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Foreshore 2023 Monitoring Report Below Area 2 - Eastern Impounding Basin, Parkland Burnaby Refinery, Burnaby, BC

Parkland Refining (BC) Ltd.

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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 annual porewater monitoring and sampling in March 2023 and inspections of the Foreshore Passive Treatment System (FPTS) conducted between July 2022 and March 2023 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 FPTS Monitoring and Maintenance Plan (MMP). The report also fulfills conditions established by the British Columbia Ministry of Environment and Climate Change Strategy (ENV) in letters provided on April 25, 2018 (ENV 2018a) and May 19, 2020 (ENV 2020a).

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. Twelve select porewater wells were monitored for NAPL in July 2022, October 2022 and January 2023. Thirty-three porewater wells were monitored for NAPL in March 2023. During monitoring events completed in July and October 2022, and January and March 2023, none of the gauged porewater wells associated with the FPTS contained an observable sheen, or a measurable thickness of NAPL[2] (**Table 1**).

Standards and Contaminants of Concern

Analytical results for porewater samples collected in March 2023 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 33 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 2023. 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 (2017-2022) 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 2023 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 33 porewater wells.

Inspection of the Foreshore Passive Treatment System

The FPTS was visually inspected during quarterly inspection events in July 2022, October 2022, January 2023 and March 2023. 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. Vegetation was observed on top of the Eastern and Western FPTS near the southern boundary of the Foreshore Site. 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. A wooden platform had obstructed one well (PW17-31) during the March 2022 sampling event. During the July 2022 inspection event this wooden platform was no longer present, the handle on the lid of the concrete casing lid was damaged. The well lid handle of PW17-31 was repaired in October 2022 and the well was monitored and sampled in March 2023. Significant damage to all other monitoring wells was not observed. Inspections indicate there are no significant deficiencies in the FPTS.

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 samples collected from all 33 monitoring wells were below their applicable RBMTs in 2023.

Based on the data collected post-construction of the FPTS, AECOM recommends the frequency of sampling be reduced to biennial (every two years) in 2023, and inspections of the FPTS be reduced from quarterly to semi-annual in 2023. A request for approval to reduce the frequency of sampling and inspections of the FPTS, along with the 2022 FPTS MMP was submitted to ENV in December 2022 for their review; a response from ENV is pending.

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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 in March 2023 and inspections of the Foreshore Passive Treatment System (FPTS) conducted between July 2022 and March 2023 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**).

Permit 16-180 issued by the Vancouver Fraser Port Authority (VFPA) on May 24, 2017 for removal of the former Interim Remedial Action Barriers and installation of the FPTS and associated monitoring wells, expired on May 31, 2022. On June 22, 2022, the VFPA agreed inspections of the FPTS, monitoring and porewater sampling can be completed at the Foreshore Site without a permit and requested annual reports for the Site be provided for their review (AECOM, 2022b).

This report fulfills reporting requirements in accordance with the FPTS Monitoring and Maintenance Plan (MMP) (AECOM 2017c) and VFPA's request for annual reports.

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. In 2023, 33 porewater monitoring wells were sampled.

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

A request for approval to reduce the frequency of sampling and inspections of the FPTS along with an updated 2022 MMP was submitted to ENV for their review and approval on December 8, 2022.A response from ENV on the proposed 2022 FPTS MMP is pending.

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	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: 3. Reduction of bi-monthly NAPL monitoring to monthly for the remainder of 2014 and quarterly in 2015; 4. Reduction of porewater sampling in the Project 1 Area to 62 monitoring wells; 5. Elimination of porewater sampling in the Project 2 Area (except for monitoring well P18-4.5S); 6. Discontinuation of surface water sample collection from the Reference Area; and 7. 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).
2022	VFPA Permit 16-180 expired May 31, 2022. On June 22, 2022, the VFPA agreed inspections of the FPTS, monitoring and porewater sampling at the can be completed at the Foreshore Site without a permit. VFPA requests provision of annual reports is continued. A request for approval to reduce the frequency of inspections of the FPTS and porewater monitoring along with a 2022 FPTS MMP was submitted to ENV on December 8, 2022 for their review and approval.

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, 2022a).

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 November 1, 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:

[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

Table C. Total Precipitation Recorded at Area 1 Eton Street (Burnaby North) Air Quality and Rainfall Station, T024 (Metro Vancouver 2023)

Month	Total Precipitation (mm)
	2022/2023
July	29.0
August	15.6
September	15.0
October	212.4
November	168.6
December	271.6
January	184.6
February	176.0
March	78.4

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 March 1, 2023. 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 2023, 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 2023 were in accordance with the amended Foreshore MMP (AECOM 2019b). The monitoring program also fulfills conditions established by in letters provided on April 25, 2018 (ENV 2018a) and May 19, 2020 (ENV 2020a) (refer to **Section 2** of this report). In addition to the annual sampling event and inspection completed in March 2023, three quarterly inspections of the FPTS were completed in July 2022, October 2022 and January 2023 to check the integrity of the FPTS.

Between July 2022 to March 2023, 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 and 2023, 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 on a quarterly basis, 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 during the annual sampling event.
- Collect porewater samples during one annual sampling event (March 2023) 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. Raymund Sampaga, Mr. Alexander Hook, Mr. Alberto Espinosa, and Mr. Michael MacNeill. The report was prepared by Mr. Alexander Hook. Senior reviews of this report were conducted by Ms. Leslie Southern, P.Ag. and Ms. Lesley Reid, M.Eng., P.Eng., CSAP.

5.1 Modifications to the Scope of Work

At the request of Parkland, AECOM located and assessed the condition of three historical monitoring wells (PR2-8S/I/D) associated with the Project 2 Area[4] of the Site. The wells are presented in **Figure 2**.

[4] In 2013, it was determined between Chevron Canada Limited (then-owner of the Parkland Burnaby Refinery), AECOM, SLR Consulting Canada Ltd. (SLR), and ENV that the two areas of concern on the Foreshore down slope of the EIB in Area 2 of the Refinery, would be dealt with through two projects: Project 1 covers the Foreshore NAPL former Seep Area, and Project 2 covers the Foreshore outside of the former Seep Area (AECOM, 2021).

The objective of this task was to assess whether the wells are present and viable for potential future sample collection.

5.2 Sampling Schedule

The annual sampling event was completed in March 2023. During the 2023 event, 33 porewater monitoring wells in the former NAPL seep areas associated with the FPTS were sampled.

5.2.1 NAPL Monitoring

In July 2022, October 2022 and January 2023, in conjunction with the quarterly inspection of the FPTS, 12 select monitoring wells were monitored for NAPL. During the annual sampling event in March 2023, 33 monitoring wells were monitored for NAPL.

6. RESULTS

The data shown in this report represents monitoring and sampling events completed between July 2022 and March 2023 and are presented in **Tables 1 to 5** and **Figures 3 to 6**. 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 (2017-2022) are included in **Appendix A**. Methodologies are summarized in **Appendix B**.

6.1 Field Monitoring Results

During the monitoring completed between July 2022 and March 2023, none of the gauged wells associated with the FPTS contained a measurable thickness of NAPL[5]. 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 Annual Results

Porewater samples were collected from 33 porewater monitoring wells associated with the Foreshore Site during the annual sampling event completed in March 2023.

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 3 to 6**. Copies of the 2023 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 2023 sampling event are discussed in the following subsections.

[5] 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.

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 eight Up Gradient Wells located within the Eastern and Western FPTS treatment cells were below their respective RBMTs.

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.

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 2023 from the 33 porewater wells contained concentrations of dissolved zinc and copper below their applicable RBMTs.

7. INSPECTION OF THE FPTS

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

- July 13, 2022
- October 7, 2022
- January 27, 2023
- March 24, 2023

A detailed table of the inspection results is provided in **Table 6** and a photographic log is provided in **Appendix F**.

Three hand dug test pits were advanced within the cobble mat of the Eastern and Western FPTS to a depth where the liner was encountered or the maximum depth possible where ground conditions allowed for hand digging. Test pits advanced at both the Eastern and Western FPTS revealed sand overlying cobbles to a depth of 0.40 m below grade, where the liner was encountered. The thickness of rip rap was observed to be a minimum of 1.4m of depth. No significant deficiencies in the Eastern and Western FPTS were found during the inspection.

Most of the Sentry and Compliance Wells are covered in barnacles and seaweed and no significant damage to monitoring wells was observed, minor chipping to the well casing and lids was noted. The lid handle on well PW 17-31 was observed to be broken, refer to Photo 7 in the Photo Log in **Appendix F**.

During the July 13, 2022 inspection, three historical monitoring wells (PR2-8S/I/D) were located, the PVC casings of each well were observed to be filled with sand and rocks; caps were missing from all three

wells. Due to infilling, none of the wells were monitored. Refer to Photo 1 in the Photo Log in **Appendix F** to the condition of these wells when they were found during this inspection event.

During the October 7, 2022 inspection, AECOM observed that concrete protectors of six wells (PW17-16, PW17-17, PW17-21, PW17-22, PW17-26, and PW17-26) had graffiti on them. Refer to Photo 4 and 5 in the Photo Log in **Appendix F.** No damage or disturbance to the wells was observed at the time of inspection and they did not appear to have been tampered with. A handle was constructed to access PW17-31 during this inspection, refer to Photo 8 in the Photo Log in **Appendix F**.

During the January 27, 2023 and March 24, 2023 inspections, similar graffiti to the previous inspection events was observed, however, the wells did not sustain any additional or substantial damage.

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 2023, an exceedance refers to concentrations of BTEX, VPH_w, $LEPH_w$, benzo(a)pyrene, naphthalene, dissolved copper, or dissolved zinc above their applicable RBMTs.

During the 2023 sampling event, concentrations of the majority of COCs were less than the RDL; refer to **Tables 2 to 4**. 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 2023.

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.

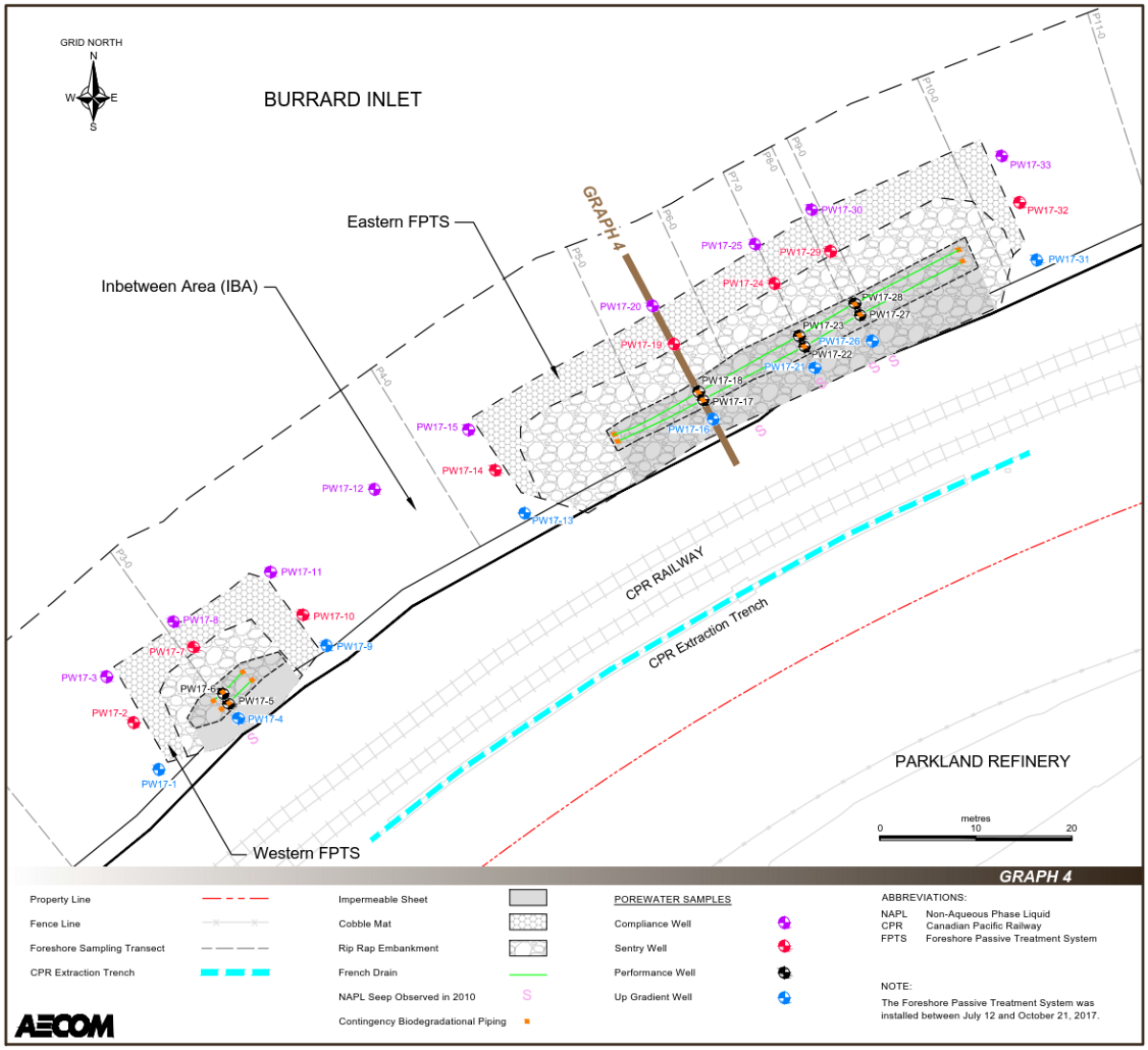
Graph 3 indicates that average concentrations of benzene in porewater generally decrease after porewater has been transported through the FPTS, from Up Gradient to Sentry and Compliance Wells.

