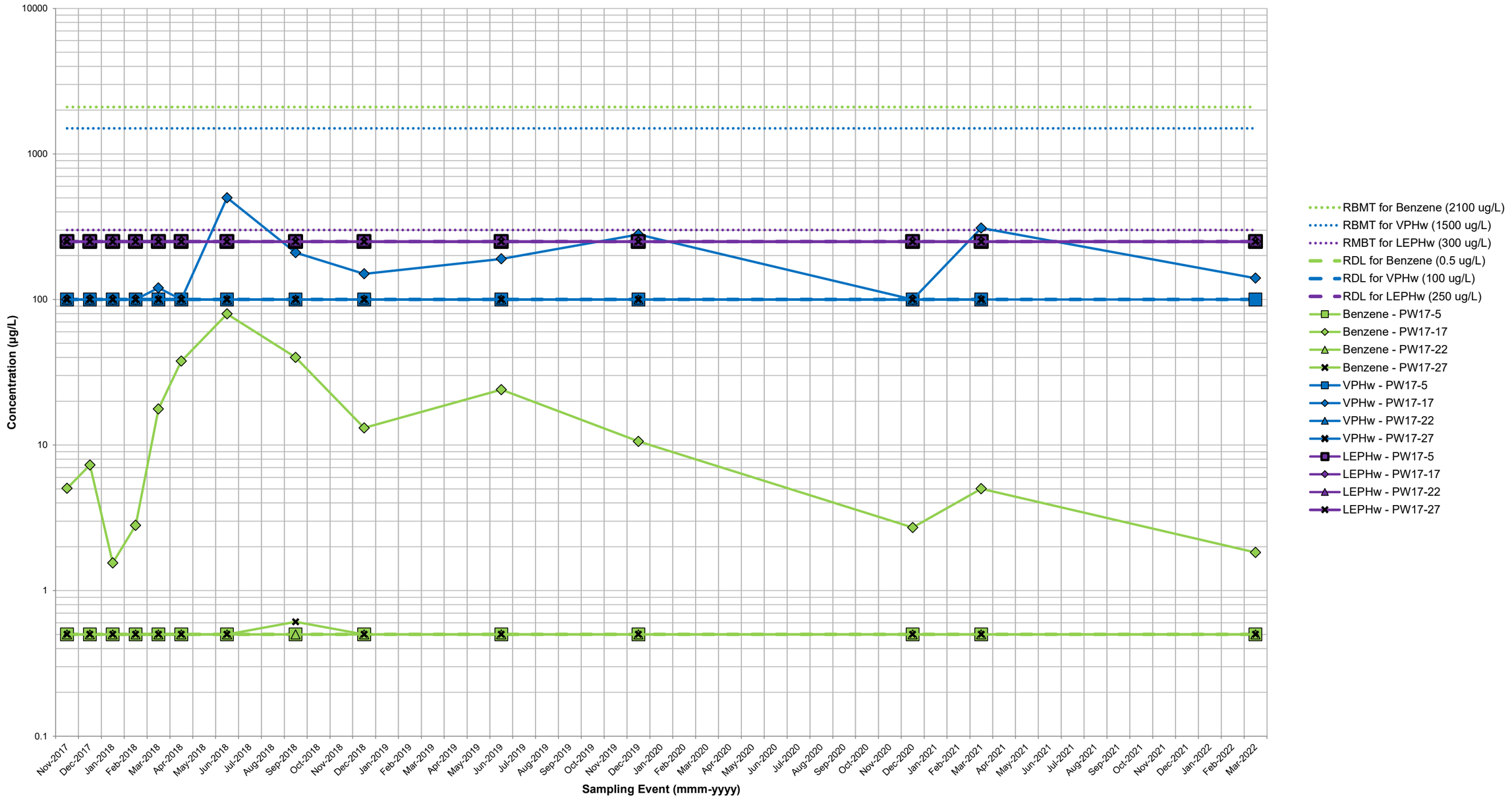


AECOM

Graph 4
Concentrations of Benzene, VPHw and LEPHw in Porewater Wells (PW17-16, PW17-17, PW17-18, PW17-19 and PW17-20)

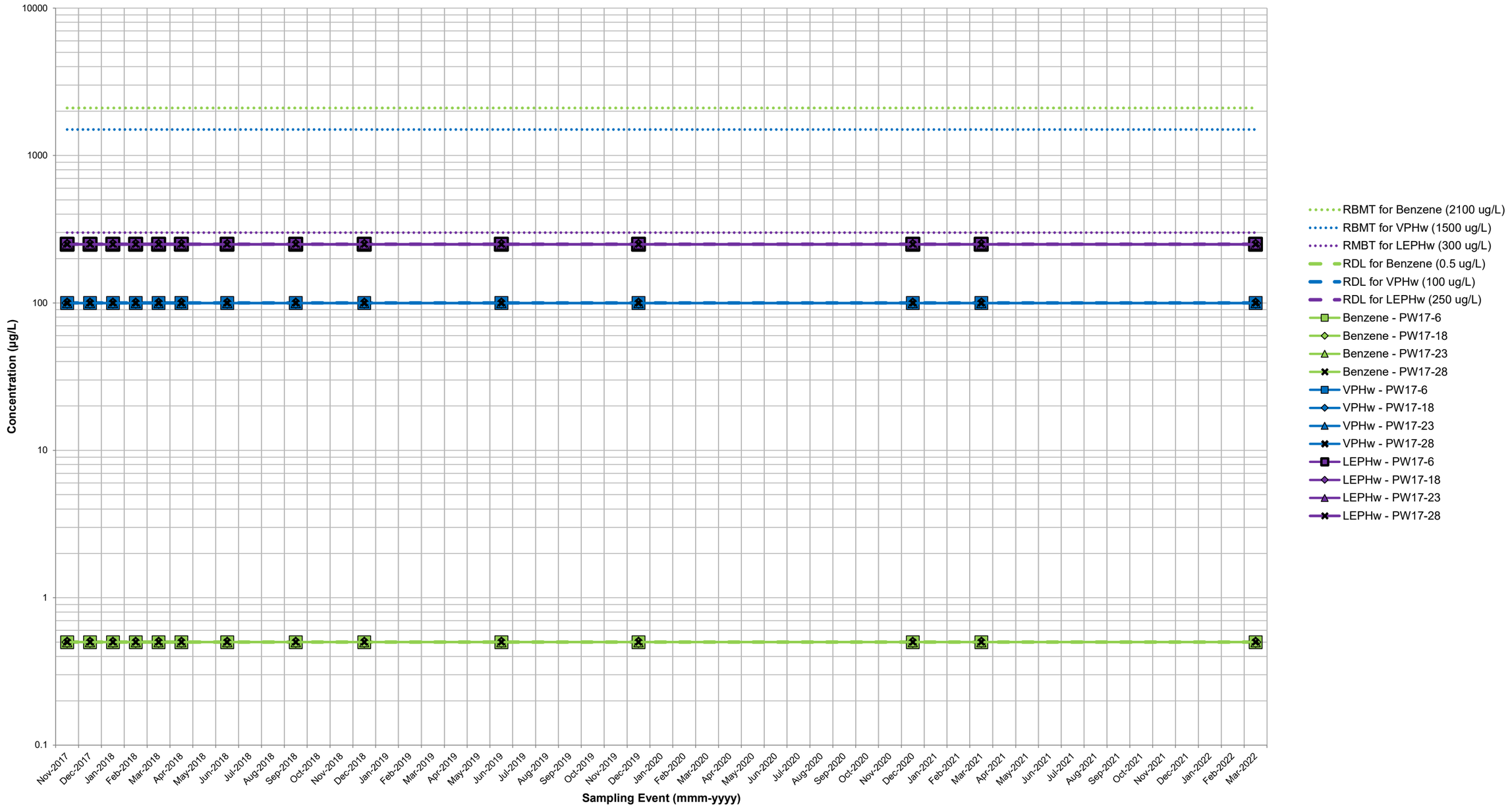
AECOM

Graph 5
Concentrations of Benzene, VPHw and LEPHw in Performance (OC) Wells (PW17-5, PW17-17, PW17-22 and PW17-27)



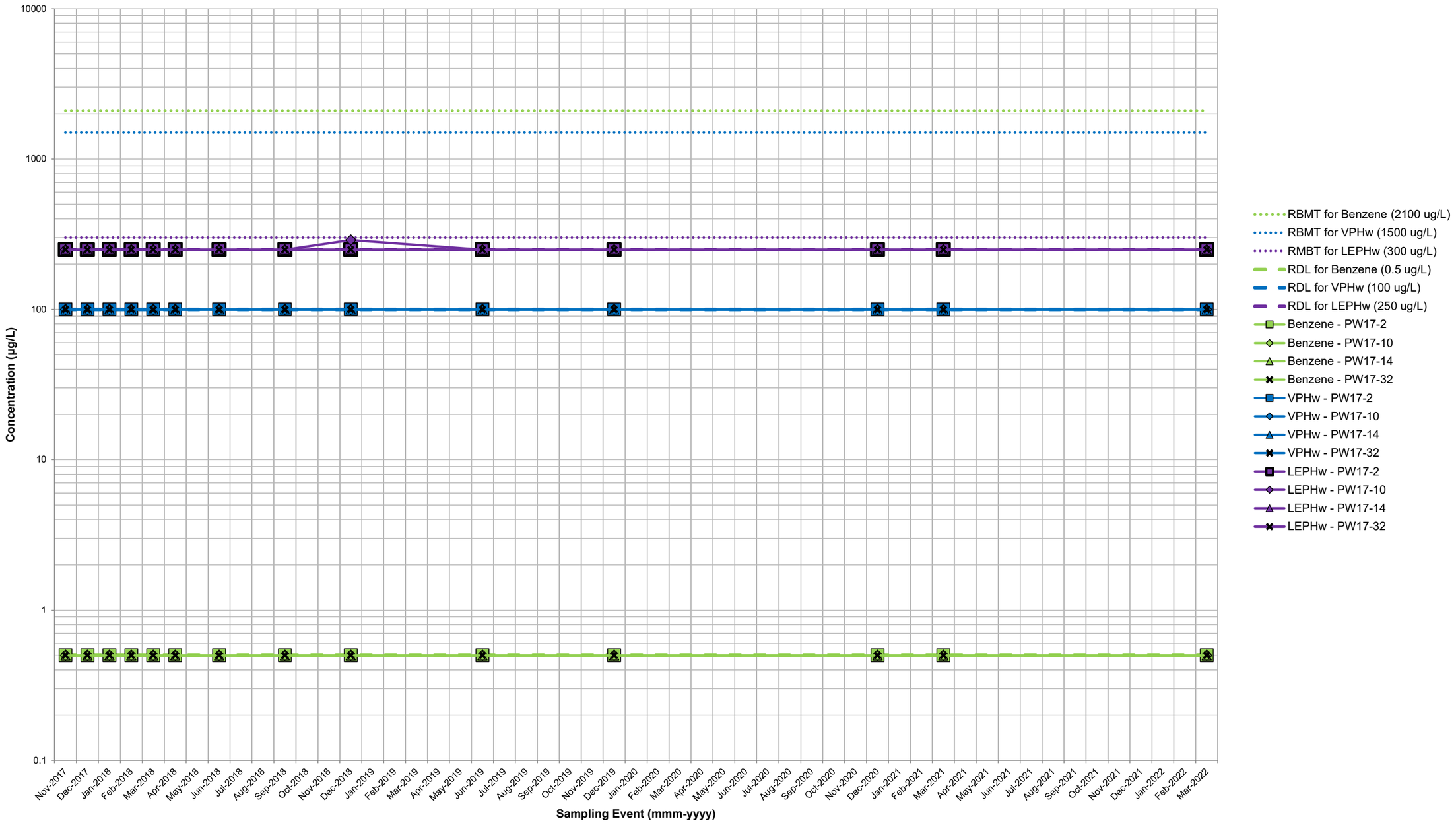
AECOM

Graph 6
Concentrations of Benzene, VPHw and LEPHw in Performance (AC) Wells (PW17-6, PW17-18, PW17-23 and PW17-28)



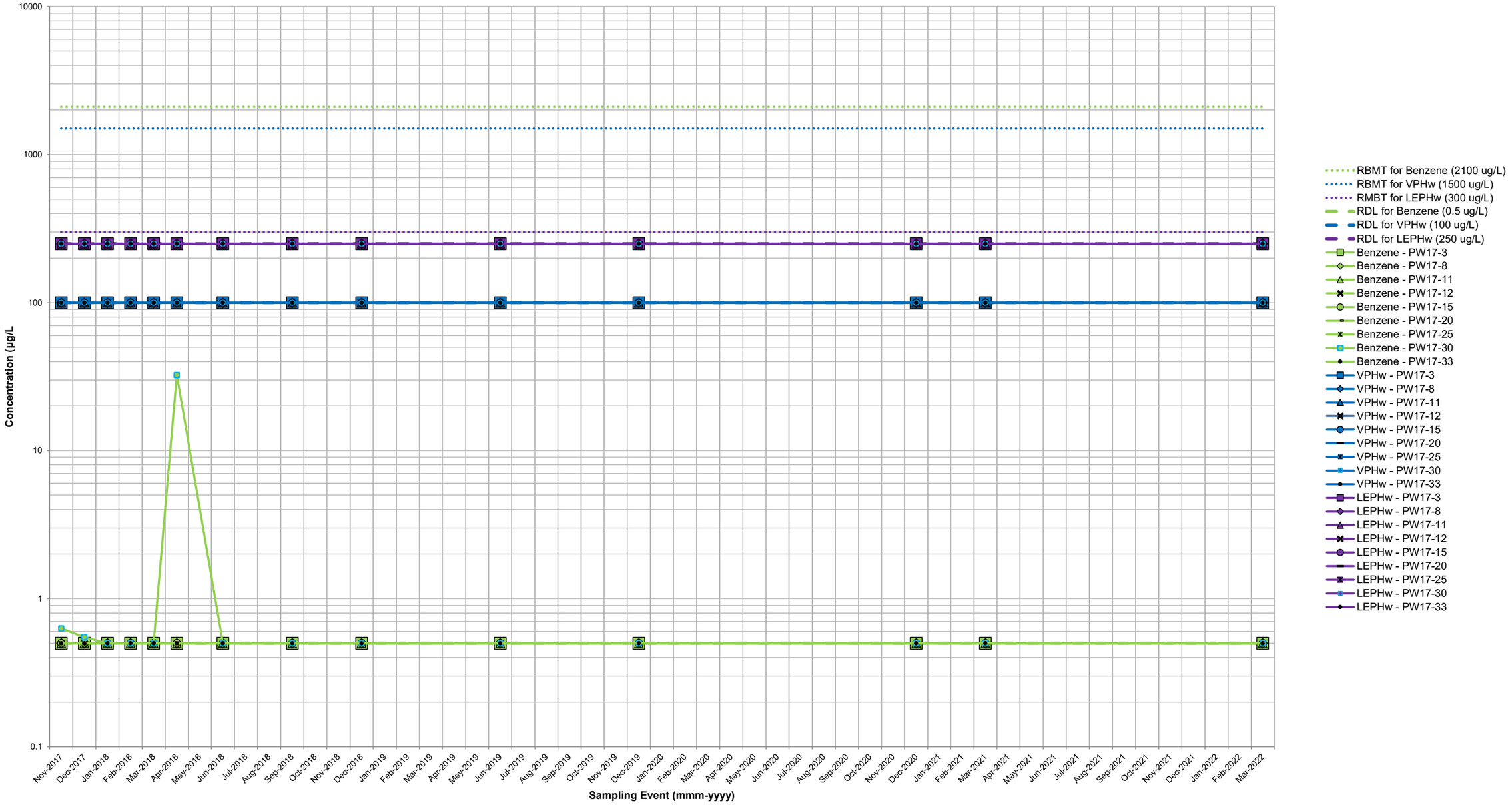
AECOM

Graph 7
Concentrations of Benzene, VPHw and LEPHw in Sentry Wells PW17-2, PW17-10, PW17-14, and PW17-32



AECOM

Graph 8
Concentrations of Benzene, VPHw and LEPHw in Compliance Wells PW17-3, PW17-8, PW17-11, PW17-12, PW17-15, PW17-20, PW17-25, PW17-30, and PW17-33



Appendix A

Post FPTS Construction Water Analytical Tables, 2017-2021

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
Post-Construction FPTS																	
P3-6-NBO	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-NBO	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P3-6-NBO	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-NBO	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-NBO	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P3-6-O	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-O	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P3-6-O	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-O	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-6-O	Surface Water	PW17-06	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P3-12-NBO	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP1 (P3-12-NBO)	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											11-Dec-17		---	---	---	---	---	---
P3-12-NBO	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P3-12-NBO	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-5 (P3-12-NBO)	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											14-Jun-18		---	---	---	---	---	---
P3-12-NBO	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	13-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-12-NBO	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-2 (P3-12-NBO)	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											3-Dec-18		---	---	---	---	---	---
P3-12-O	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-12-O	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P3-12-O	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-12-O	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P3-12-O	Surface Water	PW17-08	ALS	GC-MS/FID	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P6-6-NBO	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-NBO	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	**0.79**	<0.75
P6-6-NBO	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-NBO	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-NBO	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P6-6-O	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-O	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P6-6-O	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-O	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-6-O	Surface Water	PW17-18	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P6-12-NBO	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-12-NBO	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P6-12-NBO	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	13-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-12-NBO	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P6-12-O	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-12-O	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
DUP 5 (P6-12-O)	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
QA/QC RPD											20-Mar-18		---	---	---	---	---	---
P6-12-O	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Sample Date	Laboratory Report	$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
P6-12-O	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-5 (P6-12-O)	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.45	<0.75
QA/QC RPD											12-Sep-18		---	---	---	---	---	---
P6-12-O	Surface Water	PW17-20	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P8-6-NBO	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-NBO	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-NBO	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-NBO	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-NBO	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P8-6-O	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-O	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P8-6-O	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-O	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-6-O	Surface Water	PW17-28	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
P8-12-NBO	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-NBO	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P8-12-NBO	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-NBO	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-NBO	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-1 (P8-12-NBO)	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											3-Dec-18		---	---	---	---	---	---
P8-12-O	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-O	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<250.	<100.	<0.5	<0.5	<0.45	<0.75
P8-12-O	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-O	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P8-12-O	Surface Water	PW17-30	ALS	GC-MS/FID	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-1	Porewater	CBP-1	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-1	Porewater	CBP-1	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-1	Porewater	CBP-1	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-2	Porewater	CBP-2	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-2	Porewater	CBP-2	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-2	Porewater	CBP-2	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-5	Porewater	CBP-5	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-5	Porewater	CBP-5	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-5	Porewater	CBP-5	ALS	GC-MS/FID	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-6	Porewater	CBP-6	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-6	Porewater	CBP-6	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-6	Porewater	CBP-6	ALS	GC-MS/FID	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-7	Porewater	CBP-7	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-1(CBP-7)	Porewater	CBP-7	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											13-Jun-18		---	---	---	---	---	---
CBP-7	Porewater	CBP-7	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-7	Porewater	CBP-7	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**						
CBP-8	Porewater	CBP-8	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-8	Porewater	CBP-8	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-8	Porewater	CBP-8	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
CBP-15	Porewater	CBP-15	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-15	Porewater	CBP-15	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-15	Porewater	CBP-15	ALS	GC-MS/FID	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	6-Dec-18	L2207439	<250	<100	**2.51**	<0.50	<0.50	<0.75
CBP-16	Porewater	CBP-16	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-16	Porewater	CBP-16	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
CBP-16	Porewater	CBP-16	ALS	GC-MS/FID	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP1 (PW17-01)	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											14-Nov-17		---	---	---	---	---	---
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-18	L2071889	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	**1.13**	**1.66**	**5.5**
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Sample Date	Laboratory Report	$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	23-Mar-18	L2071889	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP2 (PW17-05)	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											13-Dec-17		---	---	---	---	---	---
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	23-Mar-18	L2071889	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	23-Mar-18	L2071889	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-08	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-08	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-08	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
PW17-07	Porewater EAZ	PW17-08	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Dec-18	L2205028	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	**0.71**	**1.15**	**3.72**
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Dec-18	L2205028	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10 Bottle 1[3]	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	**480.**	<100	<0.50	<0.50	<0.50	<0.75
PW17-10 Bottle 2[3]	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<250	---	---	---	---	---
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75

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FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	**0.54**	**0.8**	**2.81**
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Dec-18	L2205028	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Sample Date	Laboratory Report	$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	<250.	<100.	**11.**	**9.62**	<0.5	**4.46**
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	<250.	<100.	**17.**	**13.**	<0.5	**2.85**
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	**430.**	**1120.**	**50.9**	**120.**	**0.91**	**19.**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	**410.**	**1250.**	**53.**	**115.**	**0.99**	**19.**
QA/QC RPD											16-Jan-18		---	11.0%	4.0%	4.3%	---	0.0%
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	**290.**	**800.**	**20.**	**4.1**	<0.5	**4.43**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	**320.**	**860.**	**22.9**	**7.61**	<0.5	**4.33**
QA/QC RPD											14-Feb-18		---	7.2%	13.5%	59.9%	---	2.3%
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	**300.**	**750.**	**43.**	**26.7**	**0.58**	**5.3**
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	**490.**	**780.**	**85.1**	**132.**	**1.24**	**28.3**
DUP-1(PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	NA	18-Apr-18	L2081868	**550.**	**880.**	**70.8**	**108.**	**1.12**	**23.**
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	<250.	**450.**	**9.99**	**9.**	<0.5	<0.75
DUP-2(PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	<250.	**410.**	**9.83**	**8.57**	<0.5	<0.75
QA/QC RPD											13-Jun-18		---	---	1.6%	4.9%	---	---
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2162362	<250.	<100.	<0.5	**0.96**	<0.5	<0.75
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Dec-18	L2206732	**410.**	**480.**	**19.2**	**61.**	**0.53**	**1.28**
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	<250	**390.**	**8.85**	**7.33**	<0.50	<0.75
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	**350.**	**510.**	**4.63**	**8.14**	<0.50	<0.75
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<250	**280.**	**1.54**	**2.8**	<0.50	<0.75
DUP-1 (PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<250	**330.**	**1.69**	**4.28**	<0.50	<0.75
QA/QC RPD											9-Dec-20		---	---	---	**42%**	---	---
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<250	**550.**	**8.44**	**1.96**	<0.50	<0.50
DUP-3 (PW17-16)	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	**280.**	**550.**	**8.47**	**1.97**	<0.50	<0.50
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	<250.	<100.	**5.04**	<0.5	<0.5	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	**7.29**	**1.81**	<0.5	<0.75
DUP3 (PW17-17)	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	**7.62**	**1.85**	<0.5	<0.75
QA/QC RPD											13-Dec-17		---	---	4.4%	---	---	---
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	**1.55**	<0.5	<0.5	<0.75
DUP2 (PW17-17)	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	**1.59**	<0.5	<0.5	<0.75
QA/QC RPD											16-Jan-18		---	---	---	---	---	---
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	<250.	<100.	**2.81**	<0.5	<0.5	<0.75
DUP2 (PW17-17)	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	<250.	<100.	**2.82**	<0.5	<0.5	<0.75
QA/QC RPD											14-Feb-18		---	---	0.4%	---	---	---
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<250.	**120.**	**17.7**	**0.69**	<0.5	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<250.	<100.	**37.7**	**1.98**	<0.5	<0.75

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FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**						
DUP-2(PW17-17)	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	NA	18-Apr-18	L2081868	<250.	<100.	**38.4**	**1.99**	<0.5	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	<250.	**500.**	**79.6**	**10.3**	**0.56**	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<250.	**210.**	**40.**	**0.52**	<0.5	<0.75
DUP-1 (PW17-17)	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<250.	**250.**	**41.9**	<0.5	<0.5	<0.75
QA/QC RPD											11-Sep-18		---	---	4.6%	---	---	---
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<250	**150.**	**13.1**	**0.64**	<0.50	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<250	**190.**	**24.**	**0.84**	<0.50	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<250	**280.**	**10.6**	<0.50	<0.50	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<250	<100	**2.71**	<0.50	<0.50	<0.75
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<250	**310.**	**5.01**	**1.62**	<0.50	<0.50
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP3 (PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											15-Nov-17		---	---	---	---	---	---
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP3 (PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											16-Jan-18		---	---	---	---	---	---
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP3 (PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											14-Feb-18		---	---	---	---	---	---
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-3(PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-3(PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											13-Jun-18		---	---	---	---	---	---
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-2 (PW17-18)	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											11-Sep-18		---	---	---	---	---	---
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	**4.04**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Dec-17	L2034402	<250.	**120.**	**5.53**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	15-Jan-18	L2045142	<250.	<100.	**3.52**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	13-Feb-18	L2056920	<250.	<100.	**11.4**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	21-Mar-18	L2070802	<250.	<100.	**13.2**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	16-Apr-18	L2080621	<250.	<100.	**11.4**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Jun-18	L2111276	<250.	<100.	**5.29**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Sep-18	L2161513	<250.	<100.	**2.3**	<0.5	<0.5	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Dec-18	L2205928	<250	<100	**8.29**	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Dec-19	L2395326	<250	<100	**7.23**	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<250	<100	**7.80**	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	**8.23**	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Sample Date	Laboratory Report	$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Nov-17	---	Monitoring well not sampled - infilled					
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-17	---	Monitoring well not sampled - infilled					
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	---	Monitoring well not sampled - infilled					
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	---	Monitoring well not sampled - infilled					
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<250.	<100.	**0.67**	<0.5	<0.5	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	<250	<100	**0.7**	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<250	<100	**0.7**	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<250	<100	**1.41**	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											13-Dec-17		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											16-Jan-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											15-Feb-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 4(PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-4(PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP-4(PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-3 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Dec-18		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-2 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Jun-19		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-1 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

Sample ID[4]	Matrix	Sample Location	Laboratory	Method	Well Location	Location Area	Screened Interval (m)	Top Screen (m)	Bottom Screen (m)	Lithology of Screen Interval (Primary)	Sample Date	Laboratory Report	LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-3 (PW17-22)	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											9-Dec-20		---	---	---	---	---	---
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	**1.08**	**0.9**
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-4 (PW17-23)	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											6-Dec-18		---	---	---	---	---	---
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-3 (PW17-23)	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Jun-19		---	---	---	---	---	---
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-2 (PW17-23)	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP2 (PW17-25)	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											14-Nov-17		---	---	---	---	---	---
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	<250.	**150.**	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 1 (PW17-26)	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 1 (PW17-26)	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											6-Jun-19		---	---	---	---	---	---
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP 3 (PW17-26)	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-2 (PW17-26)	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											9-Dec-20		---	---	---	---	---	---
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 2(PW17-27)	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	<250.	<100.	**0.61**	<0.5	<0.5	<0.75
DUP-3(PW17-27)	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	<250.	<100.	**0.54**	<0.5	<0.5	<0.75
QA/QC RPD											12-Sep-18		---	---	---	---	---	---
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-5 (PW17-27)	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											6-Dec-18		---	---	---	---	---	---
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Jun-19	L2287095	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
DUP-2 (PW17-27)	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
QA/QC RPD											4-Mar-21		---	---	---	---	---	---
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 3(PW17-28)	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
DUP 4(PW17-28)	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											12-Sep-18		---	---	---	---	---	---
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	**0.5**	<0.75
DUP-6 (PW17-28)	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											6-Dec-18		---	---	---	---	---	---
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Jun-19	L2287095	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<250.	<100.	**2.04**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<250.	<100.	**0.52**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Feb-18	L2056918	<250.	<100.	**0.69**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<250.	<100.	**0.67**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<250.	<100.	**11.7**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<250.	<100.	**1.91**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	<250.	<100.	**2.46**	<0.5	<0.5	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Jun-19	L2285149	<250	<100	**7.64**	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	<250	<100	**27.4**	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<250	<100	**5.33**	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<250	<100	**19.0**	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
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													LEPH$_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]													5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]													300	1,500	2,100	320	770	330
Reported Detection Limit													250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**						
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Nov-17	L2022366	<250.	<100.	**0.63**	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	<250.	<100.	**0.55**	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	<250.	<100.	**32.5**	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75

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												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	9-Dec-20	VA20C3039	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK 1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Nov-17	L2023092	<250.	<100.	<0.5	<0.5	<0.5	<0.75
RINSATE-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Dec-17	L2033765	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Jan-18	L2045142	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Nov-17	L2023753	<250.	<100.	<0.5	<0.5	<0.5	<0.75
RINSATE-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Dec-17	L2034402	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Jan-18	L2045816	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Dec-17	L2035368	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS		NA	NA	NA	NA	NA	NA	15-Feb-18	L2056920	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS		NA	NA	NA	NA	NA	NA	14-Feb-18	L2056918	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-3	NA	NA	ALS		NA	NA	NA	NA	NA	NA	15-Feb-18	L2057618	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Apr-18	L2080621	---	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	17-Apr-18	L2081248	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Jun-18	L2111276	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Jun-18	L2111824	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112662	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Sep-18	L2161513	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Sep-18	L2162362	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163271	<250.	<100.	<0.5	<0.5	<0.5	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	4-Dec-18	L2205928	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	5-Dec-18	L2206732	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	4-Jun-19	L2285149	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	5-Jun-19	L2286145	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Dec-19	L2395326	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Dec-19	L2395640	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	8-Dec-20	VA20C2850	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	10-Dec-20	VA20C3128	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	3-Mar-21	VA21A3930	<250	<100	<0.50	<0.50	<0.50	<0.75
R-BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	4-Mar-21	VA21A4107	<250	<100	<0.50	<0.50	<0.50	<0.50
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Nov-17	L2022366	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Nov-17	L2023092	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Nov-17	L2023753	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Dec-17	L2033765	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Dec-17	L2034402	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Dec-17	L2035368	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Nov-17	L2022366	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Nov-17	L2023092	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Dec-17	L2034402	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Dec-17	L2035368	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Jan-18	L2045142	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Jan-18	L2045142	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Jan-18	L2045816	---	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Jan-18	L2045816	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Feb-18	L2056920	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Feb-18	L2056918	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Feb-18	L2056918	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	15-Feb-18	L2057618	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	20-Mar-18	L2070135	---	<100.	<0.5	<0.5	<0.45	<0.75
T-BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	22-Mar-18	L2071404	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	23-Mar-18	L2071889	---	<100.	<0.5	<0.5	<0.5	<0.75
T-BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	16-Apr-18	L2080621	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	17-Apr-18	L2081248	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	18-Apr-18	L2081868	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Jun-18	L2111276	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Jun-18	L2111276	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Jun-18	L2111824	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Jun-18	L2111824	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112693	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-6	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112693	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-7	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112662	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Sep-18	L2161513	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Sep-18	L2161513	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Sep-18	L2162362	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Sep-18	L2162362	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163271	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163271	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-7	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163427	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-8	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163427	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-6	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	13-Sep-18	L2164036	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205028	---	<100.	<0.5	<0.5	<0.5	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	4-Dec-18	L2205928	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	5-Dec-18	L2206732	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-6	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	6-Dec-18	L2207439	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	4-Jun-19	L2285149	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	4-Jun-19	L2285149	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	5-Jun-19	L2286145	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	5-Jun-19	L2286145	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	6-Jun-19	L2287095	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-1	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Dec-19	L2395326	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	10-Dec-19	L2395326	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Dec-19	L2395640	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-4	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	11-Dec-19	L2395640	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-5	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Dec-19	L2396150	---	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

												$LEPH_w$	VPHw	Benzene	Ethylbenzene	Toluene	Xylenes
Upper Cap Concentrations[1]												5,000	15,000	10,000	25000	20,000	3,000
RBMT[2]												300	1,500	2,100	320	770	330
Reported Detection Limit												250	100	0.5	0.5	0.5	0.75, 0.5 [3]
Sample ID[4]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Laboratory Report**					
TRAVEL BLANK-6	NA	NA	ALS	NA	NA	NA	NA	NA	NA	NA	12-Dec-19	L2396150	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	8-Dec-20	VA20C2850	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	9-Dec-20	VA20C3039	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	9-Dec-20	VA20C3039	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-5	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	10-Dec-20	VA20C3128	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-1	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	3-Mar-21	VA21A3930	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	3-Mar-21	VA21A3930	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	3-Mar-21	VA21A3930	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-4	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	4-Mar-21	VA21A4107	---	<100	<0.50	<0.50	<0.50	<0.50
TRAVEL BLANK-5	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	4-Mar-21	VA21A4107	---	<100	<0.50	<0.50	<0.50	<0.50

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.

1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances
2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.
3 - Laboratory detection limit for xylenes was reduced from 0.75 ug/L to 0.5 ug/L for select samples analyzed in 2021.

BOLD	Sample concentration is detected
SHADE	Sample concentration greater than RBMT
SHADE	Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres

Acronyms
AG - aquagate
C - Compliance well (Post-construction)
CS - well located cross slope
DL - detection limit
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
IBA - In between area
LEPHw - light extractable petroleum hydrocarbons in water
NA - not applicable
GC-MS/FID - Gas Chromotography - Mass Spectrometry / Flame Ionization Detection
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target
S - Sentry well (Post-construction)
U - Up gradient well (Post-construction)
VPHw - volatile petroleum hydrocarbons in water
W FPTS - Western Foreshore Passive Treatment System
QA/QC - Quality Assurance / Quality Control
RPD - Relative Percent Difference

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
Post-Construction FTPS														
P3-6-NBO	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	**0.0084**	<0.05
P3-6-NBO	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
P3-6-NBO	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<0.005	<0.05
P3-6-NBO	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<0.005	<0.05
P3-6-NBO	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
P3-6-O	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P3-6-O	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
P3-6-O	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
P3-6-O	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
P3-6-O	Surface Water	PW17-06	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P3-12-NBO	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
DUP1 (P3-12-NBO)	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
QA/QC RPD											11-Dec-17		---	---
P3-12-NBO	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
P3-12-NBO	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<0.005	<0.05
P3-12-NBO	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	13-Sep-18	L2163427	<0.005	<0.05
P3-12-NBO	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
DUP-2 (P3-12-NBO)	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
QA/QC RPD											3-Dec-18		---	---
P3-12-O	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P3-12-O	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
P3-12-O	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
DUP-5 (P3-12-O)	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
QA/QC RPD											14-Jun-18		---	---
P3-12-O	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
P3-12-O	Surface Water	PW17-08	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P6-6-NBO	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
P6-6-NBO	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	**0.054**
P6-6-NBO	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<0.005	<0.05
P6-6-NBO	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<0.005	<0.05
P6-6-NBO	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
P6-6-O	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P6-6-O	Surface Water	PW17-18	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
P6-6-O	Surface Water	PW17-18	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
P6-6-O	Surface Water	PW17-18	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
P6-6-O	Surface Water	PW17-18	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P6-12-NBO	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
P6-12-NBO	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
P6-12-NBO	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<0.005	<0.05
P6-12-NBO	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	**0.01**	<0.050
P6-12-NBO	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	**0.01**	<0.050
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
DUP 5 (P6-12-O)	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
QA/QC RPD											20-Mar-18		---	---
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
DUP-5 (P6-12-O)	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
QA/QC RPD											12-Sep-18		---	---
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P8-6-NBO	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
P8-6-NBO	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
P8-6-NBO	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<0.005	<0.05
P8-6-NBO	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<0.005	<0.05
P8-6-NBO	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
P8-6-O	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P8-6-O	Surface Water	PW17-28	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
P8-6-O	Surface Water	PW17-28	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
P8-6-O	Surface Water	PW17-28	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
P8-6-O	Surface Water	PW17-28	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P8-12-NBO	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	<0.005	<0.05
P8-12-NBO	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	<0.005	<0.05
P8-12-NBO	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	<0.005	<0.05
P8-12-NBO	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
P8-12-NBO	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
DUP-1 (P8-12-NBO)	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	<0.0050	<0.050
QA/QC RPD											3-Dec-18		---	---
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	<0.005	<0.05
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	<0.005	<0.05
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<0.005	<0.05
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<0.005	<0.05
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
P8-12-O	Surface Water	PW17-30	ALS	Hexane	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	<0.0050	<0.050
CBP-1	Porewater	CBP-1	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<0.005	<0.05
CBP-1	Porewater	CBP-1	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	<0.005	<0.05
CBP-1	Porewater	CBP-1	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
CBP-2	Porewater	CBP-2	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<0.005	<0.05
CBP-2	Porewater	CBP-2	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	<0.005	<0.05
CBP-2	Porewater	CBP-2	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	4-Dec-18	L2205928	<0.0050	<0.050
CBP-5	Porewater	CBP-5	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	**0.0184**	<0.05
CBP-5	Porewater	CBP-5	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	**0.0212**	<0.05
CBP-5	Porewater	CBP-5	ALS	Hexane	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
CBP-6	Porewater	CBP-6	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	**0.0116**	<0.05
CBP-6	Porewater	CBP-6	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	<0.005	<0.05
CBP-6	Porewater	CBP-6	ALS	Hexane	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<0.0050	<0.050
CBP-7	Porewater	CBP-7	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<0.005	<0.05
DUP-1 (CBP-7)	Porewater	CBP-7	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	<0.005	<0.05
QA/QC RPD											13-Jun-18		---	---
CBP-7	Porewater	CBP-7	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	<0.005	<0.05
CBP-7	Porewater	CBP-7	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
CBP-8	Porewater	CBP-8	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<0.005	<0.05
CBP-8	Porewater	CBP-8	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<0.005	<0.05
CBP-8	Porewater	CBP-8	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<0.0050	<0.050
CBP-15	Porewater	CBP-15	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	14-Jun-18	L2112662	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
CBP-15	Porewater	CBP-15	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	<0.005	<0.05
CBP-15	Porewater	CBP-15	ALS	Hexane	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	6-Dec-18	L2207439	<0.0050	<0.050
CBP-16	Porewater	CBP-16	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	**0.007**	<0.05
CBP-16	Porewater	CBP-16	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<0.005	<0.05
CBP-16	Porewater	CBP-16	ALS	Hexane	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<0.0050	<0.050
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
DUP1 (PW17-01)	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
QA/QC RPD											14-Nov-17		---	---
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	16-Jan-18	L2045816	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	**0.0068**	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Jun-18	L2111824	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	<0.005	<0.05
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<0.0050	<0.050
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<0.0050	<0.050
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	<0.0050	<0.050
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	**0.0256**	**0.054**
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Jun-18	L2111824	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	<0.005	<0.05
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**		**Sample Date**	**Report**	
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		16-Nov-17	L2023753	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		12-Dec-17	L2034402	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		15-Jan-18	L2045142	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		14-Feb-18	L2056918	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		23-Mar-18	L2071889	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		16-Apr-18	L2080621	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		17-Apr-18	L2081248	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		12-Jun-18	L2111276	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		10-Sep-18	L2161513	<0.005	<0.05
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		3-Dec-18	L2205028	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Jun-19	L2285149	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		11-Dec-19	L2395640	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand		3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		15-Nov-17	L2023092	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		13-Dec-17	L2035368	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		16-Jan-18	L2045816	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		14-Feb-18	L2056918	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		23-Mar-18	L2071889	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		18-Apr-18	L2081868	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		13-Jun-18	L2111824	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		11-Sep-18	L2162362	<0.005	<0.05
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		5-Dec-18	L2206732	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		5-Jun-19	L2286145	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		11-Dec-19	L2395640	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium		4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		15-Nov-17	L2023092	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		13-Dec-17	L2035368	<0.005	<0.05
DUP2 (PW17-05)	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		13-Dec-17	L2035368	<0.005	<0.05
QA/QC RPD												13-Dec-17		---	---
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		16-Jan-18	L2045816	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		14-Feb-18	L2056918	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		23-Mar-18	L2071889	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC		18-Apr-18	L2081868	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<0.005	<0.05
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Dec-19	L2395640	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	23-Mar-18	L2071889	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<0.005	<0.05
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Dec-19	L2395640	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-06	Porewater	PW17-06	ALS	Hexane	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Nov-17	L2023092	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Dec-18	L2205028	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	5-Jun-19	L2286145	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	11-Dec-19	L2395640	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	<0.005	<0.05

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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Dec-18	L2205028	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Dec-19	L2395640	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	<0.005	<0.05
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<0.0050	<0.050

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Nov-17	L2023753	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Apr-18	L2080621	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Dec-18	L2205028	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	**0.0188**	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	**0.0052**	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	**0.0052**	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	**0.016**	<0.05
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	**0.0147**	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	<0.005	<0.05
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	**0.046**	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	<0.0050	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	13-Dec-17	L2035368	**0.008**	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	<0.005	<0.05
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	**0.011**	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	<0.005	<0.05
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	<0.005	<0.05
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	<0.005	**2.1**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	<0.005	**1.98**
QA/QC RPD											16-Jan-18		---	5.9%
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	<0.005	<2.
DUP1 (PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	<0.005	<2.
QA/QC RPD											14-Feb-18		---	---
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<0.005	<2.
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	<0.005	<5.
DUP-1(PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	<0.005	<5.
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	<0.005	<0.7
DUP-2(PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	<0.005	<0.9
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2162362	<0.005	<0.2
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Dec-18	L2206732	<0.0050	<2.0
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	<0.0050	<0.70
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<0.0050	<0.60
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<0.0050	<0.400
DUP-1 (PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<0.0050	<0.450
QA/QC RPD											9-Dec-20		---	---
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<0.0050	<0.700
DUP-3 (PW17-16)	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<0.0050	<0.670
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	<0.005	<0.05
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<0.005	<0.05
DUP3 (PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<0.005	<0.05
QA/QC RPD											13-Dec-17		---	---
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<0.005	<0.05
DUP2 (PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<0.005	<0.05
QA/QC RPD											16-Jan-18		---	---
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	<0.005	<0.05
DUP2 (PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	<0.005	<0.05
QA/QC RPD											14-Feb-18		---	---
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<0.005	<0.05
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<0.005	<0.05
DUP-2(PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<0.005	<0.05
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<0.005	<0.05
DUP-1 (PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	<0.005	<0.05
QA/QC RPD											11-Sep-18		---	---
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<0.0050	<0.060
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<0.0050	<0.10
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<0.0050	<0.200
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<0.0050	<0.210
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<0.005	<0.05
DUP3 (PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<0.005	<0.05
QA/QC RPD											15-Nov-17		---	---
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<0.005	<0.05
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<0.005	<0.05
DUP3 (PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<0.005	<0.05
QA/QC RPD											16-Jan-18		---	---
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<0.005	<0.05
DUP3 (PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	<0.005	<0.05
QA/QC RPD											14-Feb-18		---	---
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<0.005	<0.05
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<0.005	<0.05
DUP-3(PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<0.005	<0.05
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<0.005	<0.05
DUP-3(PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	<0.005	<0.05
QA/QC RPD											13-Jun-18		---	---
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<0.005	<0.05
DUP-2(PW17-18)	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	<0.005	<0.05
QA/QC RPD											11-Sep-18		---	---
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	<0.0050	<0.050
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<0.0050	<0.050
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<0.0050	<0.050
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-18	Porewater	PW17-18	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Dec-17	L2034402	<0.005	<0.2
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	15-Jan-18	L2045142	<0.005	<0.1

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	13-Feb-18	L2056920	<0.005	<0.2
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	21-Mar-18	L2070802	<0.005	<0.2
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	16-Apr-18	L2080621	<0.005	**0.096**
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Jun-18	L2111276	<0.005	<0.07
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Sep-18	L2161513	<0.0050	<0.060
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Dec-18	L2205928	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Jun-19	L2285149	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Dec-19	L2395326	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	16-Apr-18	L2080621	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Sep-18	L2161513	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Dec-18	L2205928	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	3-Mar-21	VA21A3930	<0.005	<0.05
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Nov-17	---		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-17	---		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	---		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	---	<0.005	<0.2
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<0.005	<0.09
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	<0.005	<0.2
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	<0.005	<0.2
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2163271	<0.0050	<0.20
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	<0.0050	<0.10
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	<0.0050	<0.090
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<0.0050	<0.100
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<0.0050	<0.110