During the sampling events completed between 2019 and 2022, the average concentrations of benzene were higher in Sentry Wells compared to OCP Wells; however, in 2023 the average concentrations of benzene in Up Gradient Wells and Sentry wells were similar at 2.10 and 2.30 ug/L, respectively. Of the eight Sentry Wells, only two wells (PW17-19 and PW17-29) contained detectable concentrations of benzene (11.9 and 3.54 ug/L, respectively) in 2023; concentrations of benzene were below the RDL in the remaining six Sentry Wells. Reported concentrations of benzene are significantly lower than the applicable RBMT.

Concentrations of benzene have not been reported above the laboratory RDL in any of the porewater samples collected from ACP Wells since 2017. Benzene has been detected above the laboratory RDL in only one Compliance Well (PW17-30) on three occasions (November and December 2017 and April 2018). 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 6), a north-south transect through the Eastern FPTS

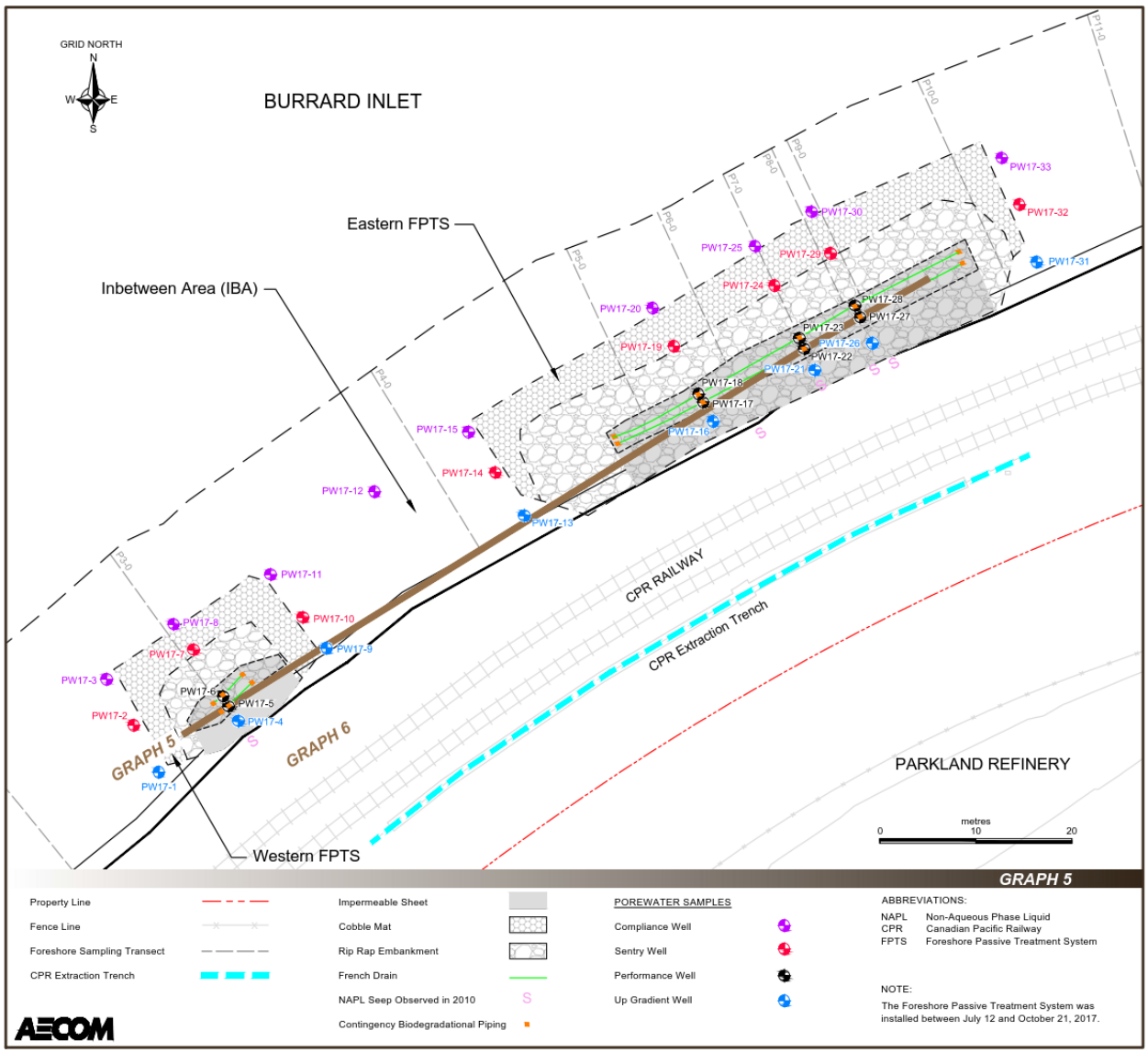


Graph 4 indicates a general decrease in concentrations of benzene and VPHw and LEPHw from the Up Gradient Well (PW17-16) to the down slope Compliance Well (PW17-20) since 2017. The samples with the highest concentration of benzene reported in March 2023 collected from this transect were from Up Gradient Well PW17-17 (1.52 µg/L) and Sentry Well PW17-19 (11.9 µg/L), but beneath the maximum concentrations of each parameter in both wells and far below the RBMT for benzene (2,100 ug/L).

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 at this transect. Further, concentrations of benzene, VPHw and LEPHw have not been reported above the laboratory RDL in ACP well (PW17-18) and the down slope Compliance Well (PW17-20) at this transect since monitoring began in 2017, 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.

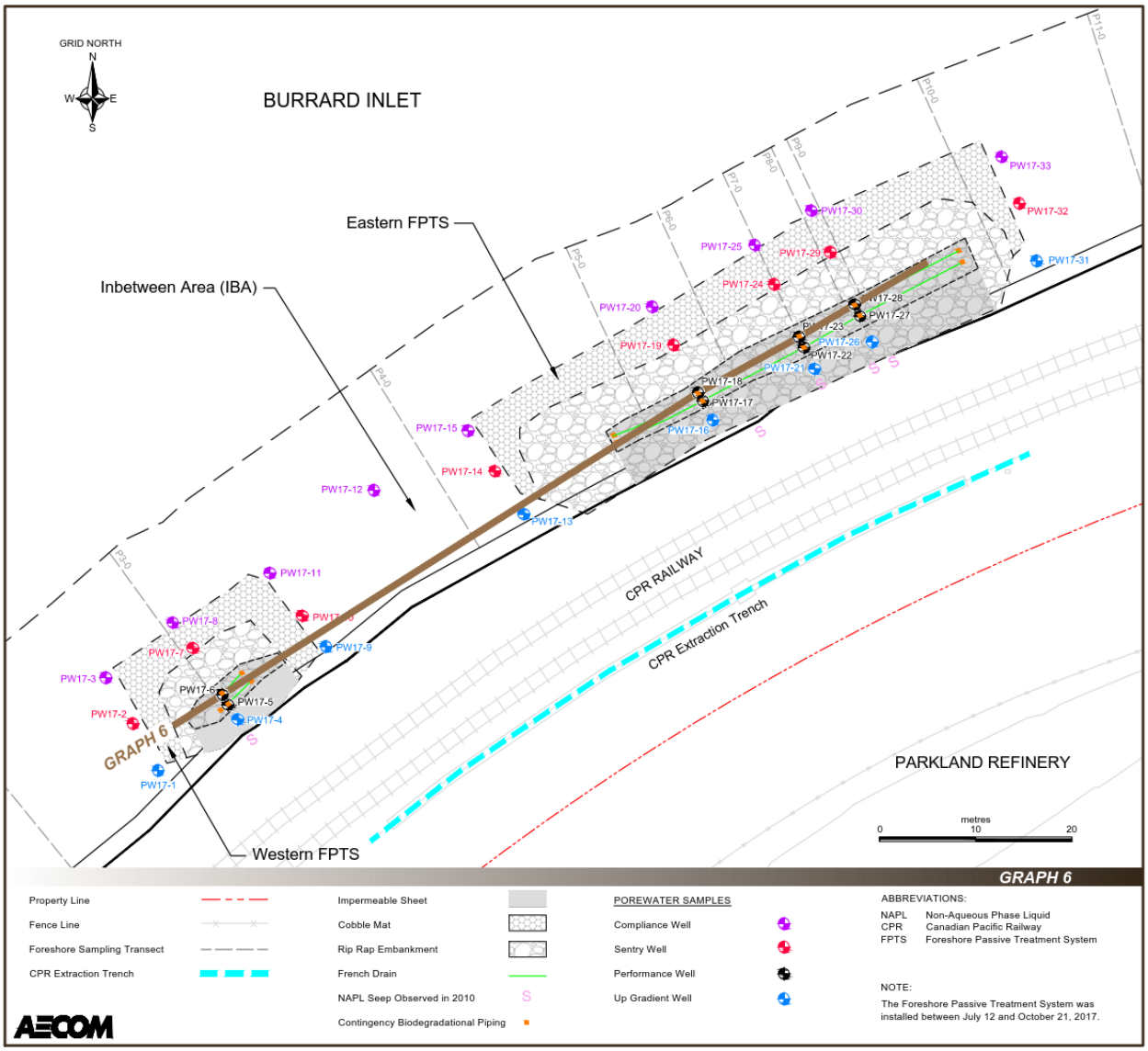
Figure B: Wells included in Graph 5, an east-west transect through Performance (OC) Wells



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.

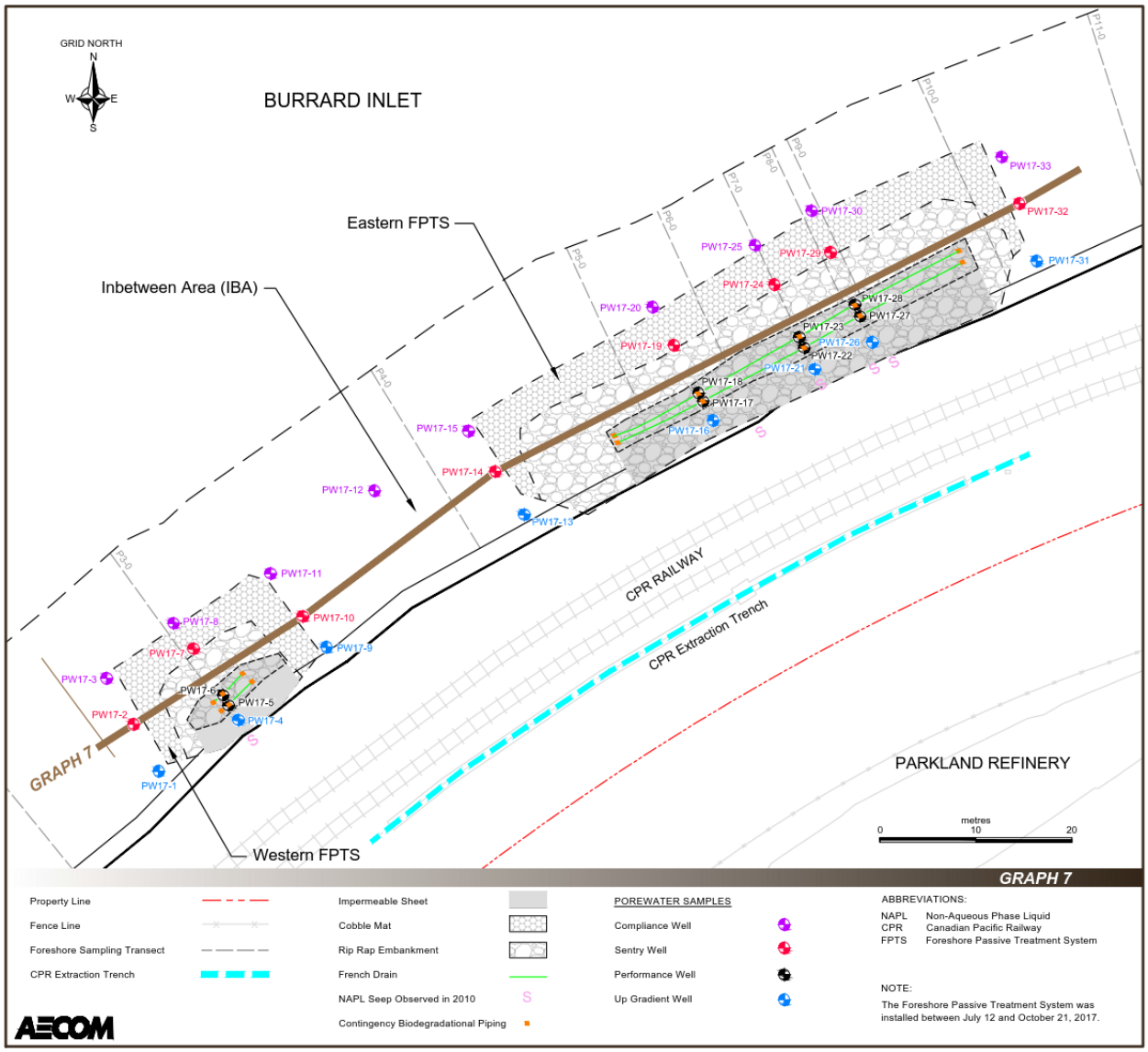
Figure C: Wells included in Graph 6, an east-west transect through Performance (AC) Wells



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 2023. 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.

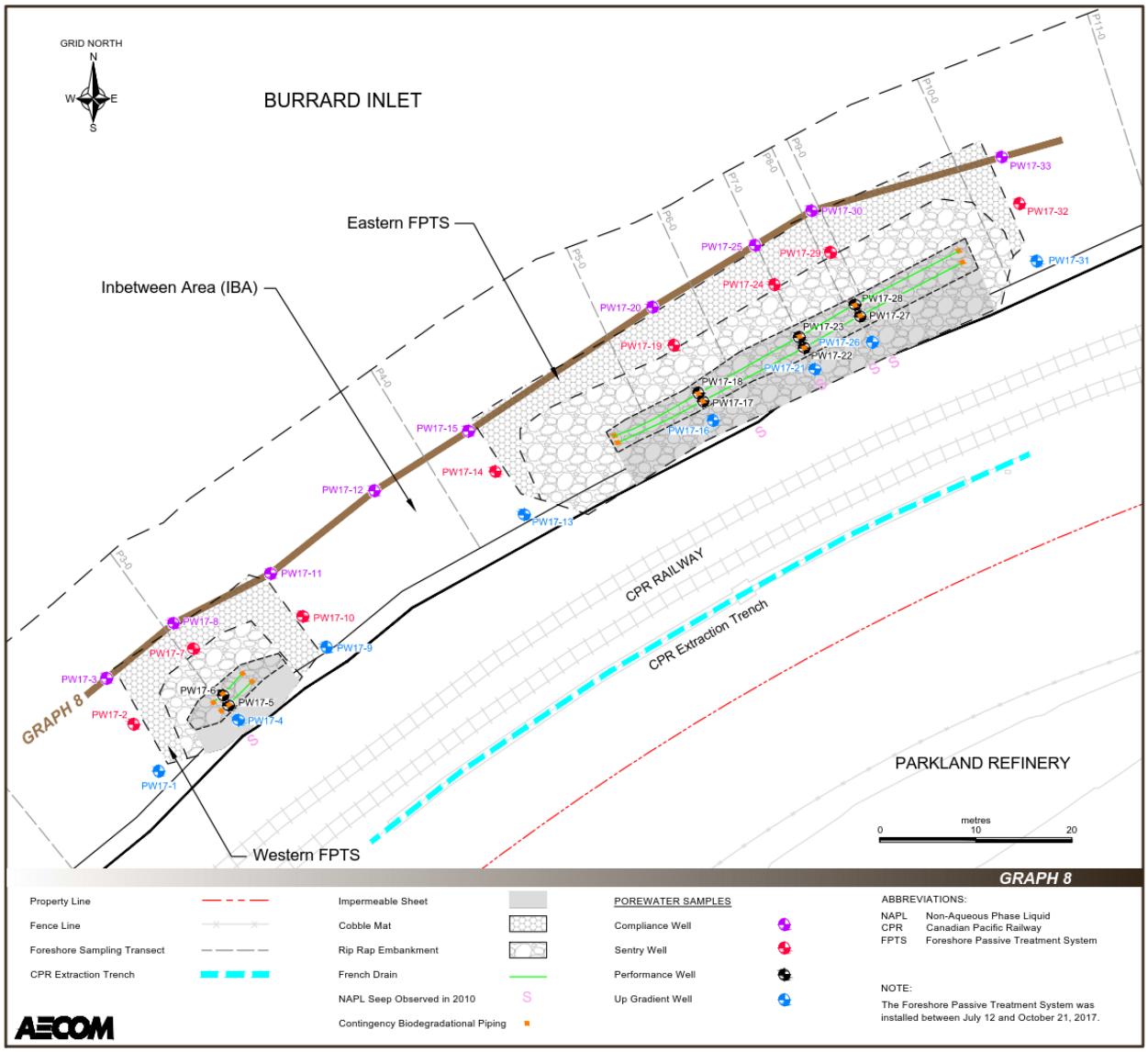
Figure D: Wells included in Graph 7, an east-west transect through Sentry Wells



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 2023, 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 2023. 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 2023.

8.2.2 Dissolved Metals

All porewater samples collected in 2023 from the 33 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 2023, detectable concentrations of dissolved copper ranged from 0.54 to 1.37 µg/L and detectable concentrations of dissolved zinc ranged from 1.0 to 3.7 µg/L. The concentrations of dissolved copper and dissolved zinc observed in 2023 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 in 2023 were below their applicable RBMTs;
- The elevated dissolved copper concentrations detected in porewater in select 2018 sampling events were not observed in subsequent sampling events completed in 2019 through 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 2023 confirms that all COCs have remained under the RBMTs in all Sentry and Compliance Wells.

9. SUMMARY

This 2023 monitoring report summarizes monitoring activities conducted between July 2022 through March 2023 along the Foreshore Site.

Table D below summarizes the objectives and results from the monitoring activities conducted on the Foreshore Site between July 2022 and March 2023.

Table D. Summary of the Objectives and Results from the 2023 Foreshore Monitoring Program

Objective	Result
Monitor for the presence of NAPL and associated COCs in Site monitoring wells	During monitoring events between July 2022 and March 2023, none of the porewater wells contained an observable sheen or measurable thickness of NAPL.
	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 2023.

Objective	Result
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).

Fifteen 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[6].

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[6], but below their RBMTs, with the one exception previously noted in PW17-5**.**

In 2023, concentrations of LEPHw, BTEX, VPHw, and PAHs were not detected above the RDLs in any of the Compliance Wells; a detectable concentration of dissolved zinc (2.2 ug/L) was reported in only one (PW17-20) of the nine Compliance Wells, but far below the applicable RBMT of 90 ug/L. The treatment system is effective in addressing dissolved phase hydrocarbons in porewater and is operating as designed.

10. CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected post-construction of the FPTS, AECOM recommends reducing the frequency of sampling to biennial (every two years) beginning in 2023 based on the following:

- The absence of sheens or measurable NAPL 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 Performance Well PW17-5 in 2018 and LEPHw in Up Gradient Well PW17-16 between 2018 and 2019 and 2022). Concentrations of dissolved copper in PW17-5 and LEPHw in PW17-16 have decreased since 2018.
- Concentrations of petroleum hydrocarbons (PHCs[7]) 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. 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. Concentrations

[6] 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.

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

of benzo(a)pyrene and naphthalene have been below the RDLs in PW17-01 since March 2021 and in PW17-16 since February 2018.

- Between 2017 and 2023 detectable concentrations below the RBMTs 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 below the RBMTs 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; and have not been reported in either PW17-14 or PW17-19 since.

AECOM recommends a reduction in the frequency of inspections of the FPTS from quarterly to semi annual in 2023 based on the following:

- NAPL has not been detected in any of the Foreshore monitoring wells associated with the FPTS since they were installed in 2017.
- Inspections of the FPTS completed between 2017 and 2021 indicated no significant deficiencies in the FPTS. Minor maintenance was completed to cover exposed portions of geogrid and geotextile layers and exposed bases of concrete well protectors in September 2021.

Any changes to the sampling frequency or termination of parts or the whole of the sampling program requires the approval of ENV. A request for approval to reduce the frequency of sampling and inspections of the FPTS, along with the 2022 FPTS MMP was submitted to ENV in December 2022 for their review; a response from ENV is pending.

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.