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	3-Mar-21	VA21A3930	<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<0.005	<0.05
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	---	---
QA/QC RPD											13-Dec-17		<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<0.005	<0.05
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	---	---
QA/QC RPD											16-Jan-18		<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	<0.005	<0.05
DUP4 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	---	---
QA/QC RPD											15-Feb-18		<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<0.005	<0.05
DUP 4(PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	---	---
QA/QC RPD											22-Mar-18		<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<0.005	<0.05
DUP-4(PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	<0.005	<0.05
DUP 4(PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	---	---
QA/QC RPD											14-Jun-18		<0.005	<0.05
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Sep-18	L2161513	<0.0050	<0.050
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	<0.0050	<0.050
DUP-3 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	---	---
QA/QC RPD											5-Dec-18		<0.0050	<0.050
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	<0.0050	<0.050
DUP-2 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	---	---
QA/QC RPD											5-Jun-19		<0.0050	<0.050
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<0.0050	<0.050
DUP-1 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	---	---
QA/QC RPD											12-Dec-19		<0.0050	<0.050
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<0.0050	<0.050
DUP-3 (PW17-22)	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	---	---
QA/QC RPD											9-Dec-20			
PW17-22	Porewater EAZ	PW17-22	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	<0.005	<0.05
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Sep-18	L2161513	<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<0.0050	<0.050
DUP-4 (PW17-23)	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	---	---
QA/QC RPD											6-Dec-18		<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	<0.0050	<0.050
DUP-3 (PW17-23)	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	---	---
QA/QC RPD											5-Jun-19		<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<0.0050	<0.050
DUP-2 (PW17-23)	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-23	Porewater	PW17-23	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
DUP2 (PW17-25)	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	---	---
QA/QC RPD											14-Nov-17		<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	**0.006**	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	<0.005	<0.05
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Nov-17	L2023753	<0.005	<0.05
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	<0.005	<0.05
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	<0.005	<0.05
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	L2057618	<0.005	<0.2
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<0.005	<0.1
DUP 1(PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	<0.005	<0.05
QA/QC RPD											22-Mar-18		---	---
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	17-Apr-18	L2081248	<0.005	<0.2
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	<0.005	<0.2
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Sep-18	L2163271	<0.005	<0.2
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	<0.0050	<0.050
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	<0.0050	<0.050
DUP 1(PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	<0.0050	<0.050
QA/QC RPD											6-Jun-19		---	---
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<0.0050	<0.050
DUP 3 (PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	<0.0050	<0.050
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<0.0050	<0.050
DUP-2(PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	<0.0050	<0.050
QA/QC RPD											9-Dec-20		---	---
PW17-26	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<0.0050	<0.050
DUP-1(PW17-26)	Porewater EAZ	PW17-26	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	<0.0050	<0.050
QA/QC RPD											4-Mar-21		---	---
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Nov-17	L2023753	<0.005	<0.3
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	<0.005	<0.05
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	<0.005	<0.05
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	<0.005	<0.07

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<0.005	<0.05
DUP 2(PW17-27)	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	<0.005	<0.05
QA/QC RPD											22-Mar-18		---	---
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	17-Apr-18	L2081248	<0.005	<0.05
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	<0.005	<0.05
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	<0.005	<0.05
DUP-3(PW17-27)	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	<0.005	<0.05
QA/QC RPD											12-Sep-18		---	---
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	<0.0050	<0.050
DUP-5 (PW17-27)	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	<0.0050	<0.050
QA/QC RPD											6-Dec-18		---	---
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Jun-19	L2287095	<0.0050	<0.050
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	<0.0050	<0.050
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-27	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<0.0050	<0.050
DUP-2(PW17-27)	Porewater EAZ	PW17-27	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	<0.0050	<0.050
QA/QC RPD											4-Mar-21		---	---
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Nov-17	L2023753	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<0.005	<0.05
DUP 3(PW17-28)	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	<0.005	<0.05
QA/QC RPD											22-Mar-18		---	---
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	<0.005	<0.05
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<0.005	<0.05
DUP-4(PW17-28)	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	<0.005	<0.05
QA/QC RPD											12-Sep-18		---	---
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<0.0050	<0.050
DUP-6 (PW17-28)	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	<0.0050	<0.050
QA/QC RPD											6-Dec-18		---	---
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Jun-19	L2287095	<0.0050	<0.050
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	<0.0050	<0.050
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-28	Porewater	PW17-28	ALS	Hexane	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Feb-18	L2056918	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	<0.005	<0.05
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Jun-19	L2285149	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Sep-18	L2162362	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-17	L2033765	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Jan-18	L2045816	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	<0.005	<0.05
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Sep-18	L2163271	<0.0050	<0.050

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**		**Sample Date**	**Report**	
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Dec-18	L2205928	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Jun-19	L2285149	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand		10-Dec-19	L2395326	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand		8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Mar-21	VA21A4107	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		14-Nov-17	L2022366	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		11-Dec-17	L2033765	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		16-Jan-18	L2045816	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		14-Feb-18	L2056918	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		22-Mar-18	L2071404	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		17-Apr-18	L2081248	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		12-Jun-18	L2111276	<0.005	<0.05
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		11-Sep-18	L2162362	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Dec-18	L2205928	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Jun-19	L2285149	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		10-Dec-19	L2395326	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		8-Dec-20	VA20C2850	<0.0050	<0.050
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand		3-Mar-21	VA21A3930	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		14-Nov-17	L2022366	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		12-Dec-17	L2034402	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		15-Jan-18	L2045142	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		14-Feb-18	L2056918	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		22-Mar-18	L2071404	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		16-Apr-18	L2080621	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		12-Jun-18	L2111276	<0.005	<0.05
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		11-Sep-18	L2162362	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Dec-18	L2205928	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		4-Jun-19	L2285149	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		10-Dec-19	L2395326	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		9-Dec-20	VA20C3039	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand		3-Mar-21	VA21A3930	<0.0050	<0.050
R-BLANK 1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA		15-Nov-17	L2023092	<0.005	<0.05
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA		15-Jan-18	L2045142	<0.005	<0.05
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA		15-Feb-18	L2056920	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	16-Nov-17	L2023753	<0.005	<0.05
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	16-Jan-18	L2045816	<0.005	<0.05
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	14-Feb-18	L2056918	<0.005	<0.05
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	13-Dec-17	L2035368	<0.005	<0.05
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	15-Feb-18	L2057618	<0.005	<0.05
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	<0.005	<0.05
RINSATE-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	11-Dec-17	L2033765	<0.005	<0.05
RINSATE-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	12-Dec-17	L2034402	<0.005	<0.05
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	17-Apr-18	L2081248	<0.005	<0.05
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	12-Jun-18	L2111276	<0.005	<0.05
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	13-Jun-18	L2111824	<0.005	<0.05
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112662	<0.005	<0.05
R-BLANK 1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	10-Sep-18	L2161513	<0.005	<0.05
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	11-Sep-18	L2162362	<0.005	<0.05
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163271	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	03-Dec-18	L2205030	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	04-Dec-18	L2205928	<0.0050	<0.050
R-BLANK-3	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	05-Dec-18	L2206732	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	04-Jun-19	L2285149	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	05-Jun-19	L2286145	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	10-Dec-19	L2395326	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	11-Dec-19	L2395640	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	08-Dec-20	VA20C2850	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	10-Dec-20	VA20C3128	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	03-Mar-21	VA21A3930	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	04-Mar-21	VA21A4107	<0.0050	<0.050

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.

1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances

2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]													1	100
RBMT[2]													0.28	44
Reported Detection Limit													0.005	0.05
Sample ID[3]	**Matrix**	**Sample Location**	**Laboratory**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**		

3 - The Ministry of Environment and Climate Change Strategy (ENV) requires the co-reporting of PAHs when LEPH and HEPH calculations are required, consequently, LEPH and HEPH must be co-reported with the corresponding PAH results. Although these PAHs are not considered site specific contaminants of concern (COCs), they were analyzed to calculate LEPH and/or HEPH and were either not detected or detected below Updated Screening Levels (USLs). For the purpose of this monitoring report, these PAHs have not been tabulated; however, as it is an ENV requirement, the data has been included in the ALS laboratory reports provided in Appendix C.

BOLD	Sample concentration is detected
SHADE	Sample concentration greater than RBMT
SHADE	Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres
Acronyms
AG - aquagate
C - Compliance well (Post-construction)
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
IBA - In between area
NA - not applicable
NS - no standard established for indicated parameter.
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target
S - Sentry well (Post-construction)
U - Up gradient well (Post-construction)
W FPTS - Western Foreshore Passive Treatment System

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
Post-Construction FTPS														
P3-6-NBO @	Surface Water	PW17-06	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**23.7**	<20.
P3-6-NBO	Surface Water	PW17-06	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<10.	<60.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.68**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**1.91**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	**0.62**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.83**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	**0.88**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**1.56**	<3.
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	<0.50	<3.0
P3-6-NBO	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	<0.50	<3.0
P3-6-O @	Surface Water	PW17-06	CRC ICPMS	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**10.8**	<20.
P3-6-O	Surface Water	PW17-06	CRC ICPMS	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**1.18**	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**1.28**	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.72**	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	**0.7**	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	<0.5	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	**0.66**	<3.
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	<0.50	<3.0
P3-6-O	Surface Water	PW17-06	HR ICPMS	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**1.35**	<3.0
P3-12-NBO @	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**29.5**	<20.
DUP1 (P3-12-NBO) @	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**7.8**	<20.
QA/QC RPD										11-Dec-17			116.4%	---
P3-12-NBO	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<10.	<60.
DUP1 (P3-12-NBO)	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<10.	<60.
QA/QC RPD										11-Dec-17			---	---
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.83**	**3.2**
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**1.04**	**3.1**
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	**0.55**	<3.
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.75**	<3.
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	13-Sep-18	L2163427	D	**0.53**	<3.
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	13-Sep-18	L2163427	T	**0.74**	<3.
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	**0.53**	<3.0
DUP-2 (P3-12-NBO)	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	**0.52**	**4.1**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
QA/QC RPD										3-Dec-18			---	---
P3-12-NBO	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.92**	**3.3**
DUP-2 (P3-12-NBO)	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.51**	**5.3**
QA/QC RPD										3-Dec-18			---	---
P3-12-O @	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**13.5**	<20.
P3-12-O	Surface Water	PW17-08	CRC ICPMS	NA	W FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**0.77**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**1.54**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.56**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	**0.77**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	**0.61**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	**0.67**	<3.
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	**0.59**	<3.0
P3-12-O	Surface Water	PW17-08	HR ICPMS	NA	W FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**0.85**	<3.0
P6-6-NBO @	Surface Water	PW17-18	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**20.8**	<20.
P6-6-NBO	Surface Water	PW17-18	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<10.	<60.
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.6**	**3.8**
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**1.32**	**4.6**
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	**0.6**	**3.8**
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.68**	**0.7**
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	<0.5	<3.
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**0.63**	<3.
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	<0.50	<3.0
P6-6-NBO	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.59**	<3.0
P6-6-O @	Surface Water	PW17-18	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**28.1**	<20.
P6-6-O	Surface Water	PW17-18	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**1.1**	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**1.2**	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.65**	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	<0.5	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	<0.5	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	**0.92**	<3.
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	<0.50	<3.0
P6-6-O	Surface Water	PW17-18	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**0.59**	<3.0

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CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
P6-12-NBO @	Surface Water	PW17-20	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**23.1**	<20.
P6-12-NBO	Surface Water	PW17-20	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<10.	<60.
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.51**	<3.
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**1.26**	**3.5**
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	<0.5	<3.
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**0.71**	<3.
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	**0.58**	**8.6**
P6-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.81**	**7.1**
P6-12-O @	Surface Water	PW17-20	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**23.9**	<20.
P6-12-O	Surface Water	PW17-20	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**0.8**	<3.
DUP5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.66**	<3.
QA/QC RPD										20-Mar-18			---	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**1.12**	<3.
DUP5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**1.11**	<3.
QA/QC RPD										20-Mar-18			0.0	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.51**	<3.
DUP-5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	<0.5	<3.
QA/QC RPD										14-Jun-18			---	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	**1.78**	<3.
DUP5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.66**	<3.
QA/QC RPD										14-Jun-18			---	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	**0.63**	<3.
DUP-5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	**0.55**	<3.
QA/QC RPD										14-Jun-18			---	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	<0.50	<3.
DUP-5 (P6-12-O)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**0.66**	<3.
QA/QC RPD										14-Jun-18			---	---
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	<0.50	<3.0
P6-12-O	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**0.55**	<3.0
P8-6-NBO @	Surface Water	PW17-28	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**22.2**	<20.
P8-6-NBO	Surface Water	PW17-28	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	**11.**	<60.
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.69**	<3.
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**0.63**	<3.0

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	**1.03**	<3.0
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.7**	<3.0
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	**0.5**	<3.0
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**0.7**	<3.0
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	<0.50	<3.0
P8-6-NBO	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	<0.50	<3.0
P8-6-O @	Surface Water	PW17-28	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**22.5**	<20.
P8-6-O	Surface Water	PW17-28	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**1.22**	**7.4**
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**1.04**	**10.1**
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.73**	<3.0
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	**0.7**	<3.0
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	**0.51**	<3.0
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	**0.79**	**4.7**
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	**0.55**	<3.0
P8-6-O	Surface Water	PW17-28	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**0.61**	<3.0
P8-12-NBO @	Surface Water	PW17-30	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	D	**19.3**	<20.
P8-12-NBO	Surface Water	PW17-30	CRC ICPMS	NA	E FPTS	NBO	NBO	NBO	---	11-Dec-17	L2033765	T	<0.3	<60.
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	**0.59**	<3.
DUP10 (P8-12-NBO)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	D	<0.5	<3.
QA/QC RPD										20-Mar-18			---	---
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**0.84**	<3.
DUP10 (P8-12-NBO)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	20-Mar-18	L2070135	T	**0.86**	<3.
QA/QC RPD										20-Mar-18			---	---
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	D	**0.56**	<3.
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	14-Jun-18	L2112693	T	**0.92**	<3.
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	D	<0.5	<3.
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	12-Sep-18	L2163427	T	**0.68**	<3.
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.58**	<3.0
DUP-1 (P8-12-NBO)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	T	**0.65**	**4.2**
QA/QC RPD										3-Dec-18			---	---
P8-12-NBO	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	<0.50	<3.0
DUP-1 (P8-12-NBO)	Surface Water	PW17-20	HR ICPMS	NA	E FPTS	NBO	NBO	NBO	---	3-Dec-18	L2205030	D	**0.52**	<3.0
QA/QC RPD										3-Dec-18			---	---

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
P8-12-O @	Surface Water	PW17-30	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	D	**19.**	<20.
P8-12-O	Surface Water	PW17-30	CRC ICPMS	NA	E FPTS	SW	SW	SW	---	11-Dec-17	L2033765	T	<10.	<60.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	D	**0.76**	**4.1**
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	20-Mar-18	L2070135	T	**0.83**	<3.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	D	**0.52**	<3.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	T	**0.81**	<3.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	D	<0.5	<3.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	T	**0.62**	<3.
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	D	**0.77**	**4.1**
P8-12-O	Surface Water	PW17-30	HR ICPMS	NA	E FPTS	SW	SW	SW	---	3-Dec-18	L2205030	T	**0.52**	<3.0
CBP-1	Porewater	CBP-1	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-1	Porewater	CBP-1	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	D	**1.01**	**1.6**
CBP-1	Porewater	CBP-1	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.50	<3.0
CBP-2	Porewater	CBP-2	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-2	Porewater	CBP-2	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	D	**0.22**	**1.6**
CBP-2	Porewater	CBP-2	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	4-Dec-18	L2205928	D	<0.50	<3.0
CBP-5	Porewater	CBP-5	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-5	Porewater	CBP-5	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Sep-18	L2164036	D	<0.2	<1.
CBP-5	Porewater	CBP-5	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.50	<3.0
CBP-6	Porewater	CBP-6	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-6	Porewater	CBP-6	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Sep-18	L2164036	D	<0.2	**1.1**
CBP-6	Porewater	CBP-6	HR ICPMS	CBP	W FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	D	<0.50	<3.0
CBP-7	Porewater	CBP-7	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	<3.
DUP-1(CBP-7)	Porewater	CBP-7	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	<3.
QA/QC RPD										13-Jun-18			---	---
CBP-7	Porewater	CBP-7	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	D	<0.5	**4.4**
CBP-7	Porewater	CBP-7	HR ICPMS	CBP	W FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.20	**1.3**
CBP-8	Porewater	CBP-8	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-8	Porewater	CBP-8	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	D	<0.5	<3.
CBP-8	Porewater	CBP-8	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	D	<0.20	<1.0

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
CBP-15	Porewater	CBP-15	HR ICPMS	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-15	Porewater	CBP-15	HR ICPMS	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	12-Sep-18	L2163271	D	<0.5	**3.2**
CBP-15	Porewater	CBP-15	HR ICPMS	CBP	E FPTS	0.9-1.0	0.9	1.0	Imported sand and AG/OC	6-Dec-18	L2207439	D	**0.22**	<1.0
CBP-16	Porewater	CBP-16	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	<3.
CBP-16	Porewater	CBP-16	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	D	<0.5	<3.
CBP-16	Porewater	CBP-16	HR ICPMS	CBP	E FPTS	1.1-1.2	1.1	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	D	<0.40	<2.0
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	**2.8**	<10.
DUP1 (PW17-01)	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	<10.	<50.
QA/QC RPD										14-Nov-17			---	---
PW17-01 @	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	D	**38.9**	**12.**
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	16-Jan-18	L2045816	D	<4.	<20.
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	D	**2.3**	<10.
DUP6 (PW17-01)	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	**0.64**	**5.4**
PW17-01	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	**0.81**	**5.6**
QA/QC RPD										21-Mar-18			---	3.6%
PW17-01	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	D	<0.5	**3.6**
PW17-01	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Jun-18	L2111824	D	**0.55**	<3.
PW17-01	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	D	**0.54**	**4.7**
PW17-01	Porewater	PW17-01	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	D	**0.68**	<3.0
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	D	**0.63**	**2.7**
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	D	**0.36**	**2.**
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	D	**0.44**	**2.1**
PW17-01	Porewater	PW17-01	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	D	**0.4**	**1.7**
PW17-02	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	**2.4**	<10.
PW17-02 @	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**38.**	<10.
PW17-02	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-02	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-02	Porewater	PW17-02	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**0.79**	<3.
PW17-02	Porewater	PW17-02	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	**0.69**	<3.
PW17-02	Porewater	PW17-02	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Jun-18	L2111824	D	<0.5	**3.2**
PW17-02	Porewater	PW17-02	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	D	**0.73**	<3.
PW17-02	Porewater	PW17-02	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	D	**0.69**	<3.0
PW17-02	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	D	**0.64**	**1.2**
PW17-02	Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	D	**0.38**	<1.0

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID		**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-02		Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	D	**0.66**	**1.2**
PW17-02		Porewater	PW17-02	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.51**	<1.0
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Nov-17	L2023753	D	<10.	<50.
PW17-03	@	Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**23.7**	<10.
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	**4.1**	<20.
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	D	**4.5**	<10.
PW17-03		Porewater	PW17-03	HR ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-18	L2071889	D	**0.83**	**4.7**
PW17-03		Porewater	PW17-03	HR ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	D	<2.	<10.
PW17-03		Porewater	PW17-03	HR ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**0.66**	<3.
PW17-03		Porewater	PW17-03	HR ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	<0.5	<3.
PW17-03		Porewater	PW17-03	HR ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	D	<0.50	<3.0
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	**0.58**	<1.0
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	D	**0.4**	<1.0
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	D	**0.46**	**3.1**
PW17-03		Porewater	PW17-03	CRC ICPMS	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.54**	**1.6**
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	D	<4.	<20.
PW17-04	@	Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	D	**40.4**	**13.**
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	D	**5.2**	<10.
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	D	**3.6**	<5.
PW17-04		Porewater EAZ	PW17-04	HR ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	23-Mar-18	L2071889	D	<0.5	**4.5**
PW17-04		Porewater EAZ	PW17-04	HR ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	D	<1.	<5.
PW17-04		Porewater EAZ	PW17-04	HR ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	D	<0.5	**3.9**
PW17-04		Porewater EAZ	PW17-04	HR ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2162362	D	<0.5	<3.
PW17-04		Porewater EAZ	PW17-04	HR ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Dec-18	L2206732	D	<0.50	<3.0
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	D	<0.20	**1.3**
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Dec-19	L2395640	D	<0.20	<1.0
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	10-Dec-20	VA20C3128	D	**0.2**	**1.2**
PW17-04		Porewater EAZ	PW17-04	CRC ICPMS	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	D	<0.20	**1.1**
PW17-05		Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	D	<4.	<20.
PW17-05		Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	<2.	<10.
DUP2 (PW17-05)		Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2022366	D	<2.	<10.
QA/QC RPD											13-Dec-17			---	---
PW17-05		Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	**1.63**	<2.
PW17-05		Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	D	**2.43**	**2.2**