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

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

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

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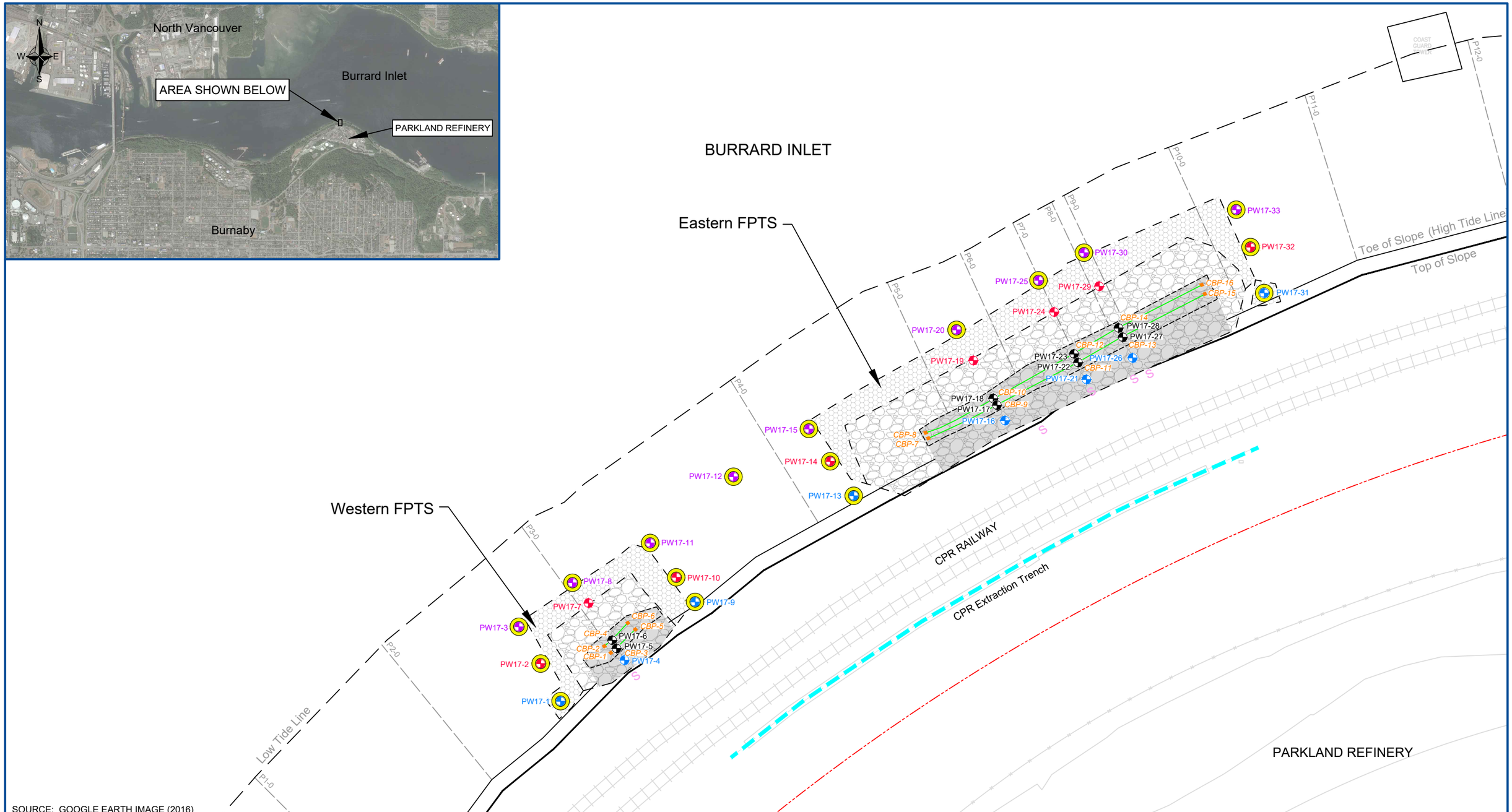


SOURCE: GOOGLE EARTH IMAGE (2016)

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
- 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

SITE MAP AND FORESHORE SAMPLING LOCATIONS

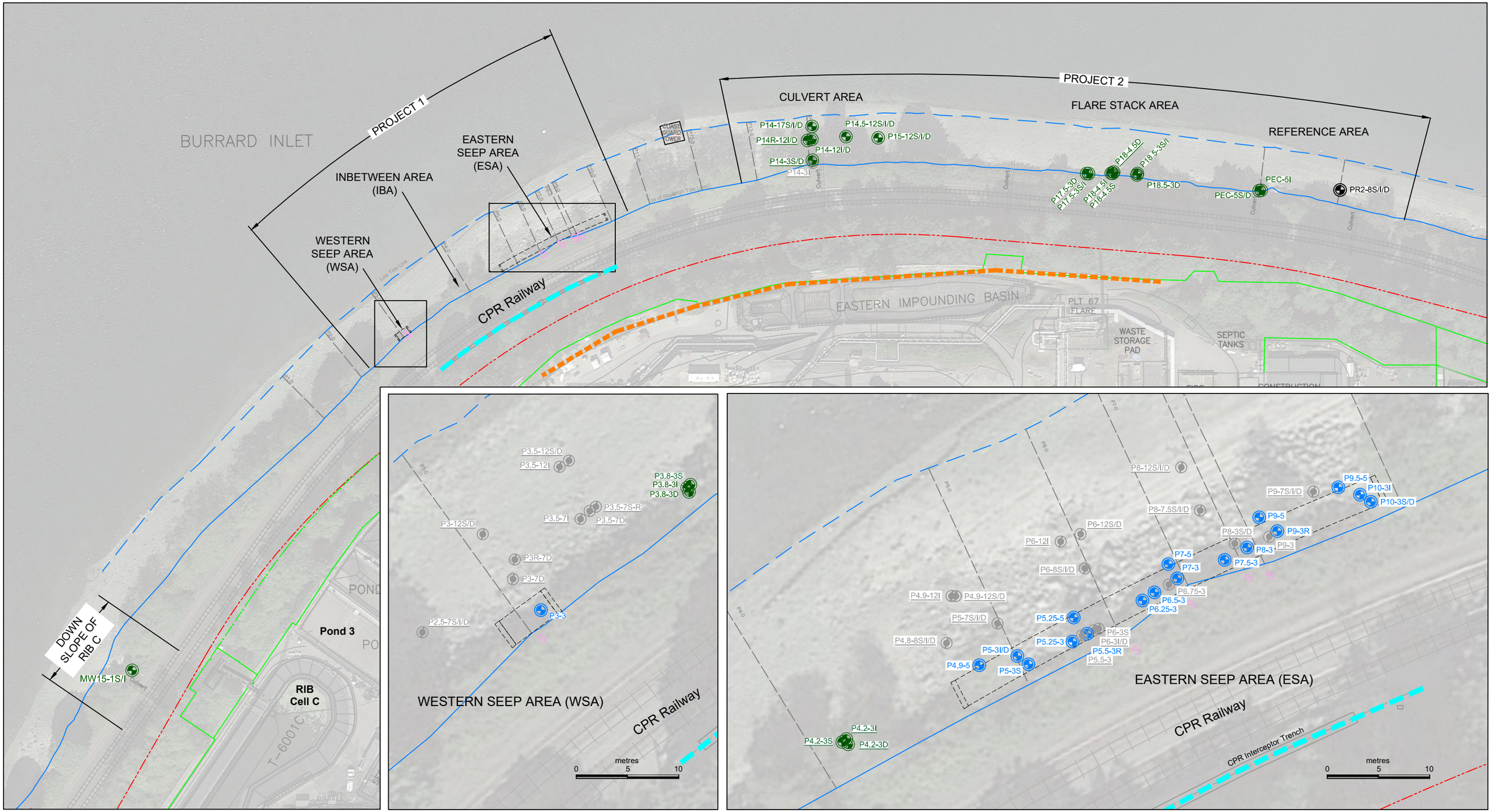
Foreshore 2023 Monitoring Report,
Foreshore Below Area 2 - Parkland Refinery, Burnaby, B.C.

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2023	60704318	SGC	0	FIGURE 1

AECOM

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



LEGEND:

- Property Line
- Fence Line
- Foreshore Monitoring Well
- Foreshore Sampling Transect
- NAPL Seep Observed in 2010 (S)
- Excavation in 2017
- CPR Interceptor Trench
- Refinery Extraction System
- Monitoring Well Decommissioned During Construction of the FPTS
- Monitoring Well Not Found/ Destroyed (S/I/D)
- Monitoring Well Decommissioned in July 2019
- Monitoring Well Remains in Place

ABBREVIATIONS:

S	Shallow Well
I	Intermediate Well
D	Deep Well
NAPL	Non-Aqueous Phase Liquid
FPTS	Foreshore Passive Treatment System

NOTE:

Monitoring wells installed during the construction of the Foreshore Passive Treatment System in 2017 are not shown.

GRID NORTH

N, W, E, S

metres 0 20 40

AECOM

SITE MAP - FORESHORE WELL DECOMMISSIONING

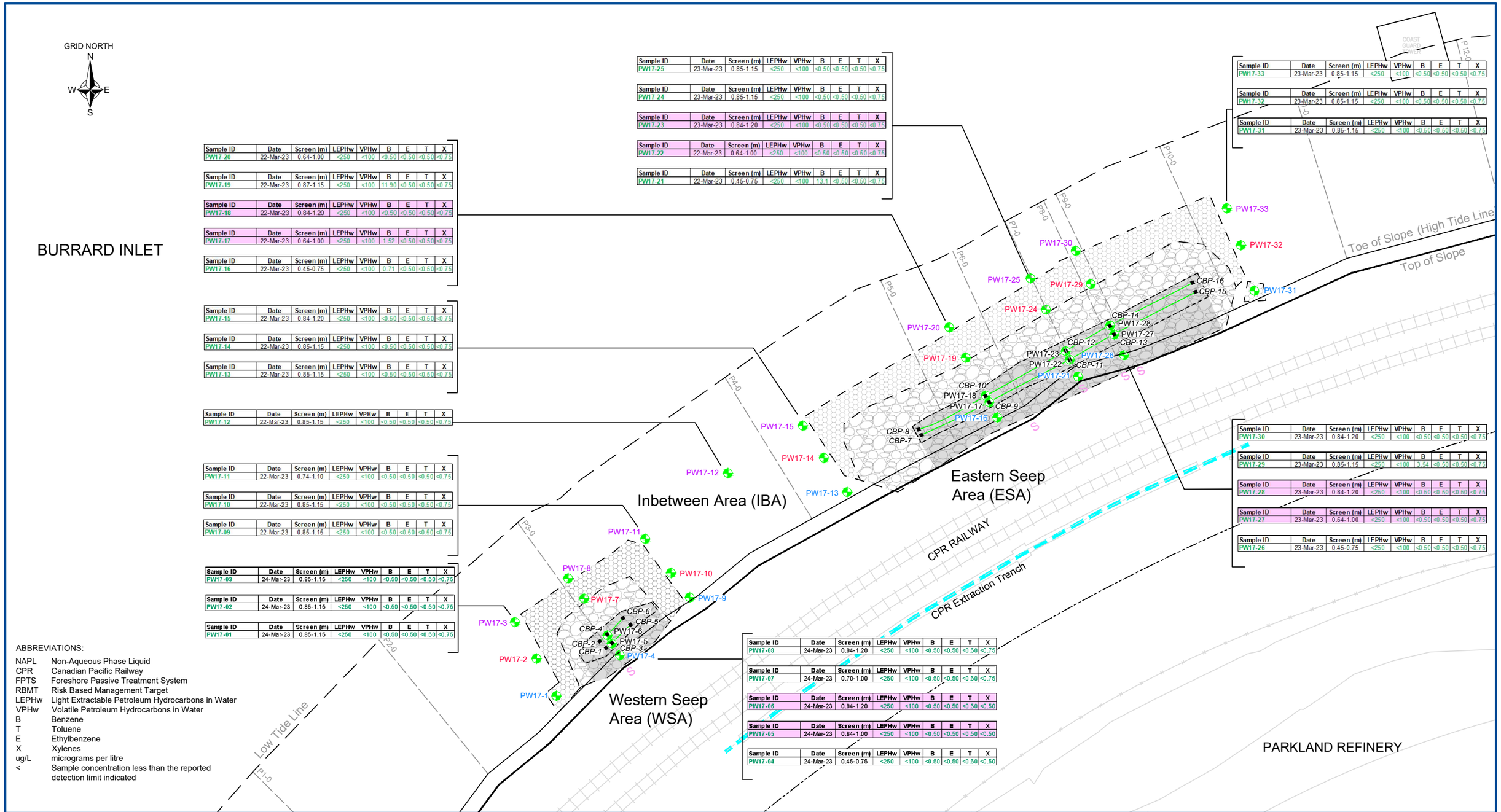
Foreshore 2023 Monitoring Report

Foreshore Below Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May, 2023	60704318	NT	0	FIGURE 2

FILE NAME: H:\URS-PROPOSALS\2019\2019-1686-007 - 2019 Foreshore Well Decom\Figures\2019-08-08 F01 SITE PLAN - PRE CONSTRUCTION.dwg



Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-25	23-Mar-23	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	23-Mar-23	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	23-Mar-23	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	22-Mar-23	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	22-Mar-23	0.45-0.75	<250	<100	13.1	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-33	23-Mar-23	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	23-Mar-23	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	23-Mar-23	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
PW17-20	22-Mar-23	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
PW17-19	22-Mar-23	0.87-1.15	<250	<100	11.90	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-18	22-Mar-23	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
PW17-17	22-Mar-23	0.64-1.00	<250	<100	1.52	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-16	22-Mar-23	0.45-0.75	<250	<100	0.71	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-15	22-Mar-23	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
PW17-14	22-Mar-23	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
PW17-13	22-Mar-23	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	22-Mar-23	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	22-Mar-23	0.74-1.10	<250	<100	<0.50	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-10	22-Mar-23	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
PW17-09	22-Mar-23	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	24-Mar-23	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
PW17-02	24-Mar-23	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
PW17-01	24-Mar-23	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
PW17-30	23-Mar-23	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	23-Mar-23	0.85-1.15	<250	<100	3.54	<0.50	<0.50	<0.75