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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-05	Porewater EAZ	PW17-05	HR ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	23-Mar-18	L2071889	D	**1.36**	<3.
PW17-05	Porewater EAZ	PW17-05	HR ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	D	**0.79**	<1.
PW17-05	Porewater EAZ	PW17-05	HR ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	D	**1.52**	<3.
PW17-05	Porewater EAZ	PW17-05	HR ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	D	**15.8**	<3.
PW17-05	Porewater EAZ	PW17-05	HR ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	D	**4.76**	<2.0
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	D	**1.6**	**3.7**
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Dec-19	L2395640	D	**3.23**	<1.0
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Dec-20	VA20C3128	D	**1.08**	**1.**
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	D	**1.74**	<1.0
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	D	<4.	<20.
PW17-06 @	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	D	**23.1**	<10.
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	D	**3.6**	<10.
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	D	**2.25**	**2.4**
PW17-06	Porewater	PW17-06	HR ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	23-Mar-18	L2071889	D	<1.	<5.
PW17-06	Porewater	PW17-06	HR ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	D	<0.4	<2.
PW17-06	Porewater	PW17-06	HR ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	<3.
PW17-06	Porewater	PW17-06	HR ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	D	<0.5	<3.
PW17-06	Porewater	PW17-06	HR ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	D	<0.50	<3.0
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	D	<0.20	<1.0
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Dec-19	L2395640	D	<0.20	<1.0
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Dec-20	VA20C3128	D	<0.20	<1.0
PW17-06	Porewater	PW17-06	CRC ICPMS	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	D	<0.20	<1.0
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Nov-17	L2023092	D	<10.	<50.
PW17-07 @	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Dec-17	L2034402	D	**14.**	<50.
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	15-Jan-18	L2045142	D	**4.6**	**22.**
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-07	Porewater EAZ	PW17-07	HR ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	21-Mar-18	L2070802	D	<0.5	**9.8**
PW17-07	Porewater EAZ	PW17-07	HR ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	17-Apr-18	L2081248	D	**0.58**	**5.2**
PW17-07	Porewater EAZ	PW17-07	HR ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	12-Jun-18	L2111276	D	**0.58**	**6.4**
PW17-07	Porewater EAZ	PW17-07	HR ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Sep-18	L2161513	D	**0.86**	**5.8**
PW17-07	Porewater EAZ	PW17-07	HR ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Dec-18	L2205028	D	**0.52**	<3.0
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	5-Jun-19	L2286145	D	**0.48**	**3.3**
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	11-Dec-19	L2395640	D	**0.27**	**1.4**
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	10-Dec-20	VA20C3128	D	**0.31**	**1.8**
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS	S	W FPTS	0.70-1.00	0.7	1	Beach sand	3-Mar-21	VA21A3930	D	<0.20	**1.6**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID		**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	D	<10.	<50.
PW17-08	@	Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	D	**49.3**	**11.**
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	D	<4.	<20.
PW17-08		Porewater	PW17-08	HR ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	D	**1.73**	**6.7**
PW17-08		Porewater	PW17-08	HR ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	D	<2.	<10.
PW17-08		Porewater	PW17-08	HR ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	D	**0.63**	**3.4**
PW17-08		Porewater	PW17-08	HR ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	D	<0.5	<3.
PW17-08		Porewater	PW17-08	HR ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Dec-18	L2205028	D	<0.50	<3.0
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	D	**0.63**	<1.0
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Dec-19	L2395640	D	**0.39**	<1.0
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	D	**0.4**	<1.0
PW17-08		Porewater	PW17-08	CRC ICPMS	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	D	**0.43**	<1.0
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	<4.	<20.
PW17-09	@	Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	D	**35.7**	**18.**
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	D	<4.	<20.
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	D	<4.	<20.
PW17-09		Porewater	PW17-09	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	<0.5	<3.
PW17-09		Porewater	PW17-09	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	D	<0.5	<3.
PW17-09		Porewater	PW17-09	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	D	<0.5	<3.
PW17-09		Porewater	PW17-09	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	D	<0.5	<3.
PW17-09		Porewater	PW17-09	HR ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	D	<0.50	<3.0
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	D	<0.20	**1.2**
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Dec-19	L2395640	D	<0.20	**1.3**
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-20	VA20C3128	D	**6.18**	**3.9**
PW17-09		Porewater	PW17-09	CRC ICPMS	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	D	**1.43**	<1.0
PW17-10		Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	D	<10.	<50.
PW17-10	@	Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**33.7**	<10.
PW17-10		Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	<10.	<50.
PW17-10		Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-10		Porewater	PW17-10	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**0.85**	**4.**
PW17-10		Porewater	PW17-10	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	**0.66**	**4.2**
PW17-10		Porewater	PW17-10	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**1.18**	<3.
PW17-10		Porewater	PW17-10	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	**0.92**	**4.4**

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CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-10	Porewater	PW17-10	HR ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	D	**0.69**	**4.7**
PW17-10	Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	D	**0.72**	**3.5**
PW17-10	Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-19	L2395640	D	**0.77**	**1.4**
PW17-10	Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	D	**0.61**	**2.3**
PW17-10	Porewater	PW17-10	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.62**	**1.9**
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Nov-17	L2023753	D	<4.	<20.
PW17-11 @	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Dec-17	L2034402	D	**45.2**	**10.**
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	14-Feb-18	L2056918	D	**6.7**	<20.
PW17-11	Porewater	PW17-11	HR ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	21-Mar-18	L2070802	D	<0.50	<3.0
PW17-11	Porewater	PW17-11	HR ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	16-Apr-18	L2080621	D	<2.	<10.
PW17-11	Porewater	PW17-11	HR ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	12-Jun-18	L2111276	D	<0.50	<3.0
PW17-11	Porewater	PW17-11	HR ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Sep-18	L2161513	D	<0.50	<3.0
PW17-11	Porewater	PW17-11	HR ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Dec-18	L2205028	D	<0.50	<3.0
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	4-Jun-19	L2285149	D	<4.0	<20
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-19	L2395326	D	<0.20	<1.0
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	10-Dec-20	VA20C3128	D	<0.20	<1.0
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	3-Mar-21	VA21A3930	D	<0.20	<1.0
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	D	<10.	<50.
PW17-12 @	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**52.1**	**11.**
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	**5.7**	<20.
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	D	<10.	<50.
PW17-12	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	<0.5	<3.
DUP7 (PW17-12)	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**0.51**	<3.
QA/QC RPD										21-Mar-18			---	---
PW17-12	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	<0.5	<3.
PW17-12	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**0.98**	**18.7**
PW17-12	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	**0.78**	<3.
PW17-12	Porewater	PW17-12	HR ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	**0.59**	<3.0
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	**0.64**	<1.0
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	**0.32**	<1.0
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	10-Dec-20	VA20C3128	D	**0.37**	**1.4**
PW17-12	Porewater	PW17-12	CRC ICPMS	C	IBA	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.43**	<1.0

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CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
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													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID		**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	<4.	<20.
PW17-13	@	Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	D	**39.5**	**11.**
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	D	**3.7**	<10.
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	13-Feb-18	L2056920	D	<4.	<20.
PW17-13		Porewater	PW17-13	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	**1.06**	**1.9**
PW17-13		Porewater	PW17-13	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	D	**2.23**	<3.
PW17-13		Porewater	PW17-13	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	D	**1.15**	<3.
PW17-13		Porewater	PW17-13	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Sep-18	L2161513	D	**1.45**	**3.1**
PW17-13		Porewater	PW17-13	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	D	**1.47**	<3.0
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	5-Jun-19	L2286145	D	**1.25**	**1.7**
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	D	**1.2**	**1.6**
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	D	**2.05**	<1.0
PW17-13		Porewater	PW17-13	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	D	**1.25**	**1.4**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	<2.	<10.
PW17-14	@	Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**40.3**	**13.**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-14		Porewater	PW17-14	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**1.**	**8.**
PW17-14		Porewater	PW17-14	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	**0.92**	**7.8**
PW17-14		Porewater	PW17-14	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**0.65**	**4.2**
PW17-14		Porewater	PW17-14	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	**0.59**	<3.
PW17-14		Porewater	PW17-14	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	**0.85**	**3.4**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	5-Jun-19	L2286145	D	**0.6**	**3.6**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	**0.83**	**3.5**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	D	**0.56**	**3.4**
PW17-14		Porewater	PW17-14	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.51**	**1.8**
PW17-15		Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Nov-17	L2023753	D	<4.	<20.
PW17-15	@	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	13-Dec-17	L2035368	D	**22.5**	<20.
PW17-15		Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	D	**31.7**	<20.
PW17-15		Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	D	<4.	<20.
PW17-15		Porewater	PW17-15	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	D	<0.5	<3.
PW17-15		Porewater	PW17-15	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	17-Apr-18	L2081248	D	<0.5	<3.
PW17-15		Porewater	PW17-15	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	D	<0.5	**4.4**
PW17-15		Porewater	PW17-15	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Sep-18	L2161513	D	<0.5	<3.
PW17-15		Porewater	PW17-15	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	D	<0.50	<3.0

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	D	<4.0	<20
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	D	**0.21**	**1.2**
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-20	VA20C3128	D	**0.27**	**1.4**
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	D	**0.4**	<1.0
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	D	<4.	<20.
PW17-16 @	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	D	**29.7**	**10.**
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	D	**1.**	**4.6**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	D	**1.07**	**4.7**
QA/QC RPD										16-Jan-18			---	---
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	D	**1.6**	**4.**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Feb-18	L2056918	D	**7.46**	**11.5**
QA/QC RPD										14-Feb-18			129.4%	---
PW17-16	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	D	**0.34**	**5.**
PW17-16	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	D	<0.2	**1.7**
DUP1 (PW17-16)	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	D	<0.2	**1.7**
QA/QC RPD										18-Apr-18			---	---
PW17-16	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	D	**0.62**	**5.5**
DUP-2 (PW17-16)	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Jun-18	L2111824	D	**0.64**	**6.9**
QA/QC RPD										13-Jun-18			---	22.6%
PW17-16	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	11-Sep-18	L2162362	D	**0.77**	**4.6**
PW17-16	Porewater EAZ	PW17-16	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Dec-18	L2206732	D	<0.20	**1.3**
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	D	**0.33**	**3.7**
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	D	<1.0	<5.0
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	D	<0.4	<2
DUP1 (PW17-16)	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	D	**0.52**	<2
QA/QC RPD										9-Dec-20			---	---
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	D	<1.0	<5.0
DUP-3 (PW17-16)	Porewater EAZ	PW17-16	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	D	<1.0	<5.0
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	D	**1.48**	**11.5**
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	**1.2**	<4.
DUP3 (PW17-17)	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	**2.24**	<4.
QA/QC RPD										13-Dec-17			60.5%	---
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	**1.4**	**2.5**
DUP2 (PW17-17)	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	**1.36**	**2.5**
QA/QC RPD										16-Jan-18			2.9%	---

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	D	**0.37**	**2.6**
DUP2 (PW17-17)	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Feb-18	L2056918	D	**0.4**	**3.**
QA/QC RPD										14-Feb-18			---	---
PW17-17	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	D	<0.2	**1.7**
PW17-17	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	D	<0.2	**1.3**
DUP2 (PW17-17)	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	D	<0.2	**1.5**
QA/QC RPD										18-Apr-18			---	---
PW17-17	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Jun-18	L2111824	D	<0.5	**22.3**
PW17-17	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	D	<0.5	**16.5**
DUP-1 (PW17-17)	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	11-Sep-18	L2162362	D	<0.5	**15.7**
QA/QC RPD										11-Sep-18			---	5.0%
PW17-17	Porewater EAZ	PW17-17	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.20	**1.9**
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	D	<1.0	<5.0
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	D	<0.20	**1.4**
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	D	<0.2	**1.3**
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	D	<0.20	<1.0
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	D	**3.35**	<5.
DUP3 (PW17-18)	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	D	**3.71**	<5.
QA/QC RPD										15-Nov-17			10.2%	---
PW17-18 @	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	D	**18.3**	<4.
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	D	**1.14**	**2.5**
DUP3 (PW17-18)	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	D	**2.54**	**4.**
QA/QC RPD										16-Jan-18			76.1%	---
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	D	**1.68**	**1.8**
DUP3 (PW17-18)	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Feb-18	L2056918	D	**2.89**	**3.**
QA/QC RPD										14-Feb-18			53.0%	---
PW17-18	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	D	<0.2	**4.1**
PW17-18	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	D	<0.2	<1.
DUP3 (PW17-18)	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	D	<0.2	<1.
QA/QC RPD										18-Apr-18			---	---
PW17-18	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	**7.5**
DUP3 (PW17-18)	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Jun-18	L2111824	D	<0.5	**8.8**
QA/QC RPD										18-Apr-18			---	16.0%
PW17-18	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	D	**0.54**	**34.9**
DUP-2 (PW17-18)	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	11-Sep-18	L2162362	D	**0.6**	**35.**
QA/QC RPD										11-Sep-18			---	0.3%

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-18	Porewater	PW17-18	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Dec-18	L2206732	D	<0.50	<3.0
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	D	<2.0	**15.**
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	D	<0.20	**4.8**
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	D	<0.2	**6.6**
PW17-18	Porewater	PW17-18	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	D	<0.40	<2.0
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	**2.4**	**8.7**
PW17-19 @	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Dec-17	L2034402	D	**34.9**	**11.6**
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	15-Jan-18	L2045142	D	<1.	<5.
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	13-Feb-18	L2056920	D	**4.3**	**6.2**
PW17-19	Porewater	PW17-19	HR ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	<0.2	**2.4**
PW17-19	Porewater	PW17-19	HR ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	16-Apr-18	L2080621	D	<0.2	**3.4**
PW17-19	Porewater	PW17-19	HR ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	12-Jun-18	L2111276	D	**1.04**	**3.**
PW17-19	Porewater	PW17-19	HR ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Sep-18	L2161513	D	**5.**	**5.**
PW17-19	Porewater	PW17-19	HR ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Dec-18	L2205928	D	<0.50	<3.0
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	4-Jun-19	L2285149	D	**2.9**	<10
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	10-Dec-19	L2395326	D	**1.02**	**2.6**
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	D	**1.48**	**2.2**
PW17-19	Porewater	PW17-19	CRC ICPMS	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	D	**0.24**	**1.6**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	14-Nov-17	L2022366	D	**2.9**	**6.**
PW17-20 @	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Dec-17	L2034402	D	**36.6**	**8.8**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	15-Jan-18	L2045142	D	<1.	<5.
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	13-Feb-18	L2056920	D	**2.4**	<5.
PW17-20	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	21-Mar-18	L2070802	D	<0.5	<3.
DUP8 (PW17-20)	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	21-Mar-18	L2070802	D	<0.5	<3.
QA/QC RPD										21-Mar-18			---	---
PW17-20	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	16-Apr-18	L2080621	D	<0.4	<2.
PW17-20	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	12-Jun-18	L2111276	D	<0.5	**5.**
PW17-20	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Sep-18	L2161513	D	<0.5	**3.6**
PW17-20	Porewater EAZ	PW17-20	HR ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Dec-18	L2205928	D	<0.50	**8.1**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	4-Jun-19	L2285149	D	<2.0	<10
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	10-Dec-19	L2395326	D	**0.76**	**2.5**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	9-Dec-20	VA20C3039	D	**0.46**	**7.1**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS	C	E FPTS	0.64-1.00	0.64	1	Beach sand	3-Mar-21	VA21A3930	D	**1.09**	**2.6**
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Nov-17	---	---	---	---

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-17	---	---	---	---
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	---	---	---	---
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	---	---	---	---
PW17-21	Porewater EAZ	PW17-21	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	D	**0.47**	**1.5**
PW17-21	Porewater EAZ	PW17-21	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	18-Apr-18	L2081868	D	<1.	<5.
PW17-21	Porewater EAZ	PW17-21	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	D	**0.87**	**1.4**
PW17-21	Porewater EAZ	PW17-21	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Sep-18	L2163271	D	**1.6**	<3.
PW17-21	Porewater EAZ	PW17-21	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	D	**0.95**	**1.9**
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	5-Jun-19	L2286145	D	<1.0	<5.0
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	D	<1.0	<5.0
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	D	**0.52**	<2
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	3-Mar-21	VA21A3930	D	**0.43**	<2.0
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Nov-17	L2023092	D	**1.22**	<5.
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	**1.29**	<4.
DUP4 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	**5.02**	<5.
QA/QC RPD										13-Dec-17			118.2%	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	<0.4	**2.1**
DUP4 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	<0.4	**2.6**
QA/QC RPD										16-Jan-18			---	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	D	**1.22**	**4.1**
DUP4 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	D	**0.67**	**3.1**
QA/QC RPD										15-Feb-18			---	---
PW17-22	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	D	<0.2	**1.8**
DUP 4(PW17-22)	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	D	**0.46**	**2.1**
QA/QC RPD										22-Mar-18			---	---
PW17-22	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	D	<0.2	<1.
DUP 4(PW17-22)	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	18-Apr-18	L2081868	D	<0.2	<1.
QA/QC RPD										18-Apr-18			---	---
PW17-22	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	D	<0.5	**3.1**
DUP 4(PW17-22)	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	D	<0.5	**3.**
QA/QC RPD										14-Jun-18			---	---
PW17-22	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	10-Sep-18	L2161513	D	<0.5	**5.2**
PW17-22	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.20	**1.5**
DUP-3 (PW17-22)	Porewater EAZ	PW17-22	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Dec-18	L2206732	D	<0.20	**1.5**
QA/QC RPD										5-Dec-18			---	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	D	<2.0	<10

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
DUP-2 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	5-Jun-19	L2286145	D	<4.0	<20
QA/QC RPD										5-Jun-19			---	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	D	**0.53**	**1.2**
DUP-1 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	D	**0.49**	<1.
QA/QC RPD										12-Dec-19			---	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	D	**1.53**	**3.60**
DUP3 (PW17-22)	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	D	**1.5**	**3.4**
QA/QC RPD										9-Dec-20			2.0%	---
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	D	1.12	<1.0
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Nov-17	L2023092	D	**1.64**	<3.5
PW17-23 @	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	D	**19.**	<4.
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	D	**0.57**	<1.
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	D	**0.41**	**1.8**
PW17-23	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	D	<0.5	<3.
PW17-23	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	D	<0.2	<1.
PW17-23	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	D	<0.5	**7.3**
PW17-23	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	10-Sep-18	L2161513	D	<0.5	**14.8**
PW17-23	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	D	<0.40	**2.**
DUP-4 (PW17-23)	Porewater	PW17-23	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	D	<0.20	**1.7**
QA/QC RPD										6-Dec-18			---	---
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	D	<2.0	**16.**
DUP-3 (PW17-23)	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	5-Jun-19	L2286145	D	<4.0	<20
QA/QC RPD										5-Jun-19			---	---
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	D	**0.33**	**1.4**
DUP-2 (PW17-23)	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	D	**0.32**	**2.4**
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	D	**0.34**	**11.9**
PW17-23	Porewater	PW17-23	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	D	**0.38**	<1.0
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Nov-17	L2023092	D	<10.	<50.
PW17-24 @	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**62.7**	**14.**
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	**16.7**	<20.
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-24	Porewater	PW17-24	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	<0.5	<3.
PW17-24	Porewater	PW17-24	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	<0.5	<3.
PW17-24	Porewater	PW17-24	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**0.6**	<3.
PW17-24	Porewater	PW17-24	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	**0.72**	<3.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-24	Porewater	PW17-24	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	<0.50	<3.0
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	<4.0	<20
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	<0.2	<1.
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	D	**0.26**	**1.7**
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.21**	<1.0
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	<4.	<20.
DUP2 (PW17-25)	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	<4.	<20.
QA/QC RPD										14-Nov-17			---	---
PW17-25 @	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**54.3**	**11.**
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	13-Feb-18	L2056920	D	<4.	<20.
PW17-25	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**0.89**	<3.
DUP9 (PW17-25)	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	21-Mar-18	L2070802	D	**0.96**	<3.
QA/QC RPD										21-Mar-18			---	---
PW17-25	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	D	<1.	<5.
PW17-25	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	<1.	<3.
PW17-25	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Sep-18	L2161513	D	**1.15**	<3.
PW17-25	Porewater	PW17-25	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	**0.88**	<3.0
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	**1.56**	**2.6**
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	**0.68**	<1.0
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	9-Dec-20	VA20C3039	D	**0.7**	**1.5**
PW17-25	Porewater	PW17-25	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.68**	**1.5**
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Nov-17	L2023753	D	**0.84**	**7.7**
PW17-26 @	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	13-Dec-17	L2035368	D	**19.3**	**7.5**
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	L2045816	D	**5.45**	**7.3**
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	L2057618	D	**8.96**	**10.**
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	D	**0.26**	**2.3**
DUP 1(PW17-26)	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-18	L2071404	D	**0.27**	**2.1**
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium					
QA/QC RPD										22-Mar-18			---	---
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	17-Apr-18	L2081248	D	<0.5	<3.
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	14-Jun-18	L2112662	D	<0.2	**1.2**
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Sep-18	L2163271	D	<0.5	**8.2**
PW17-26	Porewater EAZ	PW17-26	HR ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Dec-18	L2207439	D	**0.21**	**2.**
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	D	**0.41**	**3.4**

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													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
DUP 1(PW17-26)	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	6-Jun-19	L2287095	D	<0.40	**3.5**
QA/QC RPD										6-Jun-19			---	---
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	D	**0.3**	**2.1**
DUP 3 (PW17-26)	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-19	L2396150	D	**0.22**	**1.6**
QA/QC RPD										12-Dec-19			---	---
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	D	<0.2	**2.3**
DUP 2(PW17-26)	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	9-Dec-20	VA20C3039	D	<0.2	**2.6**
QA/QC RPD										9-Dec-20			---	---
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	D	<0.20	<1.0
DUP-1(PW17-26)	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	4-Mar-21	VA21A4107	D	<0.20	<1.0
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Nov-17	L2023753	D	<2.	<10.
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	13-Dec-17	L2035368	D	**4.12**	<2.
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	16-Jan-18	L2045816	D	**6.48**	**7.5**
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	15-Feb-18	L2057618	D	**5.7**	**7.8**
PW17-27	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	D	<2.	<1.
DUP 2(PW17-27)	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-18	L2071404	D	<2.	<1.
QA/QC RPD										22-Mar-18			---	---
PW17-27	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	17-Apr-18	L2081248	D	<0.5	<3.
PW17-27	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	14-Jun-18	L2112662	D	**0.95**	<3.
PW17-27	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	D	<0.5	<3.
DUP-3(PW17-27)	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Sep-18	L2163271	D	<0.5	<3.
QA/QC RPD										12-Sep-18			---	---
PW17-27	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	D	<0.20	<1.0
DUP-5 (PW17-27)	Porewater EAZ	PW17-27	HR ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Dec-18	L2207439	D	<0.20	<1.0
QA/QC RPD										6-Dec-18			---	---
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	6-Jun-19	L2287095	D	**0.4**	**1.9**
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	12-Dec-19	L2396150	D	**0.31**	**1.2**
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Dec-20	VA20C3039	D	**0.58**	**3.4**
PW17-27	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	D	**0.75**	<1.0
DUP-2(PW17-27)	Porewater EAZ	PW17-27	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	4-Mar-21	VA21A4107	D	0.75	<1.0
QA/QC RPD										4-Mar-21			---	---
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Nov-17	L2023753	D	<2.	<10.
PW17-28 @	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	13-Dec-17	L2035368	D	**29.4**	**6.**
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	16-Jan-18	L2045816	D	**0.33**	<1.
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	15-Feb-18	L2057618	D	**10.7**	**9.6**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-28	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	D	**0.99**	<1.
DUP 3(PW17-28)	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-18	L2071404	D	<2.	<1.
QA/QC RPD										22-Mar-18			---	---
PW17-28	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	18-Apr-18	L2081868	D	<0.2	<1.
PW17-28	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	14-Jun-18	L2112662	D	<0.5	**3.5**
PW17-28	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	D	**1.44**	**6.5**
DUP-4(PW17-28)	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Sep-18	L2163271	D	**1.52**	**7.**
QA/QC RPD										12-Sep-18			5.4%	7.4%
PW17-28	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	D	**0.2**	<1.0
DUP-6 (PW17-28)	Porewater	PW17-28	HR ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Dec-18	L2207439	D	<0.20	<1.0
QA/QC RPD										6-Dec-18			---	---
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	6-Jun-19	L2287095	D	<4.0	<20
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	12-Dec-19	L2396150	D	<0.2	**1.4**
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Dec-20	VA20C3039	D	**0.22**	**1.3**
PW17-28	Porewater	PW17-28	CRC ICPMS	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	4-Mar-21	VA21A4107	D	**0.28**	<1.0
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Nov-17	L2022366	D	<4.	<20.
PW17-29 @	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Dec-17	L2034402	D	**41.7**	**11.**
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	15-Jan-18	L2045142	D	**4.9**	<20.
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	14-Feb-18	L2056918	D	**3.8**	<10.
PW17-29	Porewater	PW17-29	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	21-Mar-18	L2070802	D	**0.65**	<3.
PW17-29	Porewater	PW17-29	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	17-Apr-18	L2081248	D	**0.51**	<3.
PW17-29	Porewater	PW17-29	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	12-Jun-18	L2111276	D	**0.72**	<3.
PW17-29	Porewater	PW17-29	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	11-Sep-18	L2162362	D	**0.74**	<3.
PW17-29	Porewater	PW17-29	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Dec-18	L2205928	D	<0.50	<3.0
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	4-Jun-19	L2285149	D	<2.0	<10
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	10-Dec-19	L2395326	D	<0.2	**2.**
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Dec-20	VA20C2850	D	<0.2	**1.6**
PW17-29	Porewater	PW17-29	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	3-Mar-21	VA21A3930	D	**0.48**	**1.2**
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Nov-17	L2022366	D	<4.	<20.
PW17-30 @	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Dec-17	L2034402	D	**48.6**	**10.**
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	14-Feb-18	L2056918	D	**5.3**	<10.
PW17-30	Porewater	PW17-30	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	21-Mar-18	L2070802	D	**0.9**	<3.
PW17-30	Porewater	PW17-30	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	16-Apr-18	L2080621	D	<1.	<5.
PW17-30	Porewater	PW17-30	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	12-Jun-18	L2111276	D	**1.04**	<3.

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PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-30	Porewater	PW17-30	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	11-Sep-18	L2162362	D	**1.1**	<3.
PW17-30	Porewater	PW17-30	HR ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Dec-18	L2205928	D	**0.74**	<3.0
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	4-Jun-19	L2285149	D	<4.0	<20
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	10-Dec-19	L2395326	D	**0.63**	<1.0
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	9-Dec-20	VA20C3039	D	**0.78**	**1.9**
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	3-Mar-21	VA21A3930	D	**0.76**	**1.1**
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	<4.	**26.**
PW17-31 @	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-17	L2033765	D	**37.5**	<20.
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Jan-18	L2045816	D	**2.1**	<10.
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	D	**5.1**	**7.8**
PW17-31	Porewater	PW17-31	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	D	**0.98**	<3.
PW17-31	Porewater	PW17-31	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	**1.18**	<3.
PW17-31	Porewater	PW17-31	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	**0.98**	<3.
PW17-31	Porewater	PW17-31	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Sep-18	L2163271	D	**1.52**	**8.8**
PW17-31	Porewater	PW17-31	HR ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	**0.83**	<3.0
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	<4.0	<20
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	**0.75**	**2.6**
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	D	<1.	<5.
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Mar-21	VA21A4107	D	**0.5**	**1.1**
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	**2.8**	**11.7**
PW17-32 @	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Dec-17	L2033765	D	**29.7**	<20.
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Jan-18	L2045816	D	**2.8**	<10.
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	D	**3.**	**19.3**
PW17-32	Porewater	PW17-32	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	D	**0.62**	**8.7**
PW17-32	Porewater	PW17-32	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	17-Apr-18	L2081248	D	<0.5	**4.7**
PW17-32	Porewater	PW17-32	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	<0.5	**4.2**
PW17-32	Porewater	PW17-32	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	D	**0.73**	<3.
PW17-32	Porewater	PW17-32	HR ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	**1.01**	**8.8**
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	**1.3**	**6.1**
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	**2.22**	**6.8**
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Dec-20	VA20C2850	D	**1.59**	**4.9**
PW17-32	Porewater	PW17-32	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.71**	**5.1**
PW17-33	Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Nov-17	L2022366	D	<2.	<10.
PW17-33 @	Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Dec-17	L2034402	D	**36.3**	<10.

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													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID		**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	15-Jan-18	L2045142	D	<4.	<20.
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	14-Feb-18	L2056918	D	<2.	<10.
PW17-33		Porewater	PW17-33	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-18	L2071404	D	<0.5	<3.
PW17-33		Porewater	PW17-33	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	16-Apr-18	L2080621	D	<1.	<5.
PW17-33		Porewater	PW17-33	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	12-Jun-18	L2111276	D	<0.5	**5.6**
PW17-33		Porewater	PW17-33	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	11-Sep-18	L2162362	D	<0.5	**3.1**
PW17-33		Porewater	PW17-33	HR ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Dec-18	L2205928	D	<0.50	<3.0
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	4-Jun-19	L2285149	D	<1.0	<5.0
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	10-Dec-19	L2395326	D	<0.2	**1.7**
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	9-Dec-20	VA20C3039	D	**0.22**	**2.1**
PW17-33		Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.32**	**1.9**
F-Blank-1A	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	<2.	**17.**
F-Blank-1B	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	<2.	<1.
F-Blank-1C	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	**0.85**	<1.
F-Blank-2A	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	<2.	<1.
F-Blank-2B	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	**0.68**	<1.
F-Blank-2C	#	Deionized water	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	19-Mar-18	L2070133	D	**0.7**	<1.
R-BLANK		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	D	**0.22**	<1.
R-BLANK		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	22-Mar-18	L2071404	D	<2.	<1.
R-BLANK-1		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	16-Apr-18	L2080621	D	<0.2	<1.
R-BLANK-1		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	12-Jun-18	L2111276	D	<0.2	<1.
R-BLANK-2		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	17-Apr-18	L2081248	D	<0.5	<3.
R-BLANK-2		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	13-Jun-18	L2111824	D	<0.2	<1.
R-BLANK-3		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112662	D	<0.2	<1.
R-BLANK-1		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	10-Sep-18	L2161513	D	<0.2	<1.
R-BLANK-2		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	11-Sep-18	L2162362	D	<0.5	<3.
R BLANK-3		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	12-Sep-18	L2163271	D	<0.5	<3.
R-BLANK-1		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	D	<0.50	<3.0
R-BLANK-2		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	4-Dec-18	L2205928	D	<0.20	<1.0
R-BLANK-3		NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	5-Dec-18	L2206732	D	<0.20	<1.0
R-BLANK-1		NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	5-Jun-19	L2286145	D	<0.20	<1.0
R-BLANK-2		NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	5-Jun-19	L2286145	D	<0.20	<1.0
R-BLANK-1		NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	10-Dec-19	L2395326	D	<0.20	<1.0
R-BLANK-2		NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	11-Dec-19	L2395640	D	<0.20	<1.0
R-BLANK-1		NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	8-Dec-20	VA20C2850	D	<0.20	<1.0

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		
R-BLANK-2	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	10-Dec-20	VA20C3128	D	<0.20	**1.8**
R-BLANK-1	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	3-Mar-21	VA21A3930	D	<0.20	<1.0
TRAVEL BLANK-1	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	20-Mar-18	L2070135	T	<0.5	<3.
T-BLANK-2	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	T	<2.	<1.
T-BLANK-3	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	21-Mar-18	L2070802	T	<2.	<1.
T-BLANK-4	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	22-Mar-18	L2071404	T	<0.5	<3.
T-BLANK-5	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	23-Mar-18	L2071889	T	<0.5	<3.
T-BLANK-5	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112693	T	<0.5	<3.
T-BLANK-6	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	14-Jun-18	L2112693	T	<0.5	<3.
TRAVEL BLANK-1	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	T	<0.50	<3.0
TRAVEL BLANK-2	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	3-Dec-18	L2205030	T	<0.50	<3.0
R-BLANK-2	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	4-Mar-21	VA21A4107	D	<0.20	<1.0

Notes
< - Sample concentration less than the detection limit indicated.
--- - Sample not analyzed for indicated parameter.
@ - AECOM considers the December 2017 porewater and surface water dissolved copper data as suspect.
# - Deionized water filter assessment samples.
1 - Protocol 11 Table 6. Water Upper Cap Concentrations for Schedule 3.2 Substances

2 - On February 28, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps which was accepted by the MoE in their letter dated August 28, 2014.

BOLD	Sam Sample concentration is detected
SHADE	Sam Sample concentration greater than RBMT
SHADE	Sample Concentration greater than Upper Cap

Abbreviations
µg/L [ppb] - micrograms/litre [parts per billion]
m - metres

Acronyms
AG - aquagate
C - Compliance well (Post-construction)
CCME - Canadian Council of Ministers of the Environment (Updates to May 2008). Marine unless otherwise noted as FW (freshwater).
CRC ICPMS - Collision/Reaction Cells Inductively Coupled Plasma Mass Spectrometry
OC - organoclay
P - Performance well (Post-construction)
PAC - powder activated carbon
RBMT - risk based management target

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
2022 FORESHORE MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
RBMT[2]													6.2	90
Reported Detection Limit (Dissolved)													0.2	1
Sample ID	**Matrix**	**Sample Location**	**Method**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**	**Report**	**Total/ Dissolved**		

CSR/10 - Contaminated Sites Regulation (including up to Stage 11 amendments, November 2017) divided by ten (10)
D - dissolved metals
EAZ - ecologically active zone
E FPTS - Eastern Foreshore Passive Treatment System
HR ICPMS - High Resolution Inductively Coupled Plasma Mass Spectrometry
NBO - near bottom samples
NS - no standard established for indicated parameter.
S - Sentry well (Post-construction)
SW - surface water samples
T - total metals
U - Up gradient well (Post-construction)
W FPTS - Western Foreshore Passive Treatment System

APPENDIX B: Methodology

Monitoring and Sampling Methodologies

Porewater monitoring included recording the time of day, depth to water (DTW), depth to product (DTP, if any), and total depth of the well (TD). The DTW and DTP were measured using an interface probe. The interface probe was decontaminated between monitoring wells to prevent cross contamination as follows:

- Washed external and internal surfaces of the sampling equipment with amended water[7]; scrubbed as necessary to remove dirt, grime, grease, and oil;
- Rinsed with de-ionized water; and
- Double rinsed with de-ionized water.

Reading of combustible headspace vapours were also collected from the top of the well immediately after the well seal (j-plug) had been removed using a flame ionization detector (Eagle RKI).

As in previous years, porewater samples were collected during low and mid tides when the Foreshore Site is above water. Although desirable to collect the porewater samples during a falling tide, in some cases, due to the short tidal window, a few samples were also collected during a slack tide.

Porewater samples were collected from each monitoring well using dedicated high-density polyethylene and silicone tubing attached to a peristaltic pump, to ensure minimal entrainment of silt in the sample as well as minimal losses of volatile constituents. Prior to sample collection, field parameters including pH, temperature, electrical conductivity, salinity, TDS, ORP, DO, and turbidity were monitored through an approximately 500 mL flow-through cell and documented. Field parameters were recorded once a minimum of one flow-through cell volume (~500 mL) had been removed from the well and parameters had been deemed sufficiently stable by AECOM personnel. During purging and sample collection, care was taken to remove water from near the top of the water column to minimize any disturbance and subsequent entrainment of solids near the base of the well.

[7] Amended water is a 0.5% solution of an environmentally friendly cleaner labelled Liquinox and de-ionized water.

Appendix C
Regulatory Context

Regulatory Context

Several provincial and federal regulatory agencies share authority for assessing and managing contaminated sites in British Columbia (BC). The agencies that have regulatory power include Fisheries and Oceans Canada (DFO), Environment Canada (EC), and the BC Ministry of Environment and Climate Change Strategy (ENV). The Parkland Burnaby Refinery is a tenant of the Port of Vancouver (POV), and is, therefore, also under the jurisdiction of the POV. POV operates under the *Canada Marine Act* and is a responsible agency under the *Canadian Environmental Assessment Act*. The BC ENV has taken the lead role in reviewing the remediation of the contamination at the Foreshore Site.

Federal statutes and regulations that apply to the Foreshore area marine sediment include:

- Canadian Environmental Protection Act, 1999 (S.C. 1999, c.33) and associated regulations;
- Canada Marine Act, 1998 (S.C. 1998, c.10) and associated regulations; and,
- Fisheries Act (R.S.C. 1985, c. F-14) and associated regulations.

Provincial statues and regulations that apply to the management of soil, groundwater, sediment, and porewater quality include:

- BC Environmental Management Act (EMA) (S.B.C. 2003, c 53), effective July 8, 2004;
- Contaminates Sites Regulation (CSR), BC Reg. 375/96, effective April 1, 1997 (including Stage 13 amendments, February 1, 2021); and
- Hazardous Waste Regulation (HWR), BC Reg. 63/88, effective April 1, 1988 (including amendments up to B.C. Reg. 243/2016).

For surface water and porewater below the high-water mark, the BC ENV Approved and Working Water Quality Guidelines (WQG) for marine aquatic life apply.

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

Section 67 of the *Canadian Environmental Assessment Act, 2012* requires federal authorities to determine that projects will not likely cause significant adverse environmental effects (or, if a project is likely to cause significant adverse environmental effects, requires the Governor in Council to decide whether those effects are justified in the circumstances). The Project and Environmental Review (PER) process provides that assurance. The Port Authority also considers other interests, impacts, and mitigation measures through the PER process.

CANADIAN ENVIRONMENTAL PROTECTION ACT

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

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

CANADIAN MARINE ACT

- The *Canada Marine Act (CMA)* created Canadian Port Authorities. The CMA allows POV, under the Port Authorities Operations Regulations, to provide authorization to complete works within its jurisdiction. The Foreshore Site is located within the jurisdiction of POV.

FISHERIES ACT

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

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

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

CONTAMINATED SITES REGULATION

The CSR under the EMA is the principal regulatory document defining requirements for contaminated sites management in BC. The CSR came into effect on April 1, 1997; thirteen amendments to the CSR have been completed since 1997, with the most recent being the Stage 13, which came into effect on February 1, 2021. The EMA and CSR have provisions for both the numerical standards and risk-based standards approaches to managing site contamination. They outline the procedures for site assessment, remediation and application for environmental closure for a property. Numerical standards are key components of the requirements in the CSR as they define whether or not a site is contaminated. Land Remediation staff of the ENV currently oversee the ongoing investigation and remediation.

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

The CSR is simplified into four new schedules:

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

BC CSR PROTOCOL 11 UPPER CAP CONCENTRATIONS

This protocol sets the upper cap concentrations for substances with numerical standards in the CSR and which, when present in the exposure zone of soil, water, sediment, or vapour, could pose high risks to the environment or human health. If upper cap concentrations are exceeded, an analysis of exposure pathways, under Protocol 12, usually must be carried out to determine if a site is classified as high risk.

APPLICABLE SCREENING LEVELS FOR WATER

GROUNDWATER

In accordance with BC CSR Protocol 21, standards for the protection of drinking water are applicable at sites either where groundwater is currently used as a drinking water source (current use) or could be used as a drinking water source (future use).

Current drinking water use is applicable at sites where drinking water wells or surface water intakes are present within a radial distance of 500 m from the outer extent of the groundwater contamination source. If the groundwater flow direction is reliably known, the distance is refined to drinking water wells or surface water intakes located 100 metres upgradient and 500 metres downgradient of the outer extent of the contamination source.

Future drinking water use is applicable at sites where the hydraulic conductivity is greater than 1 x 10^{-6} metres per second (m/s), has a yield greater than or equal to 1.3 litres per minute and where the natural concentration of total dissolved solids is less than 4,000 milligrams per litre (mg/L). Future drinking water use is applicable at sites where a saturated unit exists at depth that meets the above criteria and does not have a protective five metre thick confining unit with a bulk hydraulic conductivity less than 1 x 10^{-7} m/s that is continuous and unfractured[8]. Saturated geological units that are located within 500 metres of a marine and estuarine foreshore are considered to have unsuitable water quality for domestic water supply. In accordance with BC CSR Protocol 21, future drinking water use does not apply to the Foreshore Site.

The Foreshore Site is located on the foreshore of Burrard Inlet, in the north part of Burnaby where all properties are connected to the municipal potable water supply. There are no known drinking water wells in the vicinity of the Foreshore Site; therefore, there is no current drinking water use at, or in the vicinity of the Foreshore Site.

A letter requesting a drinking water standards exemption for Area 2 of the Refinery, located up-gradient of the Foreshore Site, was submitted to the British Columbia Ministry of Environment and Climate Change Strategy on December 19, 2011, and re-submitted on November 9, 2012. The drinking water exemption was provided by the BC ENV on May 15, 2017.

Standards for aquatic life water use apply to all groundwater located within 500 m of a surface water body containing aquatic life unless groundwater at the Foreshore Site flows to another surface water body located greater than 500 m from the source. Standards for aquatic life water use also apply where there is the potential for contaminated groundwater to flow through preferential corridors that discharge directly to a surface water body containing marine or freshwater aquatic life.

POREWATER

The MoE's January 24, 2011 letter outlined the previous screening standards applied to the Foreshore Site for porewater regardless of the depth (BC WQG or where they do not exist, 1/10 of the Schedule 6 CSR aquatic life [AW] Marine standard – see below for further details). For simplicity, surface water screening followed the same procedure as porewater.

Since surface water and porewater sampling locations are at the Foreshore Site (within 10 m of the high-water mark), the water screening cannot assume the dilution factor used in the development of CSR groundwater standards. Concentrations of potential contaminants of concern (PCOCs) reported in surface water and porewater samples are currently screened against Ambient BC WQG for marine waters. For PCOCs where BC WQG do not exist, 1/10 of the Schedule 6 CSR AW Marine standards were used for screening purposes. For contaminants with no BC WQG or 1/10 CSR AW standard, a reference site approach was used with background concentrations used for screening as described in Protocol 9. The Reference Area for water samples was the PR2 sampling location (Figure 1). If the background concentrations did not fall within a single statistical population, conservative estimates were used. The reference water concentrations for many PCOCs are below their respective standard laboratory reporting limit. In these cases, the laboratory reporting limit from the reference locations was considered the reference standard and used for this screening. An exception in using the 1/10 of the CSR AW standard

[8] BC Ministry of Environment, 2010. Technical Guidance 6. Water Use Determination. Victoria, BC. http://www.env.gov.bc.ca/epd/remediation/guidance/technical/pdf/tg06.pd

as the reference concentration is for $LEPH_w$. Since $LEPH_w$ does not have BC WQG standard and the common laboratory reporting limit is five times greater than 1/10 CSR AW standard, the reference location laboratory detection limit was used for $LEPH_w$ screening.

SITE SPECIFIC STANDARDS

In their memorandum dated May 9, 2013, SLR Consulting Canada Ltd. (SLR) proposed harmonizing the two sets of screening levels, i.e. those standards previously described in this section and the screening levels proposed by SLR in the problem formulation report (SLR, 2011). The rationale supporting the updated screening levels is provided by SLR in their memorandum entitled *Updated Screening Levels (USLs) for Foreshore Monitoring* including an addendum included as an appendix within the Foreshore 2012 Second Semi-Annual Report (URS, 2013). The USLs were deemed satisfactory by the MoE in email correspondence to SLR on September 4, 2013 (MoE, 2013). The porewater and surface water samples in this report were screened against the updated SLR screening levels with the exception of HEPHw.

The MoE's June 21, 2013 letter indicated that HEPHw is not a regulated parameter under the CSR and is, therefore, not normally characterized or otherwise assessed for the regulatory purposes of the CSR in groundwater or porewater. Therefore, porewater and surface water samples in this report were not screened against a standard for HEPHw.

On February 27, 2014, SLR submitted a Human Health and Ecological Risk Assessment (HHERA) to determine Risk-Based Management Targets (RBMTs) for PCOCs associated with the Foreshore seeps. The RBMTs were developed to be protective of aquatic plants and invertebrates at the community level and fish at the population level. The HHERA did not find any significant risk to human health; therefore, RBMTs were not needed for human receptors. In the HHERA, SLR derived RBMTs for the following PHCs and PAHs: BTEX, benzo(a)pyrene, naphthalene, VPH_w, and $LEPH_w$. In the HHERA, SLR derived RBMTs for only two metals, copper and zinc, which were identified as porewater PCOCs for the Foreshore Site (SLR, 2014b).