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X
PW17-28	23-Mar-23	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	23-Mar-23	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	23-Mar-23	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	24-Mar-23	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	24-Mar-23	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	24-Mar-23	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	24-Mar-23	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	24-Mar-23	0.45-0.75	<250	<100	<0.50	<0.50	<0.50	<0.50

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
Contingency Biodegradational Piping

POREWATER SAMPLES

Compliance Well PW17-8
Sentry Well PW17-7
Performance Well PW17-6
Up Gradient Well PW17-4

Sample concentration less than applicable RBMTs
Sample concentration greater than applicable RBMTs

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

metres
0 10 20

AECOM

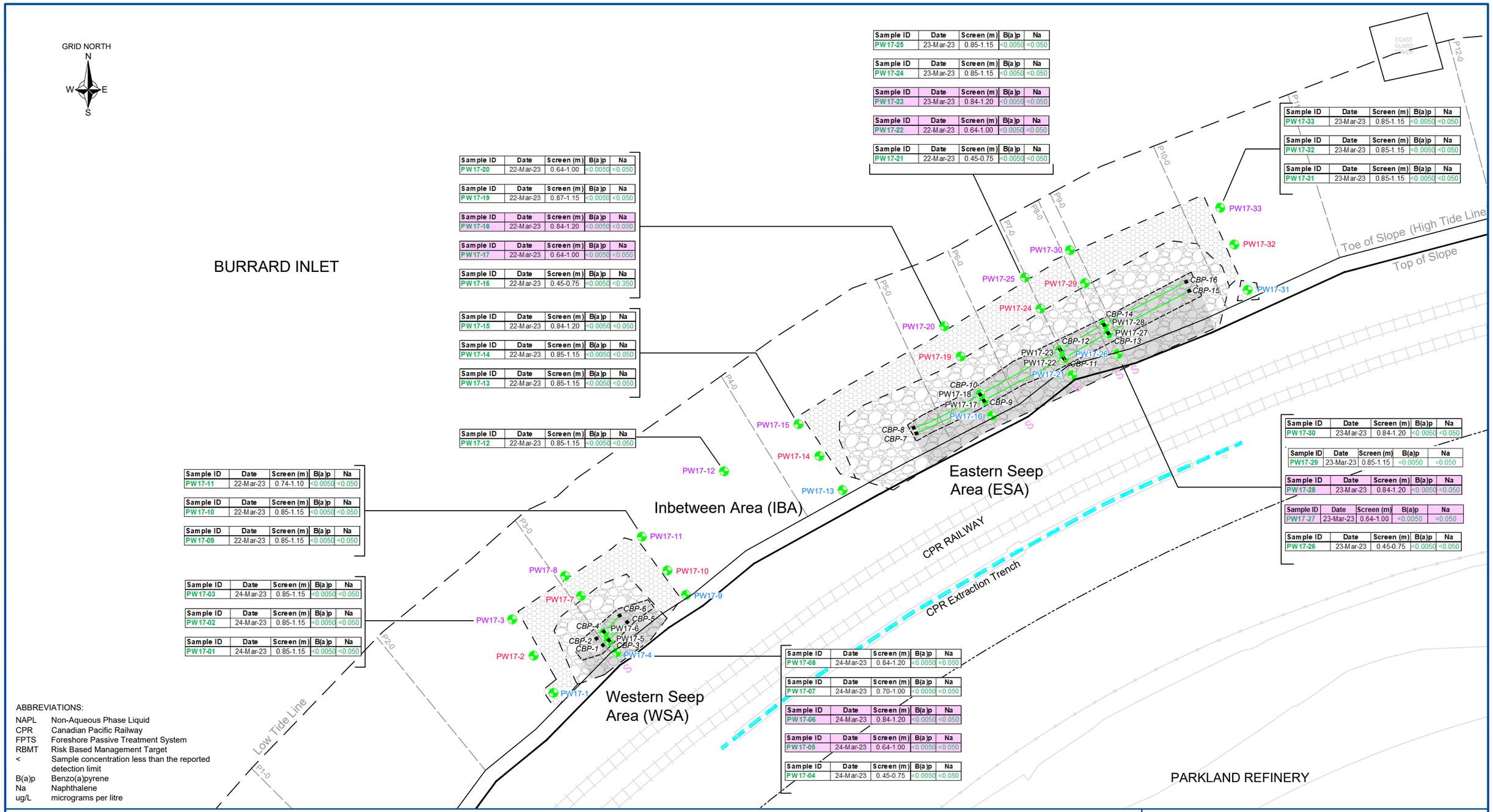
WATER ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS - 2023

Foreshore 2023 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 2023	60704318	NT/GS	0	FIGURE 3

FILE NAME: C:\Users\DobreR\AECOM\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG02 - Water Analytical Results for PHC (2023) - 60704318.dwg



Sample ID	Date	Screen (m)	B(a)p	Na
PW17-25	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-24	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-23	23-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-22	22-Mar-23	0.64-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-21	22-Mar-23	0.45-0.75	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-33	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-32	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-31	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-20	22-Mar-23	0.64-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-19	22-Mar-23	0.87-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-18	22-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-17	22-Mar-23	0.64-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-16	22-Mar-23	0.45-0.75	<0.0050	<0.350

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-15	22-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-14	22-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-13	22-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-12	22-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-11	22-Mar-23	0.74-1.10	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-10	22-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-09	22-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-03	24-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-02	24-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-01	24-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-30	23-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-29	23-Mar-23	0.85-1.15	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-28	23-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-27	23-Mar-23	0.64-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-26	23-Mar-23	0.45-0.75	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-08	24-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-07	24-Mar-23	0.70-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-06	24-Mar-23	0.84-1.20	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-05	24-Mar-23	0.64-1.00	<0.0050	<0.050

Sample ID	Date	Screen (m)	B(a)p	Na
PW17-04	24-Mar-23	0.45-0.75	<0.0050	<0.050

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

Sample concentration less than applicable RBMTs

Sample concentration greater than applicable RBMTs

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

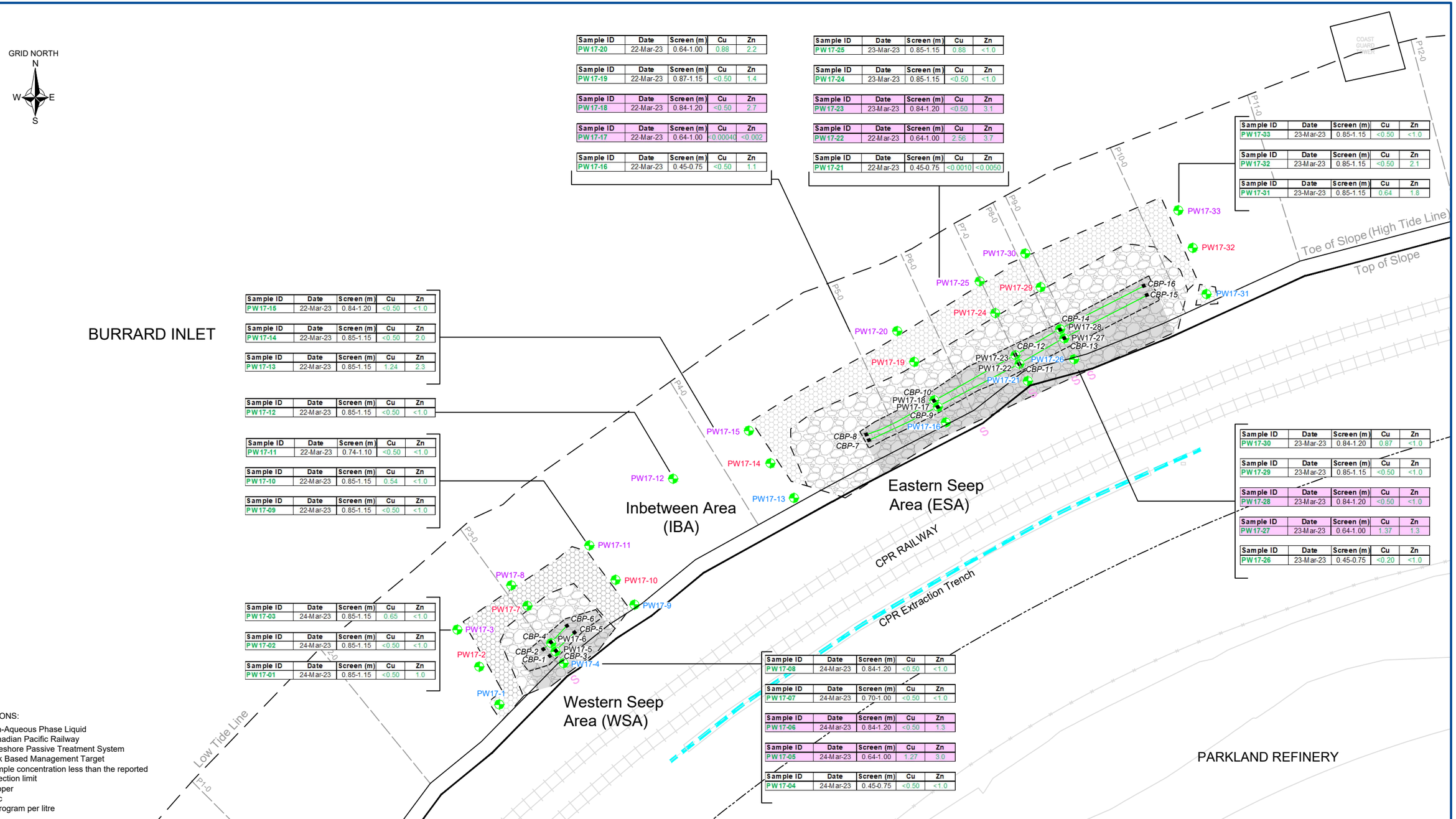
WATER ANALYTICAL RESULTS FOR POLYCYCLIC AROMATIC HYDROCARBONS - 2023

Foreshore 2023 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 2023	60704318	NT/GS	0	FIGURE 4

FILE NAME: C:\Users\DobreR\AECOM\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG03 - Water Analytical Results for PAH (2023) 60704318.dwg



Sample ID	Date	Screen (m)	Cu	Zn
PW17-20	22-Mar-23	0.64-1.00	0.88	2.2

Sample ID	Date	Screen (m)	Cu	Zn
PW17-19	22-Mar-23	0.87-1.15	<0.50	1.4

Sample ID	Date	Screen (m)	Cu	Zn
PW17-18	22-Mar-23	0.84-1.20	<0.50	2.7

Sample ID	Date	Screen (m)	Cu	Zn
PW17-17	22-Mar-23	0.64-1.00	<0.00040	<0.002

Sample ID	Date	Screen (m)	Cu	Zn
PW17-16	22-Mar-23	0.45-0.75	<0.50	1.1

Sample ID	Date	Screen (m)	Cu	Zn
PW17-25	23-Mar-23	0.85-1.15	0.88	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-24	23-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-23	23-Mar-23	0.84-1.20	<0.50	3.1

Sample ID	Date	Screen (m)	Cu	Zn
PW17-22	22-Mar-23	0.64-1.00	2.56	3.7

Sample ID	Date	Screen (m)	Cu	Zn
PW17-21	22-Mar-23	0.45-0.75	<0.0010	<0.0050

Sample ID	Date	Screen (m)	Cu	Zn
PW17-33	23-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-32	23-Mar-23	0.85-1.15	<0.50	2.1

Sample ID	Date	Screen (m)	Cu	Zn
PW17-31	23-Mar-23	0.85-1.15	0.64	1.8

Sample ID	Date	Screen (m)	Cu	Zn
PW17-15	22-Mar-23	0.84-1.20	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-14	22-Mar-23	0.85-1.15	<0.50	2.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-13	22-Mar-23	0.85-1.15	1.24	2.3

Sample ID	Date	Screen (m)	Cu	Zn
PW17-12	22-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-11	22-Mar-23	0.74-1.10	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-10	22-Mar-23	0.85-1.15	0.54	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-09	22-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-03	24-Mar-23	0.85-1.15	0.65	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-02	24-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-01	24-Mar-23	0.85-1.15	<0.50	1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-08	24-Mar-23	0.84-1.20	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-07	24-Mar-23	0.70-1.00	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-06	24-Mar-23	0.84-1.20	<0.50	1.3

Sample ID	Date	Screen (m)	Cu	Zn
PW17-05	24-Mar-23	0.64-1.00	1.27	3.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-04	24-Mar-23	0.45-0.75	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-30	23-Mar-23	0.84-1.20	0.87	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-29	23-Mar-23	0.85-1.15	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-28	23-Mar-23	0.84-1.20	<0.50	<1.0

Sample ID	Date	Screen (m)	Cu	Zn
PW17-27	23-Mar-23	0.64-1.00	1.37	1.3

Sample ID	Date	Screen (m)	Cu	Zn
PW17-26	23-Mar-23	0.45-0.75	<0.20	<1.0

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

Sample concentration less than applicable RBMTs

Sample concentration greater than applicable RBMTs

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

metres
0 10 20

AECOM

WATER ANALYTICAL RESULTS FOR DISSOLVED METALS - 2023

Foreshore 2023 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 2023	60704318	NT/GS	0	FIGURE 5

FILE NAME: C:\Users\DobreR\AECOM\Parkland Burnaby Refinery - CAD Support - General\2022 Parkland Refinery Foreshore Monitoring Figure Request\FIG04 - Water Analytical Results for Metals (2023) 60704318.dwg

A
NORTH

A'
SOUTH

PINK BACKGROUND =
FPTS TREATMENT CELL SAMPLE

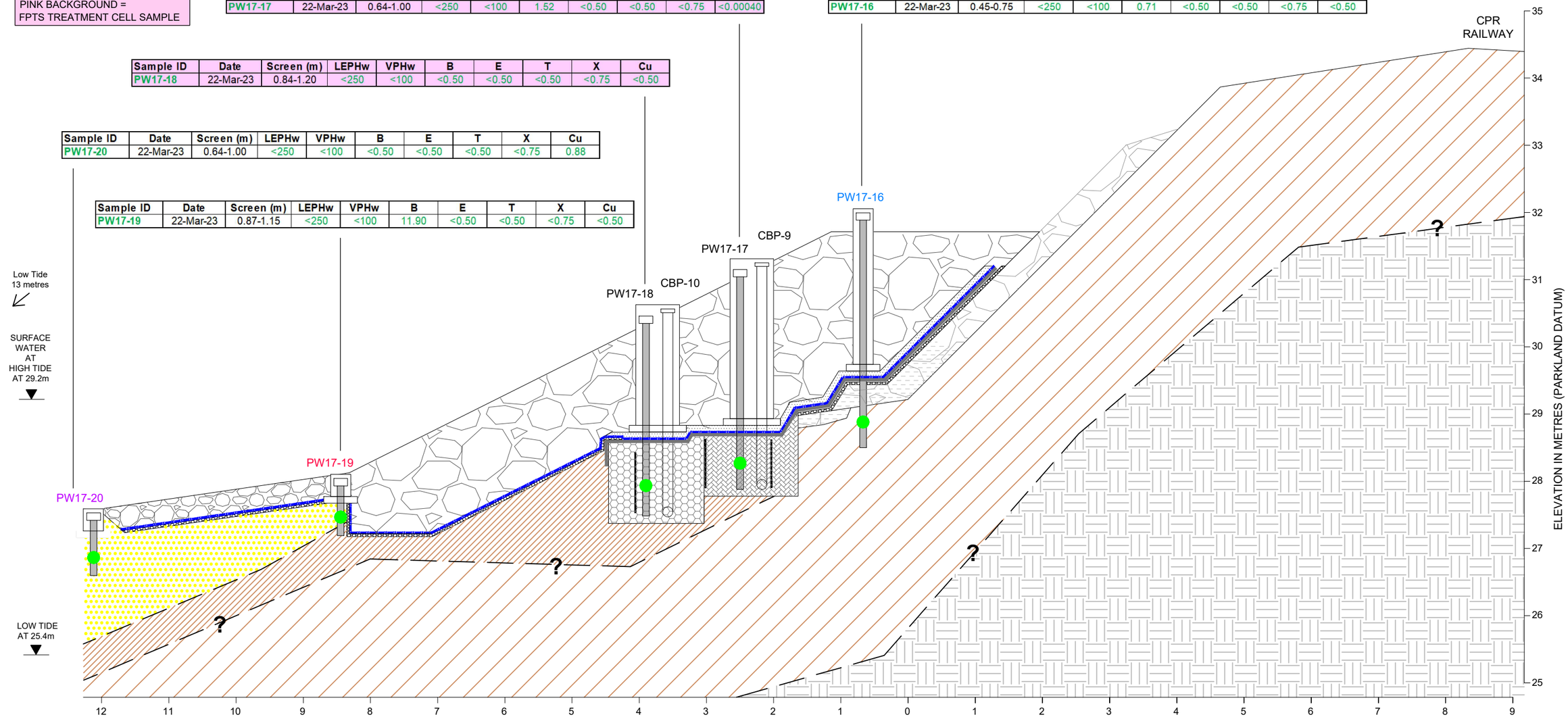
Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-17	22-Mar-23	0.64-1.00	<250	<100	1.52	<0.50	<0.50	<0.75	<0.00040

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-16	22-Mar-23	0.45-0.75	<250	<100	0.71	<0.50	<0.50	<0.75	<0.50

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-18	22-Mar-23	0.84-1.20	<250	<100	<0.50	<0.50	<0.50	<0.75	<0.50

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-20	22-Mar-23	0.64-1.00	<250	<100	<0.50	<0.50	<0.50	<0.75	0.88

Sample ID	Date	Screen (m)	LEPHw	VPHw	B	E	T	X	Cu
PW17-19	22-Mar-23	0.87-1.15	<250	<100	11.90	<0.50	<0.50	<0.75	<0.50



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, 2023

Foreshore 2023 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 2023	60704318	NT/GS	0	FIGURE 6

FILE NAME: C:\Users\DobreR\AECOM\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 (2023) - 60704318.dwg

Tables

TABLE 1
POREWATER MONITORING DATA (JULY 2022 - MARCH 2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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	13-Jul-22	9:57	11:00	1.319	29.12	50	0.85-1.15	20	---	ND	0.865	28.26	---
PW17-01	07-Oct-22	9:04	9:00	1.337	29.12	50	0.85-1.15	30	---	ND	0.614	28.51	---
PW17-01	27-Jan-23	15:21	17:00	1.32	29.12	50	0.85-1.15	0	---	ND	0.623	28.50	---
PW17-01	24-Mar-23	13:19	16:48	1.328	29.12	50	0.85-1.15	0	---	ND	0.683	28.44	DUP-01, Clear
PW17-02	24-Mar-23	13:25	16:48	1.216	27.72	50	0.85-1.16	0	---	ND	0.529	27.19	Clear
PW17-03	23-Mar-23	13:32	15:55	1.355	27.24	50	0.85-1.15	0	---	ND	0.180	27.06	Clear
PW17-04	13-Jul-22	9:45	11:00	3.375	31.19	50	0.45-0.75	0	---	ND	2.883	28.31	---
PW17-04	07-Oct-22	8:58	9:00	3.397	31.19	50	0.45-0.75	0	---	ND	2.980	28.21	---
PW17-04	27-Jan-23	15:19	17:00	3.352	31.19	50	0.45-0.75	0	---	ND	2.855	28.34	---
PW17-04	24-Mar-23	12:05	16:48	3.397	31.19	50	0.45-0.75	0	---	ND	2.865	28.33	Clear
PW17-05	13-Jul-22	9:50	11:00	3.096	30.22	50	0.64-1.00	0	---	ND	2.080	28.14	---
PW17-05	07-Oct-22	9:01	9:00	3.102	30.22	50	0.64-1.00	0	---	ND	2.188	28.03	---
PW17-05	27-Jan-23	15:16	17:00	3.100	30.22	50	0.64-1.00	0	---	ND	2.030	28.19	---
PW17-05	24-Mar-23	13:00	16:48	3.113	30.22	50	0.64-1.00	5	---	ND	1.879	28.34	Clear
PW17-06	24-Mar-23	12:45	16:48	3.124	29.79	50	0.84-1.20	0	---	ND	1.795	28.00	Clear
PW17-07	24-Mar-23	13:49	16:48	1.120	27.29	50	0.70-1.00	0	---	ND	0.323	26.97	Clear
PW17-08	24-Mar-23	13:56	16:48	1.355	26.6	50	0.84-1.20	0	---	ND	0.242	26.358	Clear
PW17-09	13-Jul-22	9:35	11:00	1.364	28.55	50	0.85-1.15	20	---	ND	0.596	27.95	---
PW17-09	07-Oct-22	8:56	9:00	1.378	28.55	50	0.85-1.15	35	---	ND	0.416	28.13	---
PW17-09	27-Jan-23	15:13	17:00	1.332	28.55	50	0.85-1.15	0	---	ND	0.357	28.19	---
PW17-09	22-Mar-23	14:35	15:01	1.373	28.55	50	0.85-1.15	0	---	ND	0.409	28.14	Clear
PW17-10	22-Mar-23	14:16	15:01	1.369	27.25	50	0.85-1.15	0	---	ND	0.263	26.99	Clear
PW17-11	22-Mar-23	14:18	15:01	1.450	26.72	50	0.74-1.10	0	---	ND	0.314	26.41	Clear
PW17-12	22-Mar-23	14:01	15:01	1.467	27.03	50	0.85-1.15	0	---	ND	0.280	26.75	Clear
PW17-13	13-Jul-22	9:31	11:00	1.319	28.9	50	0.85-1.15	15	---	ND	0.452	28.45	---
PW17-13	07-Oct-22	8:52	9:00	1.338	28.9	50	0.85-1.15	5	---	ND	0.350	28.55	---
PW17-13	27-Jan-23	15:08	17:00	1.315	28.9	50	0.85-1.15	0	---	ND	0.355	28.55	---
PW17-13	22-Mar-23	13:58	15:01	1.321	28.9	50	0.85-1.15	0	---	ND	0.375	28.53	Clear
PW17-14	22-Mar-23	13:48	15:01	1.397	27.83	50	0.85-1.15	0	---	ND	0.105	27.73	Clear
PW17-15	22-Mar-23	13:53	15:01	1.398	27.03	50	0.84-1.20	0	---	ND	0.155	26.88	Clear, DUP-02
PW17-16	13-Jul-22	9:16	11:00	3.258	31.44	50	0.45-0.75	0	---	ND	2.635	28.81	---
PW17-16	07-Oct-22	8:46	9:00	3.282	31.44	50	0.45-0.75	0	---	ND	2.918	28.52	---
PW17-16	27-Jan-23	15:01	17:00	3.248	31.44	50	0.45-0.75	0	---	ND	2.628	28.81	---