Appendix D
Analytical Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A4673**	Page	: 1 of 10
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	: 60679830/15405	Date Samples Received	: 07-Mar-2022 18:40
PO	:	Date Analysis Commenced	: 09-Mar-2022
C-O-C number	: ----	Issue Date	: 22-Mar-2022 15:53
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM		
No. of samples received	: 18		
No. of samples analysed	: 18		

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*
Austin Wasylyshyn	Lab Analyst	Metals, Edmonton, Alberta
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dan Nguyen	Team Leader - Inorganics	Metals, Edmonton, Alberta
Daniel Nguyen	Lab Assistant	Metals, Edmonton, Alberta
Jeanie Mark	Laboratory Analyst	Organics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Maqsood Ul Hassan	Laboratory Analyst	Organics, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta

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 Unit
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*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-3_20220307|REG|GW	PW17-8_20220307|REG|GW	PW17-11_20220307|REG|GW	PW17-12_20220307|REG|GW	PW17-14_20220307|REG|GW
					Client sampling date / time	07-Mar-2022 16:04	07-Mar-2022 15:45	07-Mar-2022 16:11	07-Mar-2022 16:20	07-Mar-2022 15:50
						VA22A4673-001	VA22A4673-002	VA22A4673-003	VA22A4673-004	VA22A4673-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		4230	3290	3670	4290	2570
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	<0.00200 DLM
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0100 DLM	<0.0100 DLM	<0.0100 DLM	0.0166	<0.0100 DLM
dissolved metals filtration location	----	EP421	-	-		Field	Field	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
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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		94.3	97.2	95.8	89.5	106
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		110	108	105	107	106
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
VPHw	----	EC580A	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
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		91.3	93.8	94.3	93.6	91.7
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		106	110	82.3	100	115
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		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-3_20220307|REG|GW	PW17-8_20220307|REG|GW	PW17-11_20220307|REG|GW	PW17-12_20220307|REG|GW	PW17-14_20220307|REG|GW
					Client sampling date / time	07-Mar-2022 16:04	07-Mar-2022 15:45	07-Mar-2022 16:11	07-Mar-2022 16:20	07-Mar-2022 15:50
						VA22A4673-001	VA22A4673-002	VA22A4673-003	VA22A4673-004	VA22A4673-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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	<0.010	<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		<0.020	<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	%		111	77.0	93.2	86.0	91.8
naphthalene-d8	1146-65-2	E641A	0.1	%		96.5	96.8	92.6	103	93.2
phenanthrene-d10	1517-22-2	E641A	0.1	%		93.3	96.8	94.4	98.8	90.0

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-15_2022 0307|REG|GW	PW17-19_2022 0307|REG|GW	PW17-20_2022 0307|REG|GW	PW17-21_2022 0307|REG|GW	PW17-24_2022 0307|REG|GW
					Client sampling date / time	07-Mar-2022 15:51	07-Mar-2022 15:30	07-Mar-2022 15:20	07-Mar-2022 16:39	07-Mar-2022 15:18
						VA22A4673-006	VA22A4673-007	VA22A4673-008	VA22A4673-009	VA22A4673-010
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		4100	2590	3340	470	1350
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	0.00101	<0.00200 DLM
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0100 DLM	<0.0100 DLM	<0.0100 DLM	0.0010	<0.0100 DLM
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		<0.50	3.90	<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
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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		97.0	94.1	93.2	98.7	97.6
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		104	103	106	107	107
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
VPHw	----	EC580A	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
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		89.9	90.2	88.3	83.2	86.0
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		112	117	103	112	99.6
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		<0.010	<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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-15_2022 0307|REG|GW	PW17-19_2022 0307|REG|GW	PW17-20_2022 0307|REG|GW	PW17-21_2022 0307|REG|GW	PW17-24_2022 0307|REG|GW
					Client sampling date / time	07-Mar-2022 15:51	07-Mar-2022 15:30	07-Mar-2022 15:20	07-Mar-2022 16:39	07-Mar-2022 15:18
						VA22A4673-006	VA22A4673-007	VA22A4673-008	VA22A4673-009	VA22A4673-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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	<0.010	<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		<0.020	<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	%		93.3	99.6	82.4	75.0	77.8
naphthalene-d8	1146-65-2	E641A	0.1	%		89.7	90.3	84.9	72.0	99.8
phenanthrene-d10	1517-22-2	E641A	0.1	%		86.5	94.1	86.8	73.4	90.6

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-25_2022 0307|REG|GW	PW17-29_2022 0307|REG|GW	PW17-30_2022 0307|REG|GW	PW17-32_2022 0307|REG|GW	PW17-33_2022 0307|REG|GW
					Client sampling date / time	07-Mar-2022 15:11	07-Mar-2022 14:53	07-Mar-2022 15:00	07-Mar-2022 14:04	07-Mar-2022 14:24
						VA22A4673-011	VA22A4673-012	VA22A4673-013	VA22A4673-014	VA22A4673-015
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		4140	3140	3180	2000	2730
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	<0.00200 DLM	<0.00200 DLM
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0100 DLM	<0.0100 DLM	<0.0100 DLM	<0.0100 DLM	<0.0100 DLM
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		<0.50	6.99	<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
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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		111	93.4	91.8	95.6	106
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		110	110	107	107	96.7
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
VPHw	----	EC580A	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
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		88.7	86.3	87.9	85.6	83.8
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		116	101	118	117	99.2
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		<0.010	<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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-25_2022 0307|REG|GW	PW17-29_2022 0307|REG|GW	PW17-30_2022 0307|REG|GW	PW17-32_2022 0307|REG|GW	PW17-33_2022 0307|REG|GW
					Client sampling date / time	07-Mar-2022 15:11	07-Mar-2022 14:53	07-Mar-2022 15:00	07-Mar-2022 14:04	07-Mar-2022 14:24
						VA22A4673-011	VA22A4673-012	VA22A4673-013	VA22A4673-014	VA22A4673-015
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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	<0.010	<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		<0.020	<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	%		109	99.1	120	103	100
naphthalene-d8	1146-65-2	E641A	0.1	%		106	88.5	100	94.9	98.7
phenanthrene-d10	1517-22-2	E641A	0.1	%		97.5	86.3	96.2	92.1	89.0

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	R-Blank-1_20220307	Travel Blank-1_20220307	Travel Blank-2_20220307	----	----
					Client sampling date / time	07-Mar-2022 18:06	07-Mar-2022 18:11	07-Mar-2022 18:11	----	----
						VA22A4673-016	VA22A4673-017	VA22A4673-018	--------	--------
						Result	Result	Result	----	----
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		<0.50	----	----	----	----
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00020	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0010	----	----	----	----
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	----	----
ethylbenzene	100-41-4	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	0.50	µg/L		<0.50	<0.50	<0.50	----	----
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	----	----
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		104	90.0	93.8	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		109	107	107	----	----
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	<100	<100	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	<100	----	----
HEPHw	----	EC600A	250	µg/L		<250	----	----	----	----
LEPHw	----	EC600A	250	µg/L		<250	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		89.0	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		124	117	114	----	----
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	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	R-Blank-1_20220307	Travel Blank-1_20220307	Travel Blank-2_20220307	----	----
					Client sampling date / time	07-Mar-2022 18:06	07-Mar-2022 18:11	07-Mar-2022 18:11	----	----
						VA22A4673-016	VA22A4673-017	VA22A4673-018	--------	--------
						Result	Result	Result	----	----
Polycyclic Aromatic Hydrocarbons										
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		<0.010	----	----	----	----
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	%		98.9	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%		93.4	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		91.1	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A4673**	Page	: 1 of 15
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	: 60679830/15405	Date Samples Received	: 07-Mar-2022 18:40
PO	:	Issue Date	: 22-Mar-2022 15:53
C-O-C number	: ----		
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM		
No. of samples received	: 18		
No. of samples analysed	: 18		

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 Services 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 (nitric acid) PW17-11_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-12_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-14_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-15_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-3_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-8_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		09-Mar-2022	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-19_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	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
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-20_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-21_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-24_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-25_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-29_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-30_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-32_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-33_20220307|REG|GW	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) R-Blank-1_20220307	E421	07-Mar-2022	09-Mar-2022	----	----		10-Mar-2022	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) PW17-11_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-12_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-14_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-15_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-19_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-20_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-21_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-24_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-25_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	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) PW17-29_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-3_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-30_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-32_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-33_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-8_20220307|REG|GW	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) R-Blank-1_20220307	E601A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-11_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-12_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	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) PW17-14_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-15_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-19_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-20_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-21_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-24_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-25_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-29_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-3_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	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) PW17-30_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-32_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-8_20220307|REG|GW	E581.VH+F1	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) R-Blank-1_20220307	E581.VH+F1	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-1_20220307	E581.VH+F1	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-2_20220307	E581.VH+F1	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-33_20220307|REG|GW	E581.VH+F1	07-Mar-2022	21-Mar-2022	----	----		21-Mar-2022	14 days	14 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-11_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-12_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	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) PW17-14_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-15_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-19_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-20_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-21_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-24_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-25_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-29_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-3_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	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) PW17-30_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-32_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-33_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-8_20220307|REG|GW	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) R-Blank-1_20220307	E641A	07-Mar-2022	10-Mar-2022	14 days	3 days	✓	10-Mar-2022	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-11_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-12_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-14_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-15_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	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
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-19_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-20_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-21_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-24_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-25_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-29_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-3_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-30_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-32_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	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
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-8_20220307|REG|GW	E611A	07-Mar-2022	17-Mar-2022	----	----		17-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) R-Blank-1_20220307	E611A	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-1_20220307	E611A	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-2_20220307	E611A	07-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	12 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-33_20220307|REG|GW	E611A	07-Mar-2022	21-Mar-2022	----	----		21-Mar-2022	14 days	14 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	438410	3	20	15.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	427471	2	36	5.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	438411	3	19	15.7	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	428587	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	438410	3	20	15.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	427471	2	36	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	428586	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	438411	3	19	15.7	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	428587	1	19	5.2	5.0	✓
BTEX by Headspace GC-MS	E611A	438410	3	20	15.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	427471	2	36	5.5	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	428586	1	19	5.2	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	438411	3	19	15.7	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	438410	3	20	15.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	427471	2	36	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 Edmonton - 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 Calgary - 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 Calgary - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Calgary - 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 Calgary - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Edmonton - 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 Calgary - 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 Calgary - 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 Edmonton - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 Calgary - 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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane Extraction	EP601 Calgary - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A4673**	Page	: 1 of 10
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	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60679830/15405	Date Samples Received	: 07-Mar-2022 18:40
PO	:	Date Analysis Commenced	: 09-Mar-2022
C-O-C number	: ----	Issue Date	: 22-Mar-2022 15:53
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM		
No. of samples received	: 18		
No. of samples analysed	: 18		

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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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*
Austin Wasylyshyn	Lab Analyst	Metals, Edmonton, Alberta
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dan Nguyen	Team Leader - Inorganics	Metals, Edmonton, Alberta
Daniel Nguyen	Lab Assistant	Metals, Edmonton, Alberta
Jeanie Mark	Laboratory Analyst	Organics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Maqsood Ul Hassan	Laboratory Analyst	Organics, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta

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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage 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: 427471)											
EO2201453-002	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.0478	0.0471	1.43%	20%	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.221	0.217	1.63%	20%	----
Dissolved Metals (QC Lot: 427647)											
VA22A4659-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00030	0.00031	0.000009	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0044	0.0041	0.0003	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 435677)											
VA22A4673-001	PW17-3_20220307|REG|GW	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 437180)											
VA22A4673-016	R-Blank-1_20220307	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 438410)											
CG2203189-001	Anonymous	benzene	71-43-2	E611A	0.50	µg/L	5.78	5.67	1.99%	30%	----
		ethylbenzene	100-41-4	E611A	0.50	µg/L	16.8	15.6	7.56%	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	40.8	40.6	0.308%	30%	----
		xylene, m+p-	179601-23-1	E611A	0.40	µg/L	71.1	65.3	8.49%	30%	----
		xylene, o-	95-47-6	E611A	0.30	µg/L	48.9	47.2	3.71%	30%	----
Hydrocarbons (QC Lot: 435678)											
VA22A4673-001	PW17-3_20220307|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 437179)											
VA22A4673-016	R-Blank-1_20220307	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	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*
Hydrocarbons (QC Lot: 438411)											
VA22A4673-015	PW17-33_20220307|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	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: 427471)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 427647)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 435677)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 437180)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 438410)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 428587)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 435678)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 437179)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Hydrocarbons (QCLot: 438411)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 428586)						
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: 427471)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	108	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	103	80.0	120	----
Dissolved Metals (QCLot: 427647)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	110	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	111	80.0	120	----
Volatile Organic Compounds (QCLot: 435677)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	108	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	91.3	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	95.9	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	91.0	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	96.9	70.0	130	----
Volatile Organic Compounds (QCLot: 437180)									
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	85.5	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	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	92.3	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	92.3	70.0	130	----
Volatile Organic Compounds (QCLot: 438410)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	95.1	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	102	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	83.2	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	82.7	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	96.0	70.0	130	----
Hydrocarbons (QCLot: 428587)									
EPH (C10-C19)	----	E601A	250	µg/L	7719.3 µg/L	70.2	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3536.8 µg/L	76.2	70.0	130	----
Hydrocarbons (QCLot: 435678)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	76.8	70.0	130	----
Hydrocarbons (QCLot: 437179)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Hydrocarbons (QCLot: 437179) - continued									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	97.1	70.0	130	----
Hydrocarbons (QCLot: 438411)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	120	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 428586)									
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	96.1	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	92.0	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	92.0	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	92.7	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	99.4	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	103	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	97.2	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	96.0	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	104	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	93.0	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	90.0	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	111	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	107	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
Dissolved Metals (QCLot: 427471)										
FC2200379-002	Anonymous	copper, dissolved	7440-50-8	E421	0.0178 mg/L	0.02 mg/L	88.9	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.397 mg/L	0.4 mg/L	99.3	70.0	130	----
Dissolved Metals (QCLot: 427647)										
VA22A4659-002	Anonymous	copper, dissolved	7440-50-8	E421	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		zinc, dissolved	7440-66-6	E421	0.408 mg/L	0.4 mg/L	102	70.0	130	----
Volatile Organic Compounds (QCLot: 435677)										
VA22A4673-001	PW17-3_20220307|REG|GW	benzene	71-43-2	E611A	129 µg/L	100 µg/L	129	70.0	130	----
		ethylbenzene	100-41-4	E611A	103 µg/L	100 µg/L	103	70.0	130	----
		styrene	100-42-5	E611A	107 µg/L	100 µg/L	107	70.0	130	----
		toluene	108-88-3	E611A	112 µg/L	100 µg/L	112	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	200 µg/L	200 µg/L	100	70.0	130	----
		xylene, o-	95-47-6	E611A	108 µg/L	100 µg/L	108	70.0	130	----
Volatile Organic Compounds (QCLot: 437180)										
VA22A4673-016	R-Blank-1_20220307	benzene	71-43-2	E611A	110 µg/L	100 µg/L	110	70.0	130	----
		ethylbenzene	100-41-4	E611A	98.6 µg/L	100 µg/L	98.6	70.0	130	----
		styrene	100-42-5	E611A	110 µg/L	100 µg/L	110	70.0	130	----
		toluene	108-88-3	E611A	105 µg/L	100 µg/L	105	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	201 µg/L	200 µg/L	101	70.0	130	----
		xylene, o-	95-47-6	E611A	106 µg/L	100 µg/L	106	70.0	130	----
Volatile Organic Compounds (QCLot: 438410)										
VA22A4673-015	PW17-33_20220307|REG|GW	benzene	71-43-2	E611A	106 µg/L	100 µg/L	106	70.0	130	----
		ethylbenzene	100-41-4	E611A	105 µg/L	100 µg/L	105	70.0	130	----
		styrene	100-42-5	E611A	83.3 µg/L	100 µg/L	83.3	70.0	130	----
		toluene	108-88-3	E611A	95.1 µg/L	100 µg/L	95.1	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	212 µg/L	200 µg/L	106	70.0	130	----
		xylene, o-	95-47-6	E611A	99.8 µg/L	100 µg/L	99.8	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Leslie Southern
Phone:	604-444-6608
	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	leslie.southern@aecom.com
Email 2	justin.becker@aecom.com
Email 3	Darren.Schultz@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	leslie.southern@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 #: 66079930 / 15405
PO / AFE:
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: DS, RC, SC, JB

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	P LEPH, benzo(a)pyrene, naphthalene	F/P Dissolved Copper/Dissolved Zinc	Hardness (all metals samples)	Brackish Water	S ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-3_20220307	07-Mar-22	16:09	water	5	✓	✓	✓	✓	✓			
	PW17-8_20220307	07-Mar-22	15:45	water	5	✓	✓	✓	✓	✓			
	PW17-11_20220307	07-Mar-22	16:11	water	5	✓	✓	✓	✓	✓			
	PW17-12_20220307	07-Mar-22	16:20	water	5	✓	✓	✓	✓	✓			
	PW17-14_20220307	07-Mar-22	15:50	water	5	✓	✓	✓	✓	✓			
	PW17-15_20220307	07-Mar-22	15:51	water	5	✓	✓	✓	✓	✓			
	PW17-19_20220307	07-Mar-22	15:30	water	5	✓	✓	✓	✓	✓			
	PW17-20_20220307	07-Mar-22	15:20	water	5	✓	✓	✓	✓	✓			
	PW17-21_20220307	07-Mar-22	16:39	water	5	✓	✓	✓	✓				
	PW17-24_20220307	07-Mar-22	15:18	water	5	✓	✓	✓	✓	✓			
	PW17-25_20220307	07-Mar-22	15:11	water	5	✓	✓	✓	✓	✓			
	PW17-29_20220307	07-Mar-22	14:53	water	5	✓	✓	✓	✓	✓			

Environmental Division
Vancouver
Work Order Reference
VA22A4673

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)

T-2: R-Blank-1, 8, 12, 21, 11, 3

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			
				5.50			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Darren Schultz	March 7	18:45

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DJS	Mar 7, 2022	6:40 pm

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: 20 -

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:	Leslie Southern
Phone:	604-444-6608
	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: leslie.southern@aecom.com
Email 2: justin.becker@aecom.com
Email 3: Darren.Schultz@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: leslie.southern@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 #: 60674930 / 15405
PO / AFE:
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: DS, RS, JC, JJB

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	P LEPH, benzo(a)pyrene, napthalene	F/P Dissolved Copper/Dissolved Zinc	Hardness (all metals samples)	Brackish Water	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-30_20220307	07-Mar-22	15:00	water	5	✓	✓	✓	✓	✓			
	PW17-32_20220307	07-Mar-22	14:04	water	5	✓	✓	✓	✓	✓			
	PW17-33_20220307	07-Mar-22	14:24	water	5	✓	✓	✓	✓	✓			
	R-blank-1_20220307	07-Mar-22	18:06	water	5	✓	✓	✓	✓				
	T-blank-1_20220307	07-Mar-22	18:11	water	1	✓							
	T-blank-2_20220307	07-Mar-22	18:11	water	1	✓							

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)

T-1: 15, 20, 29, 14, 19, 24, 33, 30, 25, 32

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			
				5.5°			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Darren Schultz	March 7	19:45

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
DJJ	Mar. 7 2022	6:00 p.

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.**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A4919**	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 BC Canada V5A 1W9
Telephone	: (604) 444-6400	Telephone	: +1 604 253 4188
Project	: 60679830/15405	Date Samples Received	: 09-Mar-2022 16:50
PO	: 4222178	Date Analysis Commenced	: 14-Mar-2022
C-O-C number	: ----	Issue Date	: 21-Apr-2022 17:16
Sampler	: DS, 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*
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Jeanie Mark	Laboratory Analyst	Organics, Calgary, Alberta
Kelsey Schaefer	Lab Analyst	Organics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta
Victoria Piguing	Laboratory Analyst	Organics, Calgary, Alberta

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 Unit
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

Additional PAHs added.

Qualifiers

Qualifier	*Description*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-22_2022 0309|REG|GW	PW17-23_2022 0309|REG|GW	PW17-26_2022 0309|REG|GW	PW17-27_2022 0309|REG|GW	PW17-28_2022 0309|REG|GW
					Client sampling date / time	09-Mar-2022 14:25	09-Mar-2022 14:34	09-Mar-2022 13:40	09-Mar-2022 14:45	09-Mar-2022 15:12
						VA22A4919-001	VA22A4919-002	VA22A4919-003	VA22A4919-004	VA22A4919-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		636	151	42.4	118	418
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		0.00183	<0.00100 DLDS	<0.00100 DLDS	0.00131	<0.00100 DLDS
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS	<0.0050 DLDS
dissolved metals filtration location	----	EP421	-	-		Field	Field	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
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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		85.6	80.5	75.7	81.8	84.1
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		91.7	91.9	93.8	93.1	92.4
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	<100	<100	<100
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	<100
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		82.1	74.8	83.6	76.5	85.8
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		87.1	90.6	103	95.3	94.0
Polycyclic Aromatic Hydrocarbons										
benzo(e)pyrene	192-97-2	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
methylnaphthalene, 1+2-	----	E641A	0.015	µg/L		<0.015	<0.015	<0.015	<0.015	<0.015
perylene	198-55-0	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010
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		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-22_2022 0309|REG|GW	PW17-23_2022 0309|REG|GW	PW17-26_2022 0309|REG|GW	PW17-27_2022 0309|REG|GW	PW17-28_2022 0309|REG|GW
					Client sampling date / time	09-Mar-2022 14:25	09-Mar-2022 14:34	09-Mar-2022 13:40	09-Mar-2022 14:45	09-Mar-2022 15:12
						VA22A4919-001	VA22A4919-002	VA22A4919-003	VA22A4919-004	VA22A4919-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
anthracene	120-12-7	E641A	0.010	µg/L		<0.010	<0.010	0.012	<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	<0.010	<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		<0.020	<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
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	%		98.3	94.6	100	93.5	95.7
naphthalene-d8	1146-65-2	E641A	0.1	%		105	97.2	104	98.8	103
phenanthrene-d10	1517-22-2	E641A	0.1	%		109	101	104	105	108

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	DUP-3_20220309|FB|GW	TRAVEL BLANK-3_20220306	----	----	----
					Client sampling date / time	09-Mar-2022 13:40	09-Mar-2022 16:20	----	----	----
						VA22A4919-006	VA22A4919-007	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		42.0	----	----	----	----
Dissolved Metals										
copper, dissolved	7440-50-8	E421	0.00020	mg/L		<0.00100 DLDS	----	----	----	----
zinc, dissolved	7440-66-6	E421	0.0010	mg/L		<0.0050 DLDS	----	----	----	----
dissolved metals filtration location	----	EP421	-	-		Field	----	----	----	----
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	----	----	----
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	0.50	µg/L		<0.50	<0.50	----	----	----
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		77.4	103	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		93.0	98.4	----	----	----
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	----	----	----
LEPHw	----	EC600A	250	µg/L		<250	----	----	----	----
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		81.4	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		94.6	95.8	----	----	----
Polycyclic Aromatic Hydrocarbons										
benzo(e)pyrene	192-97-2	E641A	0.010	µg/L		<0.010	----	----	----	----
methylnaphthalene, 1+2-	----	E641A	0.015	µg/L		<0.015	----	----	----	----
perylene	198-55-0	E641A	0.010	µg/L		<0.010	----	----	----	----
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	----	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	DUP-3_20220309|FB|GW	TRAVEL BLANK-3_20220306	----	----	----
					Client sampling date / time	09-Mar-2022 13:40	09-Mar-2022 16:20	----	----	----
						VA22A4919-006	VA22A4919-007	--------	--------	--------
						Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons										
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		<0.010	----	----	----	----
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 (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	----	----	----	----
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		91.8	----	----	----	----
naphthalene-d8	1146-65-2	E641A	0.1	%		96.9	----	----	----	----
phenanthrene-d10	1517-22-2	E641A	0.1	%		99.1	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A4919**	Page	: 1 of 9
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	: 60679830/15405	Date Samples Received	: 09-Mar-2022 16:50
PO	: 4222178	Issue Date	: 21-Apr-2022 17:16
C-O-C number	: ----		
Sampler	: DS, 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 Services 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 (nitric acid) DUP-3_20220309|FB|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-22_20220309|REG|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-23_20220309|REG|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-26_20220309|REG|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-27_20220309|REG|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid) PW17-28_20220309|REG|GW	E421	09-Mar-2022	22-Mar-2022	----	----		23-Mar-2022	180 days	14 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) TRAVEL BLANK-3_20220306	E581.VH+F1	09-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	14 days	14 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-3_20220309|FB|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-22_20220309|REG|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-23_20220309|REG|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-26_20220309|REG|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-27_20220309|REG|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-28_20220309|REG|GW	E581.VH+F1	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-22_20220309|REG|GW	E641A	09-Mar-2022	21-Mar-2022	14 days	12 days	✓	21-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-23_20220309|REG|GW	E641A	09-Mar-2022	21-Mar-2022	14 days	12 days	✓	21-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-3_20220309|FB|GW	E641A	09-Mar-2022	22-Mar-2022	14 days	13 days	✓	22-Mar-2022	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)										
PW17-26_20220309|REG|GW	E641A	09-Mar-2022	22-Mar-2022	14 days	13 days	✓	22-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-27_20220309|REG|GW	E641A	09-Mar-2022	22-Mar-2022	14 days	13 days	✓	22-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-28_20220309|REG|GW	E641A	09-Mar-2022	22-Mar-2022	14 days	13 days	✓	22-Mar-2022	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
TRAVEL BLANK-3_20220306	E611A	09-Mar-2022	23-Mar-2022	----	----		23-Mar-2022	14 days	14 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-3_20220309|FB|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-22_20220309|REG|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-23_20220309|REG|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-26_20220309|REG|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-27_20220309|REG|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	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)										
PW17-28_20220309|REG|GW	E611A	09-Mar-2022	14-Mar-2022	----	----		14-Mar-2022	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	440283	2	7	28.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	439506	1	15	6.6	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	432205	2	7	28.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	439663	3	27	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	440283	2	7	28.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	439506	1	15	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	439662	3	24	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	432205	2	7	28.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	439663	3	27	11.1	5.0	✓
BTEX by Headspace GC-MS	E611A	440283	2	7	28.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	439506	1	15	6.6	5.0	✓
PAHs by Hexane LVI GC-MS	E641A	439662	3	24	12.5	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	432205	2	7	28.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	440283	2	7	28.5	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	439506	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 Calgary - 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 Calgary - 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 Calgary - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Calgary - 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 Calgary - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Calgary - 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 Calgary - 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 Calgary - 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 Calgary - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 Calgary - 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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane Extraction	EP601 Calgary - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A4919**	Page	: 1 of 10
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	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60679830/15405	Date Samples Received	: 09-Mar-2022 16:50
PO	: 4222178	Date Analysis Commenced	: 14-Mar-2022
C-O-C number	: ----	Issue Date	: 21-Apr-2022 17:16
Sampler	: DS, 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 Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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*
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Metals, Calgary, Alberta
Jeanie Mark	Laboratory Analyst	Organics, Calgary, Alberta
Kelsey Schaefer	Lab Analyst	Organics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Nguyen Tran	Laboratory Analyst	Organics, Calgary, Alberta
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta
Victoria Piguing	Laboratory Analyst	Organics, Calgary, Alberta

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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage 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: 439506)											
VA22A4847-001	Anonymous	copper, dissolved	7440-50-8	E421	0.00020	mg/L	0.00040	0.00041	0.000006	Diff <2x LOR	----
		zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 432206)											
VA22A4919-001	PW17-22_20220309|REG|GW	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 440283)											
VA22A4919-007	TRAVEL BLANK-3_20220306	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 432205)											
VA22A4919-001	PW17-22_20220309|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 440282)											
VA22A4919-007	TRAVEL BLANK-3_20220306	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	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: 439506)						
copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 432206)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 440283)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 432205)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 440282)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 437712)						
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(e)pyrene	192-97-2	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: 437712) - 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	----
perylene	198-55-0	E641A	0.01	µg/L	<0.010	----
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: 438960)						
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(e)pyrene	192-97-2	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	----
perylene	198-55-0	E641A	0.01	µg/L	<0.010	----
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: 439662)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 439662) - continued						
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(e)pyrene	192-97-2	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	----
perylene	198-55-0	E641A	0.01	µg/L	<0.010	----
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: 439506)									
copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	96.0	80.0	120	----
zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	95.5	80.0	120	----
Volatile Organic Compounds (QCLot: 432206)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	121	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	75.7	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	88.4	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	89.0	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	90.5	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	81.7	70.0	130	----
Volatile Organic Compounds (QCLot: 440283)									
benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	106	70.0	130	----
ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	110	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	94.9	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	94.6	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	104	70.0	130	----
Hydrocarbons (QCLot: 432205)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	96.0	70.0	130	----
Hydrocarbons (QCLot: 440282)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	126	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 437712)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	124	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	124	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	95.7	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	103	60.0	130	----
benzo(e)pyrene	192-97-2	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	91.1	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	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 Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 437712) - continued									
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	99.2	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	114	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	112	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	92.3	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	89.6	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	91.7	50.0	130	----
perylene	198-55-0	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	91.8	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	126	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 438960)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	83.4	60.0	130	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	81.3	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	89.3	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	87.1	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	80.8	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	93.7	60.0	130	----
benzo(e)pyrene	192-97-2	E641A	0.01	µg/L	0.5 µg/L	99.2	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	94.0	60.0	130	----
chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	97.2	60.0	130	----
dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	96.3	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	99.1	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	92.9	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	89.8	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	70.7	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	71.4	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	81.3	50.0	130	----
perylene	198-55-0	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	101	60.0	130	----
pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	95.7	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 439662)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	85.4	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: 439662) - continued									
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	85.4	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	95.9	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	92.3	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
benzo(e)pyrene	192-97-2	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	93.5	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	97.2	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	94.7	60.0	130	----
fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	99.9	60.0	130	----
fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	93.2	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	99.9	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	84.5	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	95.4	60.0	130	----
naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	73.1	50.0	130	----
perylene	198-55-0	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	100	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	87.0	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: 439506)										
VA22A4847-002	Anonymous	copper, dissolved	7440-50-8	E421	0.179 mg/L	0.2 mg/L	89.3	70.0	130	----
		zinc, dissolved	7440-66-6	E421	3.66 mg/L	4 mg/L	91.4	70.0	130	----
Volatile Organic Compounds (QCLot: 432206)										
VA22A4919-001	PW17-22_20220309|REG|GW	benzene	71-43-2	E611A	119 µg/L	100 µg/L	119	70.0	130	----
		ethylbenzene	100-41-4	E611A	83.2 µg/L	100 µg/L	83.2	70.0	130	----
		styrene	100-42-5	E611A	85.9 µg/L	100 µg/L	85.9	70.0	130	----
		toluene	108-88-3	E611A	95.8 µg/L	100 µg/L	95.8	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	198 µg/L	200 µg/L	98.9	70.0	130	----
		xylene, o-	95-47-6	E611A	80.8 µg/L	100 µg/L	80.8	70.0	130	----
Volatile Organic Compounds (QCLot: 440283)										
VA22A4919-007	TRAVEL BLANK-3_20220306	benzene	71-43-2	E611A	101 µg/L	100 µg/L	101	70.0	130	----
		ethylbenzene	100-41-4	E611A	103 µg/L	100 µg/L	103	70.0	130	----
		styrene	100-42-5	E611A	89.1 µg/L	100 µg/L	89.1	70.0	130	----
		toluene	108-88-3	E611A	88.8 µg/L	100 µg/L	88.8	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	208 µg/L	200 µg/L	104	70.0	130	----
		xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

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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:	Leslie Southern
Phone:	604-444-6608
	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	leslie.southern@aecom.com
Email 2	justin.becker@aecom.com
Email 3	Darren.Schultz@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	leslie.southern@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 #:	606 79930 / 15405
PO / AFE:	
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): 4919

ALS Contact: Dean Watt

Sampler: DS, RS

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	LEPH, benzo(a)pyrene, naphthalene P	Dissolved Copper/Dissolved Zinc F/P	Hardness (all metals samples)	Brackish Water	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
1	PW17-22_20220309	09-Mar-22	14:25	PW	5	✓	✓	✓	✓				
2	PW17-23_20220309	09-Mar-22	14:34	PW	5	✓	✓	✓	✓				
3	PW17-26_20220309	09-Mar-22	13:40	PW	5	✓	✓	✓	✓				
4	PW17-27_20220309	09-Mar-22	14:45	PW	5	✓	✓	✓	✓				
5	PW17-28_20220309	09-Mar-22	15:12	PW	5	✓	✓	✓	✓				
6	DUP-3_20220309	09-Mar-22	13:40	PW	5	✓	✓	✓	✓				
7	T-Blank-3_20220309	09-Mar-22	16:20	~~Ety~~ WATER	1	✓							

Environmental Division
Vancouver
Work Order Reference
VA22A4919

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)

No MTBE
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			
				2	2		

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Darren Schultz	March 9, 2022	17:15

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	MAR 09	16:50

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**.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22A4771**	Page	: 1 of 9
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	: 60679830/15405	Date Samples Received	: 08-Mar-2022 17:30
PO	:	Date Analysis Commenced	: 14-Mar-2022
C-O-C number	: ----	Issue Date	: 14-Apr-2022 17:23
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 17		
No. of samples analysed	: 17		

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
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Christopher Li	Lab Assistant	Metals, Burnaby, British Columbia
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta
Victoria Piguing	Laboratory Analyst	Organics, Calgary, Alberta

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 Unit
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

Metals by Cu, Zn, Ca & Mg added by HMI. Cu & Mg added as required for Hardness calculation.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-1_20220308|REG|GW	PW17-2_20220308|REG|GW	PW17-4_20220308|REG|GW	PW17-5_20220308|REG|GW	PW17-6_20220308|REG|GW
					Client sampling date / time	08-Mar-2022 13:51	08-Mar-2022 13:55	08-Mar-2022 14:11	08-Mar-2022 14:41	08-Mar-2022 14:20
						VA22A4771-001	VA22A4771-002	VA22A4771-003	VA22A4771-004	VA22A4771-005
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		2710	3700	2440	1260	2600
Dissolved Metals										
calcium, dissolved	7440-70-2	E469S	1000	µg/L		188000	294000	172000	92700	227000
copper, dissolved	7440-50-8	E469S	0.20	µg/L		0.43	0.45	<0.20	1.48	<0.20
magnesium, dissolved	7439-95-4	E469S	1000	µg/L		493000	648000	448000	219000	447000
zinc, dissolved	7440-66-6	E469S	1.0	µg/L		1.6	<1.0	<1.0	<1.0	<1.0
dissolved metals filtration location	----	EP421	-	-		Field	Field	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
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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		108	112	109	111	110
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		97.4	97.9	97.6	97.9	97.4
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
VPHw	----	EC580A	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
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		86.9	89.2	91.8	93.9	87.4
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		110	102	112	96.8	104
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	<0.010

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-1_20220308|REG|GW	PW17-2_20220308|REG|GW	PW17-4_20220308|REG|GW	PW17-5_20220308|REG|GW	PW17-6_20220308|REG|GW
					Client sampling date / time	08-Mar-2022 13:51	08-Mar-2022 13:55	08-Mar-2022 14:11	08-Mar-2022 14:41	08-Mar-2022 14:20
						VA22A4771-001	VA22A4771-002	VA22A4771-003	VA22A4771-004	VA22A4771-005
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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		<0.010	<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	<0.010	<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		<0.020	<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	%		100	91.4	105	96.9	107
naphthalene-d8	1146-65-2	E641A	0.1	%		84.0	80.4	89.0	83.4	95.4
phenanthrene-d10	1517-22-2	E641A	0.1	%		97.4	89.0	104	96.0	108

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-7_20220308|REG|GW	PW17-9_20220308|REG|GW	PW17-10_20220308|REG|GW	PW17-13_20220308|REG|GW	PW17-16_20220308|REG|GW
					Client sampling date / time	08-Mar-2022 14:40	08-Mar-2022 13:30	08-Mar-2022 14:23	08-Mar-2022 13:22	08-Mar-2022 15:17
						VA22A4771-006	VA22A4771-007	VA22A4771-008	VA22A4771-009	VA22A4771-010
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		2720	2090	3700	1840	171
Dissolved Metals										
calcium, dissolved	7440-70-2	E469S	1000	µg/L		221000	168000	302000	137000	27200
copper, dissolved	7440-50-8	E469S	0.20	µg/L		0.31	0.42	0.60	1.68	<0.20
magnesium, dissolved	7439-95-4	E469S	1000	µg/L		487000	390000	766000	342000	24200
zinc, dissolved	7440-66-6	E469S	1.0	µg/L		<1.0	<1.0	1.6	1.8	<1.0
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	3.41
ethylbenzene	100-41-4	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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		100	111	110	111	106
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		98.3	97.8	97.3	97.4	97.8
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		<250	<250	<250	<250	330
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	280
VPHw	----	EC580A	100	µg/L		<100	<100	<100	<100	280
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	330
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		82.9	78.6	83.6	83.2	79.6
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		77.4	99.4	93.8	98.9	85.0
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.167
acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	<0.010	0.019

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-7_20220308|REG|GW	PW17-9_20220308|REG|GW	PW17-10_20220308|REG|GW	PW17-13_20220308|REG|GW	PW17-16_20220308|REG|GW
					Client sampling date / time	08-Mar-2022 14:40	08-Mar-2022 13:30	08-Mar-2022 14:23	08-Mar-2022 13:22	08-Mar-2022 15:17
						VA22A4771-006	VA22A4771-007	VA22A4771-008	VA22A4771-009	VA22A4771-010
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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		<0.010	<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	0.197
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	0.233
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		<0.020	<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	0.383
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	<0.065	0.383
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		91.4	92.4	97.5	94.1	101
naphthalene-d8	1146-65-2	E641A	0.1	%		84.2	83.6	89.0	91.0	93.3
phenanthrene-d10	1517-22-2	E641A	0.1	%		92.7	94.4	101	102	95.4

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-17_2022 0308|REG|GW	PW17-18_2022 0308|REG|GW	R-Blank-2_2022 0308|REG|GW	DUP-2_202203 08|FD|GW	DUP-1_202203 08|FD|GW
					Client sampling date / time	08-Mar-2022 15:13	08-Mar-2022 15:18	08-Mar-2022 16:44	08-Mar-2022 15:17	08-Mar-2022 14:11
						VA22A4771-011	VA22A4771-012	VA22A4771-013	VA22A4771-014	VA22A4771-015
						Result	Result	Result	Result	Result
Physical Tests										
hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L		186	1880	<0.50	158	2560
Dissolved Metals										
calcium, dissolved	7440-70-2	E469S	1000	µg/L		30800	280000	<1000	27300	173000
copper, dissolved	7440-50-8	E469S	0.20	µg/L		<0.20	0.35	<0.20	<0.20	<0.20
magnesium, dissolved	7439-95-4	E469S	1000	µg/L		25900	322000	<1000	23400	436000
zinc, dissolved	7440-66-6	E469S	1.0	µg/L		1.6	6.3	<1.0	<1.0	<1.0
dissolved metals filtration location	----	EP421	-	-		Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]										
benzene	71-43-2	E611A	0.50	µg/L		1.83	<0.50	<0.50	3.72	<0.50
ethylbenzene	100-41-4	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	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	<0.50	<0.50	<0.50
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	<0.75	<0.75	<0.75
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		104	93.0	98.8	103	111
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		97.4	98.6	97.1	97.5	96.8
Hydrocarbons										
EPH (C10-C19)	----	E601A	250	µg/L		250	<250	<250	320	<250
EPH (C19-C32)	----	E601A	250	µg/L		<250	<250	<250	<250	<250
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		140	<100	<100	260	<100
VPHw	----	EC580A	100	µg/L		140	<100	<100	260	<100
HEPHw	----	EC600A	250	µg/L		<250	<250	<250	<250	<250
LEPHw	----	EC600A	250	µg/L		250	<250	<250	320	<250
Hydrocarbons Surrogates										
bromobenzotrifluoride, 2- (EPH surr)	392-83-6	E601A	1.0	%		88.0	88.6	84.6	86.5	84.1
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		97.7	90.4	99.4	86.5	97.5
Polycyclic Aromatic Hydrocarbons										
acenaphthene	83-32-9	E641A	0.010	µg/L		<0.010	<0.010	<0.010	0.163	<0.010
acenaphthylene	208-96-8	E641A	0.010	µg/L		<0.010	<0.010	<0.010	0.018	<0.010

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	PW17-17_2022 0308|REG|GW	PW17-18_2022 0308|REG|GW	R-Blank-2_2022 0308|REG|GW	DUP-2_202203 08|FD|GW	DUP-1_202203 08|FD|GW
					Client sampling date / time	08-Mar-2022 15:13	08-Mar-2022 15:18	08-Mar-2022 16:44	08-Mar-2022 15:17	08-Mar-2022 14:11
						VA22A4771-011	VA22A4771-012	VA22A4771-013	VA22A4771-014	VA22A4771-015
						Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons										
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		<0.010	<0.010	<0.010	<0.010	<0.010
fluorene	86-73-7	E641A	0.010	µg/L		<0.010	<0.010	<0.010	0.185	<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	0.229	<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		<0.020	<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	0.366	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L		<0.065	<0.065	<0.065	0.366	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates										
chrysene-d12	1719-03-5	E641A	0.1	%		92.2	95.8	81.0	92.7	83.2
naphthalene-d8	1146-65-2	E641A	0.1	%		90.1	93.2	79.5	92.4	79.1
phenanthrene-d10	1517-22-2	E641A	0.1	%		90.9	99.3	85.5	87.9	85.2

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	Travel Blank-3_20220308	Travel Blank-4_20220308	----	----	----
					Client sampling date / time	08-Mar-2022 16:54	08-Mar-2022 16:54	----	----	----
						VA22A4771-016	VA22A4771-017	--------	--------	--------
						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	----	----	----
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	0.50	µg/L		<0.50	<0.50	----	----	----
xylene, o-	95-47-6	E611A	0.50	µg/L		<0.50	<0.50	----	----	----
xylenes, total	1330-20-7	E611A	0.75	µg/L		<0.75	<0.75	----	----	----
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	460-00-4	E611A	1.0	%		102	95.3	----	----	----
difluorobenzene, 1,4-	540-36-3	E611A	1.0	%		97.7	108	----	----	----
Hydrocarbons										
VHw (C6-C10)	----	E581.VH+F1	100	µg/L		<100	<100	----	----	----
VPHw	----	EC580A	100	µg/L		<100	<100	----	----	----
Hydrocarbons Surrogates										
dichlorotoluene, 3,4-	97-75-0	E581.VH+F1	1.0	%		92.6	114	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A4771**	Page	: 1 of 14
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	: 60679830/15405	Date Samples Received	: 08-Mar-2022 17:30
PO	:	Issue Date	: 14-Apr-2022 17:23
C-O-C number	: ----		
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 17		
No. of samples analysed	: 17		