TABLE 1
POREWATER MONITORING DATA (JULY 2022 - MARCH 2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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
PW17-16	22-Mar-23	12:15	15:01	3.265	31.44	50	0.45-0.75	0	---	ND	2.643	28.80	Clear, Hydrocarbon odour
PW17-17	13-Jul-22	9:22	11:00	3.192	30.73	50	0.64-1.00	0	---	ND	2.005	28.73	---
PW17-17	07-Oct-22	8:48	9:00	3.212	30.73	50	0.64-1.00	0	---	ND	2.245	28.49	---
PW17-17	27-Jan-23	15:04	17:00	3.195	30.73	50	0.64-1.00	0	---	ND	1.981	28.75	---
PW17-17	22-Mar-23	12:15	15:01	3.211	30.73	50	0.64-1.00	0	---	ND	1.675	29.06	Clear
PW17-18	22-Mar-23	12:45	15:01	3.410	30.6	50	0.84-1.20	0	---	ND	1.859	28.74	Clear
PW17-19	22-Mar-23	13:05	15:01	1.335	28.210	50	0.87-1.15	0	---	ND	0.454	27.76	Cloudy, slight hydrocarbon odour
PW17-20	22-Mar-23	13:02	15:01	1.494	27.58	50	0.64-1.00	15	---	ND	0.364	27.22	Clear
PW17-21	13-Jul-22	9:11	11:00	3.369	31.38	20	0.45-0.75	0	---	ND	2.479	28.90	---
PW17-21	07-Oct-22	9:09	9:00	3.360	31.38	20	0.45-0.75	0	---	ND	2.811	28.57	---
PW17-21	27-Jan-23	15:29	17:00	3.560	31.38	20	0.45-0.75	0	---	ND	2.400	28.98	---
PW17-21	22-Mar-23	11:41	15:01	3.360	31.38	20	0.45-0.75	0	---	ND	2.331	29.05	Clear
PW17-22	13-Jul-22	9:04	11:00	3.506	31.14	50	0.64-1.00	0	---	ND	2.357	28.78	---
PW17-22	07-Oct-22	8:43	9:00	3.533	31.14	50	0.64-1.00	0	---	ND	2.634	28.51	---
PW17-22	27-Jan-23	14:57	17:00	3.515	31.14	50	0.64-1.00	0	---	ND	2.293	28.85	---
PW17-22	22-Mar-23	11:44	15:01	3.549	31.14	50	0.64-1.00	0	---	ND	2.284	28.86	Clear
PW17-23	23-Mar-23	13:30	15:55	3.230	30.58	50	0.84-1.20	0	---	ND	1.739	28.84	Clear
PW17-24	23-Mar-23	13:15	15:55	1.349	28.12	50	0.85-1.15	0	---	ND	0.730	27.39	Clear
PW17-25	23-Mar-23	13:12	15:55	1.275	27.430	50	0.85-1.15	0	---	ND	0.115	27.32	Clear
PW17-26	13-Jul-22	8:54	11:00	3.803	31.81	50	0.45-0.75	0	---	ND	2.918	28.89	---
PW17-26	07-Oct-22	8:33	9:00	3.809	31.81	50	0.45-0.75	0	---	ND	3.236	28.57	---
PW17-26	27-Jan-23	14:53	17:00	3.812	31.81	50	0.45-0.75	0	---	ND	2.843	28.97	---
PW17-26	23-Mar-23	12:06	15:55	3.809	31.81	50	0.45-0.75	0	---	ND	2.820	28.99	Clear
PW17-27	13-Jul-22	8:48	11:00	3.805	31.4	50	0.64-1.00	0	---	ND	2.593	28.81	---
PW17-27	07-Oct-22	8:36	9:00	3.814	31.4	50	0.64-1.00	0	---	ND	2.891	28.51	---
PW17-27	27-Jan-23	14:49	17:00	3.795	31.4	50	0.64-1.00	0	---	ND	2.549	28.85	---
PW17-27	23-Mar-23	12:21	15:55	3.822	31.4	50	0.64-1.00	0	---	ND	2.546	28.85	Clear

TABLE 1
POREWATER MONITORING DATA (JULY 2022 - MARCH 2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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
PW17-28	23-Mar-23	12:25	15:55	3.249	30.53	50	0.84-1.20	0	---	ND	1.577	28.95	Clear
PW17-29	23-Mar-23	12:50	15:55	1.410	28.24	50	0.85-1.15	0	---	ND	0.494	27.75	Clear
PW17-30	23-Mar-23	12:55	15:55	1.375	27.39	50	0.84-1.20	0	---	ND	0.120	27.27	Clear
PW17-31	13-Jul-22	8:42	11:00	1.260	29.31	50	0.85-1.15	5	---	ND	0.369	28.94	Lid handle broken, difficult to open
PW17-31	07-Oct-22	9:21	9:00	1.278	29.31	50	0.85-1.15	0	---	ND	0.359	28.95	Lid fixed
PW17-31	27-Jan-23	14:44	17:00	1.255	29.31	50	0.85-1.15	0	---	ND	0.263	29.05	---
PW17-31	23-Mar-23	11:42	15:55	1.271	29.31	50	0.85-1.15	0	---	ND	0.390	28.92	Clear, DUP-03
PW17-32	23-Mar-23	11:54	15:55	1.354	27.58	50	0.85-1.15	0	---	ND	0.621	26.96	Clear
PW17-33	23-Mar-23	12:40	15:55	1.285	27.53	50	0.85-1.15	10	---	ND	0.669	26.86	Clear

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 (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	VA23A6459	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-1 (PW17-01)	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	VA23A6459	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											24-Mar-23		---	---	---	---	---	---
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	VA23A6459	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	<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	24-Mar-23	VA23A6459	<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	24-Mar-23	VA23A6459	<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	24-Mar-23	VA23A6459	<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	24-Mar-23	VA23A6313	<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	24-Mar-23	VA23A6313	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-2 (PW17-15)	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	22-Mar-23	VA23A6238	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											22-Mar-23		---	---	---	---	---	---
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-23	VA23A6238	<250	<100	**0.71**	<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	22-Mar-23	VA23A6238	<250	<100	**1.52**	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<250	<100	**11.9**	<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	22-Mar-23	VA23A6238	<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	22-Mar-23	VA23A6238	<250	<100	**13.1**	<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	22-Mar-23	VA23A6238	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE 2
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	23-Mar-23	VA23A6313	<250	<100	**3.54**	<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	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<250	<100	<0.50	<0.50	<0.50	<0.75
DUP-3 (PW17-31)	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											23-Mar-23		---	---	---	---	---	---
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	<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	23-Mar-23	VA23A6313	<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	22-Mar-23	VA23A6238	<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	23-Mar-23	VA23A6313	<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	22-Mar-23	VA23A6238	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-2	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	22-Mar-23	VA23A6238	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-3	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-4	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	---	<100	<0.50	<0.50	<0.50	<0.75
TRAVEL BLANK-5	NA	NA	ALS	GC-MS/FID	NA	NA	NA	NA	NA	NA	24-Mar-23	VA23A6459	---	<100	<0.50	<0.50	<0.50	<0.75

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 3
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

														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)**	**Lithology of Screen Interval (Secondary)**	**Sample Date**	**Report**		
PW17-01	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	24-Mar-23	VA23A6459	<0.0050	<0.050
DUP-1 (PW17-01)	Porewater	PW17-01	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	24-Mar-23	VA23A6459	<0.0050	<0.050
QA/QC RPD												24-Mar-23		---	---
PW17-02	Porewater	PW17-02	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	24-Mar-23	VA23A6459	<0.0050	<0.050
PW17-03	Porewater	PW17-03	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	24-Mar-23	VA23A6313	<0.0050	<0.050
PW17-04	Porewater EAZ	PW17-04	ALS	Hexane	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	24-Mar-23	VA23A6313	<0.0050	<0.050
PW17-05	Porewater EAZ	PW17-05	ALS	Hexane	P	W FPTS	0.64-1.01	0.64	1	Imported sand and AG/OC	NA	24-Mar-23	VA23A6313	<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	NA	24-Mar-23	VA23A6459	<0.0050	<0.050
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	S	W FPTS	0.70-1.00	0.7	1	Beach sand	NA	24-Mar-23	VA23A6313	<0.0050	<0.050
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	24-Mar-23	VA23A6313	<0.0050	<0.050
PW17-09	Porewater	PW17-09	ALS	Hexane	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-10	Porewater	PW17-10	ALS	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-11	Porewater	PW17-11	ALS	Hexane	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-12	Porewater	PW17-12	ALS	Hexane	C	IBA	0.85-1.15	0.85	1.15	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-13	Porewater	PW17-13	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-14	Porewater	PW17-14	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-15	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
DUP-2 (PW17-15)	Porewater	PW17-15	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
QA/QC RPD												22-Mar-23		---	---
PW17-16	Porewater EAZ	PW17-16	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	22-Mar-23	VA23A6238	<0.0050	<0.350
PW17-17	Porewater EAZ	PW17-17	ALS	Hexane	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	NA	22-Mar-23	VA23A6238	<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	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-19	Porewater	PW17-19	ALS	Hexane	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	C	E FPTS	0.64-1.00	0.64	1	Beach sand	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
PW17-21	Porewater EAZ	PW17-21	ALS	Hexane	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	NA	22-Mar-23	VA23A6238	<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	NA	22-Mar-23	VA23A6238	<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	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-24	Porewater	PW17-24	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-25	Porewater	PW17-25	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<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	NA	23-Mar-23	VA23A6313	<0.0050	<0.050

TABLE 3
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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)	Lithology of Screen Interval (Secondary)	Sample Date	Report	Benzo(a)pyrene[3]	Naphthalene
Upper Cap Concentrations[1]														1	100
RBMT[2]														0.28	44
Reported Detection Limit														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	NA	23-Mar-23	VA23A6313	<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	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-29	Porewater	PW17-29	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-30	Porewater	PW17-30	ALS	Hexane	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
DUP-3 (PW17-31)	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
QA/QC RPD												23-Mar-23		---	---
PW17-32	Porewater	PW17-32	ALS	Hexane	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
PW17-33	Porewater	PW17-33	ALS	Hexane	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	NA	23-Mar-23	VA23A6313	<0.0050	<0.050
R-BLANK-1	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	NA	22-Mar-23	VA23A6238	<0.0050	<0.050
R-BLANK-2	NA	NA	ALS	Hexane	NA	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	<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 D.

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
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
NA - not applicable
NS - no standard established for indicated parameter.