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 Services 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
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) DUP-1_20220308|FD|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-1_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-13_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-2_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-4_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-5_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-6_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 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
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-7_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-9_20220308|REG|GW	E469S	08-Mar-2022	05-Apr-2022	----	----		05-Apr-2022	180 days	28 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) DUP-2_20220308|FD|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-10_20220308|REG|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-16_20220308|REG|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-17_20220308|REG|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) PW17-18_20220308|REG|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Dissolved Metals : Dissolved Metals in Seawater by CRC ICPMS (HMI)										
HDPE dissolved (nitric acid) R-Blank-2_20220308|REG|GW	E469S	08-Mar-2022	11-Apr-2022	----	----		13-Apr-2022	180 days	36 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-1_20220308|FD|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	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) DUP-2_20220308|FD|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-1_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-10_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-13_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-16_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-17_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-18_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-2_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-4_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	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)										
PW17-5_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-6_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-7_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-9_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
R-Blank-2_20220308|REG|GW	E601A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-1_20220308|FD|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-2_20220308|FD|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-1_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-10_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	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) PW17-13_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-16_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-17_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-18_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-2_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-4_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-5_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-6_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-7_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	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) PW17-9_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) R-Blank-2_20220308|REG|GW	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-3_20220308	E581.VH+F1	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-4_20220308	E581.VH+F1	08-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	14 days	11 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-1_20220308|FD|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-2_20220308|FD|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-1_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-10_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-13_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	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) PW17-16_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-17_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-18_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-2_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-4_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-5_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-6_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-7_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-9_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	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)										
R-Blank-2_20220308|REG|GW	E641A	08-Mar-2022	14-Mar-2022	14 days	6 days	✓	14-Mar-2022	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-1_20220308|FD|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-2_20220308|FD|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-1_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-10_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-13_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-16_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-17_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-18_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	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
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-2_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-4_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-5_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-6_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-7_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-9_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) R-Blank-2_20220308|REG|GW	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-3_20220308	E611A	08-Mar-2022	18-Mar-2022	----	----		18-Mar-2022	14 days	10 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-4_20220308	E611A	08-Mar-2022	19-Mar-2022	----	----		19-Mar-2022	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	437180	2	20	10.0	5.0	✓
Dissolved Metals in Seawater by CRC ICPMS (HMI)	E469S	455398	2	15	13.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	432051	0	0	0.0	5.0	✗
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	455399	0	0	0.0	5.0	✗
VH and F1 by Headspace GC-FID	E581.VH+F1	437179	2	20	10.0	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	431738	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	437180	2	20	10.0	5.0	✓
Dissolved Metals in Seawater by CRC ICPMS (HMI)	E469S	455398	2	15	13.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	432051	0	0	0.0	5.0	✗
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	455399	0	0	0.0	5.0	✗
PAHs by Hexane LVI GC-MS	E641A	431737	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	437179	2	20	10.0	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	431738	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	437180	2	20	10.0	5.0	✓
Dissolved Metals in Seawater by CRC ICPMS (HMI)	E469S	455398	2	15	13.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	432051	0	0	0.0	5.0	✗
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	455399	0	0	0.0	5.0	✗
PAHs by Hexane LVI GC-MS	E641A	431737	1	17	5.8	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	437179	2	20	10.0	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	437180	2	20	10.0	5.0	✓
Dissolved Metals in Seawater by CRC ICPMS (HMI)	E469S	455398	2	15	13.3	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	432051	0	0	0.0	5.0	✗
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	455399	0	0	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
Dissolved Metals in Seawater by CRC ICPMS (HMI)	E469S Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Seawater samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS (HMI Mode).
VH and F1 by Headspace GC-FID	E581.VH+F1 Calgary - 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 Calgary - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Calgary - 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 Calgary - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Calgary - 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 Calgary - 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 Calgary - 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 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
VOCs Preparation for Headspace Analysis	EP581 Calgary - 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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PHCs and PAHs Hexane Extraction	EP601 Calgary - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A4771**	Page	: 1 of 8
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	: 604-444-6400	Telephone	: +1 604 253 4188
Project	: 60679830/15405	Date Samples Received	: 08-Mar-2022 17:30
PO	:	Date Analysis Commenced	: 14-Mar-2022
C-O-C number	: ----	Issue Date	: 14-Apr-2022 17:23
Sampler	: DS, IB, JC, RC		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 17		
No. of samples analysed	: 17		

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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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
Anthony Calero	Team Leader - Inorganics	Inorganics, Calgary, Alberta
Christopher Li	Lab Assistant	Metals, Burnaby, British Columbia
Cynthia Bauer	Organic Supervisor	Organics, Calgary, Alberta
Dwayne Bennett	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Joshua Stessun	Laboratory Analyst	Organics, Calgary, Alberta
Mackenzie Lamoureux	Lab Assistant	Metals, Calgary, Alberta
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sorina Motea	Laboratory Analyst	Organics, Calgary, Alberta
Victoria Piguing	Laboratory Analyst	Organics, Calgary, Alberta

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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage 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: 450453)											
VA22A4771-001	PW17-1_20220308|REG|GW	calcium, dissolved	7440-70-2	E469S	1000	mg/L	188000 µg/L	190	1.16%	20%	----
		copper, dissolved	7440-50-8	E469S	0.20	mg/L	0.43 µg/L	0.00042	0.00001	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E469S	1000	mg/L	493000 µg/L	497	0.938%	20%	----
		zinc, dissolved	7440-66-6	E469S	1.0	mg/L	1.6 µg/L	0.0016	0.00008	Diff <2x LOR	----
Dissolved Metals (QC Lot: 455398)											
VA22A4771-008	PW17-10_20220308|REG|GW	calcium, dissolved	7440-70-2	E469S	1000	mg/L	302000 µg/L	296	2.16%	20%	----
		copper, dissolved	7440-50-8	E469S	0.20	mg/L	0.60 µg/L	0.00057	0.00002	Diff <2x LOR	----
		magnesium, dissolved	7439-95-4	E469S	1000	mg/L	766000 µg/L	731	4.67%	20%	----
		zinc, dissolved	7440-66-6	E469S	1.0	mg/L	1.6 µg/L	0.0018	0.0001	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 436718)											
VA22A4771-001	PW17-1_20220308|REG|GW	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 437180)											
VA22A4673-016	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	----
		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	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 436717)											
VA22A4771-001	PW17-1_20220308|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 437179)											
VA22A4673-016	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	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: 450453)						
calcium, dissolved	7440-70-2	E469S	1	mg/L	<1.0	----
copper, dissolved	7440-50-8	E469S	0.0002	mg/L	<0.00020	----
magnesium, dissolved	7439-95-4	E469S	1	mg/L	<1.0	----
zinc, dissolved	7440-66-6	E469S	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 455398)						
calcium, dissolved	7440-70-2	E469S	1	mg/L	<1.0	----
copper, dissolved	7440-50-8	E469S	0.0002	mg/L	<0.00020	----
magnesium, dissolved	7439-95-4	E469S	1	mg/L	<1.0	----
zinc, dissolved	7440-66-6	E469S	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 436718)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 437180)						
benzene	71-43-2	E611A	0.5	µg/L	<0.50	----
ethylbenzene	100-41-4	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: 431738)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 436717)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 437179)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 431737)						
acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 431737) - continued						
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: 450453)									
calcium, dissolved	7440-70-2	E469S	1	mg/L	50 mg/L	105	80.0	120	----
copper, dissolved	7440-50-8	E469S	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, dissolved	7439-95-4	E469S	1	mg/L	50 mg/L	95.2	80.0	120	----
zinc, dissolved	7440-66-6	E469S	0.001	mg/L	0.5 mg/L	111	80.0	120	----
Dissolved Metals (QCLot: 455398)									
calcium, dissolved	7440-70-2	E469S	1	mg/L	50 mg/L	100	80.0	120	----
copper, dissolved	7440-50-8	E469S	0.0002	mg/L	0.25 mg/L	106	80.0	120	----
magnesium, dissolved	7439-95-4	E469S	1	mg/L	50 mg/L	94.0	80.0	120	----
zinc, dissolved	7440-66-6	E469S	0.001	mg/L	0.5 mg/L	108	80.0	120	----
Volatile Organic Compounds (QCLot: 436718)									
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	108	70.0	130	----
styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	94.6	70.0	130	----
toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	95.8	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	106	70.0	130	----
Volatile Organic Compounds (QCLot: 437180)									
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	85.5	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	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	92.3	70.0	130	----
xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	92.3	70.0	130	----
Hydrocarbons (QCLot: 431738)									
EPH (C10-C19)	----	E601A	250	µg/L	7719.3 µg/L	99.8	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3536.8 µg/L	104	70.0	130	----
Hydrocarbons (QCLot: 436717)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	110	70.0	130	----
Hydrocarbons (QCLot: 437179)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	100 µg/L	97.1	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 431737)									
acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	108	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: 431737) - continued									
acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	105	60.0	130	----
anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	86.2	60.0	130	----
benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	67.7	60.0	130	----
benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	95.2	60.0	130	----
benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	125	60.0	130	----
benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	97.5	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	121	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	109	60.0	130	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	85.9	60.0	130	----
methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	98.7	60.0	130	----
methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	96.2	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	116	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	105	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: 450453)										
VA22A4771-002	PW17-2_20220308|REG|GW	calcium, dissolved	7440-70-2	E469S	ND mg/L	8 mg/L	ND	70.0	130	----
		copper, dissolved	7440-50-8	E469S	0.0339 mg/L	0.04 mg/L	84.9	70.0	130	----
		magnesium, dissolved	7439-95-4	E469S	ND mg/L	2 mg/L	ND	70.0	130	----
		zinc, dissolved	7440-66-6	E469S	0.714 mg/L	0.8 mg/L	89.3	70.0	130	----
Dissolved Metals (QCLot: 455398)										
VA22A4771-010	PW17-16_20220308|REG|GW	calcium, dissolved	7440-70-2	E469S	ND mg/L	8 mg/L	ND	70.0	130	----
		copper, dissolved	7440-50-8	E469S	0.0398 mg/L	0.04 mg/L	99.4	70.0	130	----
		magnesium, dissolved	7439-95-4	E469S	ND mg/L	2 mg/L	ND	70.0	130	----
		zinc, dissolved	7440-66-6	E469S	0.835 mg/L	0.8 mg/L	104	70.0	130	----
Volatile Organic Compounds (QCLot: 436718)										
VA22A4771-001	PW17-1_20220308|REG|GW	benzene	71-43-2	E611A	119 µg/L	100 µg/L	119	70.0	130	----
		ethylbenzene	100-41-4	E611A	119 µg/L	100 µg/L	119	70.0	130	----
		styrene	100-42-5	E611A	103 µg/L	100 µg/L	103	70.0	130	----
		toluene	108-88-3	E611A	106 µg/L	100 µg/L	106	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	244 µg/L	200 µg/L	122	70.0	130	----
		xylene, o-	95-47-6	E611A	113 µg/L	100 µg/L	113	70.0	130	----
Volatile Organic Compounds (QCLot: 437180)										
VA22A4673-016	Anonymous	benzene	71-43-2	E611A	110 µg/L	100 µg/L	110	70.0	130	----
		ethylbenzene	100-41-4	E611A	98.6 µg/L	100 µg/L	98.6	70.0	130	----
		styrene	100-42-5	E611A	110 µg/L	100 µg/L	110	70.0	130	----
		toluene	108-88-3	E611A	105 µg/L	100 µg/L	105	70.0	130	----
		xylene, m+p-	179601-23-1	E611A	201 µg/L	200 µg/L	101	70.0	130	----
		xylene, o-	95-47-6	E611A	106 µg/L	100 µg/L	106	70.0	130	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd.
Contact:	Leslie Southern
Phone:	604-444-6608
	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: leslie.southern@aecom.com
Email 2: justin.becker@aecom.com
Email 3: Darren.Schultz@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parkland.ca
Email 2: leslie.southern@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 #: 606 74930 / 15405
PO / AFE:
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: DS, RS, JC, JB

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 (P)	LEPH, benzo(a)pyrene, napthalene (P)	Dissolved Copper/Dissolved Zinc (F/P)	Hardness (all metals samples)	Brackish Water	ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-1_20220308	08-Mar-22	13:51	Pore water	5	✓	✓	✓	✓	✓			
	PW17-2_20220308	08-Mar-22	13:55	Pore water	5	✓	✓	✓	✓	✓			
	PW17-4_20220308	08-Mar-22	14:11	Pore water	5	✓	✓	✓	✓	✓			
	PW17-5_20220308	08-Mar-22	14:41	Pore water	5	✓	✓	✓	✓	✓			
	PW17-6_20220308	08-Mar-22	14:20	Pore water	5	✓	✓	✓	✓	✓			
	PW17-7_20220308	08-Mar-22	14:40	Pore water	5	✓	✓	✓	✓	✓			
	PW17-9_20220308	08-Mar-22	13:30	Pore Water	5	✓	✓	✓	✓	✓			
	PW17-10_20220308	08-Mar-22	14:23	Pore water	5	✓	✓	✓	✓	✓			
	PW17-13_20220308	08-Mar-22	13:22	Pore Water	5	✓	✓	✓	✓	✓			
	PW17-16_20220308	08-Mar-22	15:17	Pore water	5	✓	✓	✓	✓				
	PW17-17_20220308	08-Mar-22	15:18	Pore water	5	✓	✓	✓	✓	✓			
	PW17-18_20220308	08-Mar-22	15:18	Pore Water	5	✓	✓	✓	✓	✓			

Environmental Division
Vancouver
Work Order Reference
VA22A4771

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)

TSS: 1, 9, 13, 10, 4, 2, 5
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			
				12			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Darren Schultz	March 8, 2022	

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	MAR 08	17:30

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**.

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

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:	Leslie Southern
Phone:	604-444-6608
	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	leslie.southern@aecom.com
Email 2	justin.becker@aecom.com
Email 3	Darren.Schultz@aecom.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax	christopher.boys@parkland.ca
Email 2	leslie.southern@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 #:	60679830 / 15405
PO / AFE:	
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: DS, RS, JC, JB

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 (P)	LEPH, benzo(a)pyrene, napthalene (P)	Dissolved Copper/Dissolved Zinc (F/P)	Hardness (all metals samples) (P)	Brackish Water	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	R-Blank-2_20220308	08-Mar-22	16:44	porewater	5	✓	✓	✓	✓				
	DUP-2_20220308	08-Mar-22	15:17	porewater	5	✓	✓	✓	✓				
	DUP-1_20220308	08-Mar-22	14:11	porewater	5	✓	✓	✓	✓	✓			
	T-blank-3_20220308	08-Mar-22	16:54	porewater	1	✓							
	T-blank-4_20220308	08-Mar-22	16:54	porewater	1	✓							

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)

T-4: 18, 16, 7, 6, 17, DUP1, DUP2, R-Blank,

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			
				12			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Darren Schultz	March 8, 2022	

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
RJ	MAR 08	17:30

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**.

Appendix E
Quality Assurance and Quality Control Summary

DATA QUALITY ASSURANCE/QUALITY CONTROL

In order to assure the integrity and defensibility of the data collected, rigorous QA/QC protocols were observed. These protocols ensured that all samples were properly collected, identified, stored, shipped, and documented. Standard operating procedures (SOPs) for sample collection and storage, equipment decontamination, and sample chain of custody protocols were followed. Porewater samples were collected using sampling techniques discussed above. The use of these methods ensured the quality, soundness, and defensibility of the data obtained. The laboratory analytical data, once generated, was also proofed for inconsistencies and anomalies. Field duplicates, trip blanks, and rinsate blanks were collected for QA/QC purposes.

No data quality outliers were reported by the laboratory for any parameters with RBMTs. It is AECOM's opinion that the analytical results for all parameters with RBMTs are considered reliable.

Field Duplicate Samples

Field duplicate samples are two identical samples that are submitted to the laboratory with no indication that they are the same. The analysis of field duplicate samples provides an indication of the total precision of the sampling and analysis process. Field duplicate samples were collected and analyzed at a rate of approximately 10% of samples for a given analytical suite.

Trip Blanks

Trip blanks are samples of clean deionized, distilled (Reagent Grade Type II) water that are prepared in the laboratory, taken to the field, retained on site throughout sample collection, returned to the laboratory, and analyzed with the environmental samples. The QA/QC review identifies trip blanks with detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination during transport. One trip blank was included for analysis in every cooler submitted to the laboratory.

Rinsate Blanks

Rinsate blanks are samples of deionized and distilled analyte free (Reagent Grade Type II) water that are prepared in the field by pouring water over or through decontaminated field sampling equipment[9], prior to the collection of the environmental samples. The QA/QC review identifies rinsate blank detections of target analytes and evaluates the effect of the detections on associated sample results for possible cross-contamination during sample collection. Rinsate blank samples were collected and analyzed at a rate of approximately 5% of samples for petroleum hydrocarbon parameters (BTEX, VPH_w, and $LEPH_w$).

Precision

For the annual event, a total of three samples were duplicated in the field. Relative percent differences (RPDs) can only be calculated in instances where the concentration for either sample was less than five times the reported detection limit (RDL). For all duplicated samples, the concentrations of parent and duplicate samples were either below the RDL or less than five times the RDL in one of the sample sets, outlined below:

- Reported concentrations for benzene in the primary sample and its duplicated (DUP-2), collected from PW-16 in March 2022 had a calculated RPD of 9%.

The BC Environmental Lab Manual (BCELM) provides data quality objectives (DQO) for recommended laboratory duplicate RPDs (ENV 2020b). The BC ENV has provided guidance indicating that field RPDs within 1.5 times the laboratory RPDs as defined in the BCELM are acceptable (ENV 2016b). Therefore, acceptable lab RPDs are as follows:

- Water – Petroleum Hydrocarbons have acceptable laboratory RPDs of 45%; and
- Water – Metals have an acceptable laboratory RPDs of 30%.

[9] Throughout the 2020 and 2021 sampling programs, the decontaminated equipment used for the collection of the rinsate blanks included the oil/water interface meter.

All parameters with calculated RPDs were within the acceptable range for RPD values. Based on this guidance and the above results, the calculated RPDs for benzene, ethylbenzene, VPHw, and dissolved copper in water are within acceptable limits.

Precision measures the reproducibility of repetitive measurements and is usually expressed in terms of imprecision. It is strictly defined as the degree of mutual agreement among multiple independent measurements as the result of repeated application of the same process under similar conditions.

Analytical precision is a measurement of the variability associated with the duplicate (*i.e.,* two) or replicate (*i.e.,* more than two) analyses of the same sample in the laboratory, and is determined by the analysis of matrix spike duplicate or laboratory duplicate samples.

Total precision is a measurement of the variability associated with the entire sampling and analysis process. It is determined by the analysis of duplicate or replicate field samples and incorporates any variability introduced by the analytical procedure, sample collection and handling procedures, and matrix factors. Precision data must be interpreted by taking into consideration these possible sources of variability.

Duplicate field samples were collected, and duplicate spiked or unspiked samples were analyzed to assess analytical precision. The results were assessed using the relative percent difference (RPD) between duplicate measurements. The equation used to calculate RPD for duplicate samples is:

$$RPD = \frac{(A - B)}{((A + B)/2)} \times 100$$

where:

A = analytical result
B = duplicate result.

Note that for RPDs the result can be a positive or a negative value. RPDs are often presented as *absolute* RPDs, in which case the absolute value of the RPD is reported, always resulting in a positive number. Reporting the absolute RPD results in a reduction in information, since, for instance, if a duplicate sample consistently returned higher results than the original sample, all RPD values would be negative and it may be an indication of a precision problem. In this case, if absolute RPD was reported, no indication would be forthcoming.

Total precision was determined by collecting field duplicate samples. These samples were collected and analyzed at a rate of approximately 10% of total samples for each analytical suite.

Analytical precision will be determined in the laboratory by running matrix spike/matrix spike duplicate (MS/MSD) pairs, or by running laboratory duplicate analyses. These samples will be analyzed at a rate of approximately 5% for each analytical suite.

Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (*e.g.,* variability due to imprecision) and systematic error (*e.g.,* bias). Therefore, accuracy reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ beyond acceptable limits from the true value or known concentration of the spike or standard. Acceptance criteria are indicated in the individual standardized analytical methods.

Analytical accuracy is typically measured by determining the percent recovery of known target analytes that are spiked into a field sample (*i.e.,* a surrogate or matrix spike), or reagent water (*i.e.,* laboratory control sample [LCS] or blank spike) before extraction at known concentrations. Percent recovery is calculated as:

$$\%REC = \frac{A}{B} \times 100$$

where:

A = obtained value
B = true value.

Analytical accuracy was determined in the laboratory by the running of MS samples or laboratory control samples. These samples were analyzed at a minimum rate of 5% for each analytical suite. Analytical accuracy was confirmed in a review of percent recoveries reported in the laboratory reports. Percent recoveries are obtained when the project laboratory analyzes samples with known concentrations and compares their analytical results to the known concentrations. The laboratory provided percent recoveries for the majority of the analyses. The reported Laboratory Control Sample (LCS) recoveries and Matric Spike (MS) sample recoveries for parameters with RBMTs were within laboratory QC limits. It is AECOM's opinion that the analytical results are valid with respect to accuracy.

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:

$$completeness = \frac{A}{B}\ x\ 100$$

where:

A	=	number of valid analytical results
B	=	total number of analytical results.

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

Appendix F
Photographic Log of FPTS Inspections

APPENDIX E: PHOTOGRAPHIC LOG

Client Name: Parkland Refining (B.C.) Ltd.	**Site Location:** Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	**Project Number:** 60679830

Photo No. 1	**Date:** March 7, 2022

Direction Photo Taken:

Looking East

Description:

Eastern FPTS.

Photo No. 2	**Date:** March 7, 2022

Direction Photo Taken:

Looking East at Western Section

Description:

Western Section showing placement of new cobble and rip rap.

APPENDIX E: PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project Number:
Parkland Refining (B.C.) Ltd.	Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	60679830

Photo No.	Date:
3	March 7, 2022

Direction Photo Taken:

Looking Southeast

Description:

Looking at wooden platform resting on top of concrete protection for well PW17-31.

Photo No.	Date:
4	March 7, 2022

Direction Photo Taken:

Looking SW towards the Eastern Section of the Foreshore.

Description:

A different angle showing the size of the wooden platform obstructing the monitoring and sampling of PW17-31.

APPENDIX E: PHOTOGRAPHIC LOG

Client Name: Parkland Refining (B.C.) Ltd.	**Site Location:** Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	**Project Number:** 60679830

Photo No. 5	**Date:** March 7, 2022

Direction Photo Taken:

Down

Description:

Zoomed in example of small exposure of Geogrid along the Western FPTS.

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

Photo No. 6	**Date:** March 7, 2022

Direction Photo Taken:

Down

Description:

Zoomed in example of small exposure of Geogrid along the Western FPTS.