TABLE 4
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-01	Porewater	PW17-01	CRC ICPMS (HMI)	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	VA23A6459	D	<0.50	**1.7**
DUP-1	Porewater	PW17-01	CRC ICPMS (HMI)	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	VA23A6459	D	<0.50	**1.3**
QA/QC RPD										24-Mar-23			---	---
PW17-02	Porewater	PW17-02	CRC ICPMS (HMI)	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	VA23A6459	D	<0.50	<1.0
PW17-03	Porewater	PW17-03	CRC ICPMS (HMI)	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	**0.65**	<1.0
PW17-04	Porewater EAZ	PW17-04	CRC ICPMS (HMI)	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	24-Mar-23	VA23A6459	D	<0.50	<1.0
PW17-05	Porewater EAZ	PW17-05	CRC ICPMS (HMI)	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	24-Mar-23	VA23A6459	D	**1.27**	**3.**
PW17-06	Porewater	PW17-06	CRC ICPMS (HMI)	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	24-Mar-23	VA23A6459	D	<0.50	**1.3**
PW17-07	Porewater EAZ	PW17-07	CRC ICPMS (HMI)	S	W FPTS	0.70-1.00	0.7	1	Beach sand	24-Mar-23	VA23A6313	D	<0.50	<1.0
PW17-08	Porewater	PW17-08	CRC ICPMS (HMI)	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	24-Mar-23	VA23A6313	D	<0.50	<1.0
PW17-09	Porewater	PW17-09	CRC ICPMS (HMI)	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	22-Mar-23	VA23A6238	D	<0.50	<1.0
PW17-10	Porewater	PW17-10	CRC ICPMS (HMI)	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-23	VA23A6238	D	**0.54**	<1.0
PW17-11	Porewater	PW17-11	CRC ICPMS (HMI)	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	22-Mar-23	VA23A6238	D	<0.50	<1.0
PW17-12	Porewater	PW17-12	CRC ICPMS (HMI)	C	IBA	0.85-1.15	0.85	1.15	Beach sand	22-Mar-23	VA23A6238	D	<0.50	<1.0
PW17-13	Porewater	PW17-13	CRC ICPMS (HMI)	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	22-Mar-23	VA23A6238	D	**1.24**	**2.3**
PW17-14	Porewater	PW17-14	CRC ICPMS (HMI)	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	22-Mar-23	VA23A6238	D	<0.50	**2.**
PW17-15	Porewater	PW17-15	CRC ICPMS (HMI)	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	22-Mar-23	VA23A6238	D	<0.50	<1.0
DUP-2 (PW17-15)	Porewater	PW17-15	CRC ICPMS (HMI)	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	22-Mar-23	VA23A6238	D	<0.50	<1.0
QA/QC RPD										22-Mar-23			---	---
PW17-16	Porewater EAZ	PW17-16	CRC ICPMS (HMI)	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-23	VA23A6238	D	<0.50	**1.1**
PW17-17	Porewater EAZ	PW17-17	CRC ICPMS	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-23	VA23A6238	D	<0.00040	<0.002
PW17-18	Porewater	PW17-18	CRC ICPMS (HMI)	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	22-Mar-23	VA23A6238	D	<0.50	**2.7**
PW17-19	Porewater	PW17-19	CRC ICPMS (HMI)	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	22-Mar-23	VA23A6238	D	<0.50	**1.4**
PW17-20	Porewater EAZ	PW17-20	CRC ICPMS (HMI)	C	E FPTS	0.64-1.00	0.64	1	Beach sand	22-Mar-23	VA23A6238	D	**0.88**	**2.2**
PW17-21	Porewater EAZ	PW17-21	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	22-Mar-23	VA23A6238	D	**<0.0010**	<0.0050
PW17-22	Porewater EAZ	PW17-22	CRC ICPMS (HMI)	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	22-Mar-23	VA23A6238	D	**2.56**	**3.7**
PW17-23	Porewater	PW17-23	CRC ICPMS (HMI)	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	23-Mar-23	VA23A6313	D	<0.50	**3.1**
PW17-24	Porewater	PW17-24	CRC ICPMS (HMI)	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	<0.50	<1.0
PW17-25	Porewater	PW17-25	CRC ICPMS (HMI)	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	**0.88**	<1.0
PW17-26	Porewater EAZ	PW17-26	CRC ICPMS	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	23-Mar-23	VA23A6313	D	<0.50	<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	23-Mar-23	VA23A6313	D	**1.37**	**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	23-Mar-23	VA23A6313	D	<0.50	<1.0
PW17-29	Porewater	PW17-29	CRC ICPMS (HMI)	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	23-Mar-23	VA23A6313	D	<0.50	<1.0
PW17-30	Porewater	PW17-30	CRC ICPMS (HMI)	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	23-Mar-23	VA23A6313	D	**0.87**	<1.0
PW17-31	Porewater	PW17-31	CRC ICPMS (HMI)	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	**0.64**	**1.8**
DUP-3 (PW17-31)	Porewater	PW17-31	CRC ICPMS (HMI)	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	**0.68**	**1.6**
QA/QC RPD										23-Mar-23			---	---

TABLE 4
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-32	Porewater	PW17-32	CRC ICPMS (HMI)	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	<0.50	**2.1**
PW17-33	Porewater	PW17-33	CRC ICPMS	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	23-Mar-23	VA23A6313	D	<0.50	<1.0
R-BLANK-1	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	22-Mar-23	VA23A6238	D	<0.20	<1.0
R-BLANK-2	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	D	<0.20	<1.0
TRAVEL BLANK-1	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	22-Mar-23	VA23A6238	T	<0.50	<3.0
TRAVEL BLANK-2	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	22-Mar-23	VA23A6238	T	<0.50	<3.0
TRAVEL BLANK-3	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	T	<0.50	<3.0
TRAVEL BLANK-4	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	23-Mar-23	VA23A6313	T	<0.50	<3.0
TRAVEL BLANK-5	NA	NA	HR ICPMS	NA	NA	NA	NA	NA	NA	24-Mar-23	VA23A6318	T	<0.50	<3.0

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
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.
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
T - total metals
U - Up gradient well (Post-construction)
W FPTS - Western Foreshore Passive Treatment System

TABLE 5
FIELD AND POREWATER QUALITY PARAMETERS (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

										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 [2]	**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	24-Mar-23	7.26	7.7	19600	17.97	159.1	8.46	1.12	18.98
PW17-02	Porewater	PW17-02	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	6.44	8.16	20903	19.03	114.9	7.53	1.03	20.06
PW17-03	Porewater	PW17-03	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.59	7.96	25984	24.34	60.5	8.92	4.3	25.09
PW17-04	Porewater EAZ	PW17-04	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	24-Mar-23	7.48	7.63	16184	14.67	185.9	3.26	220.4	15.75
PW17-05	Porewater EAZ	PW17-05	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	24-Mar-23	6.9	7.61	11650	10.73	95	5.53	2.29	11.5
PW17-06	Porewater	PW17-06	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	24-Mar-23	7.81	7.99	100227	8.84	203	3.7	0.47	9.876
PW17-07	Porewater EAZ	PW17-07	S	W FPTS	0.70-1.00	0.7	1	Beach sand	24-Mar-23	7.42	8.05	18170	16.35	53.2	3.71	0.88	17.45
PW17-08	Porewater	PW17-08	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	24-Mar-23	6.87	7.89	13471	11.9	131.2	4.4	39	13.01
PW17-09	Porewater	PW17-09	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	6.56	8.11	16260	14.31	0.2	3.81	0.95	15.3
PW17-10	Porewater	PW17-10	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	6.85	8.89	21734	19.42	198	3.98	1.84	20.39
PW17-11	Porewater	PW17-11	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	24-Mar-23	7.91	9.11	23526	21.03	63.8	4.54	3.2	21.03
PW17-12	Porewater	PW17-12	C	IBA	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.07	8.74	24712	22.52	226	9.75	17.8	23.33
PW17-13	Porewater	PW17-13	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	6.56	7.36	13950	12.52	70.6	6.96	1.23	13.61
PW17-14	Porewater	PW17-14	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	6.7	8.72	10712	9.08	787	4.36	3.66	10.12
PW17-15	Porewater	PW17-15	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	24-Mar-23	6.61	8.85	22525	20.25	43.4	9.21	3.26	21.22
PW17-16	Porewater EAZ	PW17-16	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	24-Mar-23	6.54	7.4	6164	5.27	30.1	1.77	9.64	6.085
PW17-17	Porewater EAZ	PW17-17	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	24-Mar-23	6.67	7.84	2118	1.64	162	0.97	53.1	2.04
PW17-18	Porewater	PW17-18	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	24-Mar-23	6.53	7.81	6642	5.59	138.9	3.86	10.6	6.441
PW17-19	Porewater	PW17-19	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	24-Mar-23	6.97	9.98	6169	4.86	28.2	4.33	51.1	5.649
PW17-20	Porewater EAZ	PW17-20	C	E FPTS	0.64-1.00	0.64	1	Beach sand	24-Mar-23	6.19	8.64	10695	9.14	141.8	4.71	16.7	10.15
PW17-21	Porewater EAZ	PW17-21	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	24-Mar-23	6.82	9.21	1118	0.81	38.7	6.88	1.85	1.036
PW17-22	Porewater EAZ	PW17-22	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	24-Mar-23	6.66	8.89	8165	6.71	271.4	3.57	1.11	7.65
PW17-23	Porewater	PW17-23	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	24-Mar-23	7.46	7.95	8089	6.62	99.5	7.07	1.7	7.674
PW17-24	Porewater	PW17-24	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.51	7.78	13623	12.04	94.8	4.12	3.35	13.16
PW17-25	Porewater	PW17-25	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.16	8.08	22658	20.83	35	7.87	8.47	21.76

TABLE 5
FIELD AND POREWATER QUALITY PARAMETERS (2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

										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 [2]	**Matrix**	**Sample Location**	**Well Location**	**Location Area**	**Screened Interval (m)**	**Top Screen (m)**	**Bottom Screen (m)**	**Lithology of Screen Interval (Primary)**	**Sample Date**								
PW17-26	Porewater EAZ	PW17-26	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	24-Mar-23	7.59	7.43	474	0.35	91.5	3.22	9.62	0.462
PW17-27	Porewater EAZ	PW17-27	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	24-Mar-23	7.36	7.35	1060	0.81	12.8	5	8.2	11.88
PW17-28	Porewater	PW17-28	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	24-Mar-23	8.27	7.38	2721	1.69	86.3	3	6.12	2.086
PW17-29	Porewater	PW17-29	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	24-Mar-23	6.59	7.78	12559	10.79	55.5	4	12.9	11.88
PW17-30	Porewater	PW17-30	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	24-Mar-23	7.8	8.09	21057	19.23	95.6	6.45	0.69	20.22
PW17-31	Porewater	PW17-31	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.15	7.7	6698	5.63	117.3	71.9	1.07	6.5
PW17-32	Porewater	PW17-32	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	5.63	7.87	5867	4.85	82	4.4	48.4	5.654
PW17-33	Porewater	PW17-33	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	24-Mar-23	7.58	8.06	11879	10.29	93.6	2.25	4.12	11.39

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

TABLE 6
FORESHORE PASIVE TREATMENT SYSTEM INSPECTIONS (JULY 2022- MARCH 2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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
13-Jul-22	Eastern	Yes	Yes	No	Tall weeds growing on south sife of barrier, overhanging vegetation along south side. No growth on top of treatment cell or OBB layer	Yes	No	Most wells outside barrier have barnacle growth as well as minor chipping. PW17-31, wood plank removed, handle of concrete protector broken, difficult to open. TP1: Sand 0 - 0.1mbgs; Cobble from 0.1 - 0.4mbgs; liner encountered TP2: Sand 0 - 0.15mbgs; Cobble from 0.15 - 0.4mbgs; liner encountered TP3: Sand 0 - 0.2mbgs; Cobble from 0.2 - 0.4mbgs; water infiltrated into test pit, preventing further advancement.
	Western	Yes	Yes	No	Weeds that are small on southern edge of barrier, overhanging vegetation along south side. No growth along treatment cells or OBB layer	Yes	No	
07-Oct-22	Eastern	Yes	Yes	No	Tall weeds growing on south sife of barrier, overhanging vegetation along south side. No growth on top of treatment cell or OBB layer	Yes	No	Most wells outside barrier have barnacle growth as well as minor chipping. The concrete protectors of six wells (PW17-16, PW17-17, PW17-21, PW17-22, PW17-26, and PW17-26) associated with the Eastern FPTS have graffiti, no damage or writing observed on the inside of protectors. Handle for PW17-31 repaired.
	Western	Yes	Yes	No	Small weeds on southern edge of barrier, overhanging vegetation along south side. No growth along treatment cells or OBB layer	Yes	No	

TABLE 6
FORESHORE PASIVE TREATMENT SYSTEM INSPECTIONS (JULY 2022- MARCH 2023)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY

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
27-Jan-23	Eastern	Yes	Yes	No	Small weeds growing on south side of barrier. Overhanging vegetation along southern side. No growth on top of treatment or OBB layer.	Yes	No	Most wells outside barrier have barnacle growth as well as minor chipping. The concrete protectors of six wells (PW17-16, PW17-17, PW17-21, PW17-22, PW17-26, and PW17-27) associated with the Eastern FPTS have graffiti, no damage or writing observed on the inside of protectors.
	Western	Yes	Yes	No	Small weeds growing on south side of barrier. Overhanging vegetation along southern side. No growth on top of treatment or OBB layer.	Yes	No	
24-Mar-23	Eastern	Yes	Yes	No	Small weeds growing on south side of barrier. Overhanging vegetation along southern side. No growth on top of treatment cells or OBB surface layer.	Yes	No	Most wells outside barrier have barnacle growth, minor chipping. As reported in previous inspections, wells on the East FPTS upper barrier have graffiti on the outer concrete casing; no damage or writing observed on the inside.
	Western	Yes	Yes	No	Small weeds growing on south side of barrier. Overhanging vegetation along southern side. No growth on top of treatment cells or OBB surface layer.	Yes	No	

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:

shore Passive Treatment System
NM - Not monitored
B - Oleophilic biobarrier
NA - Not applicable
m bgs - metres below grround surface

Graphs

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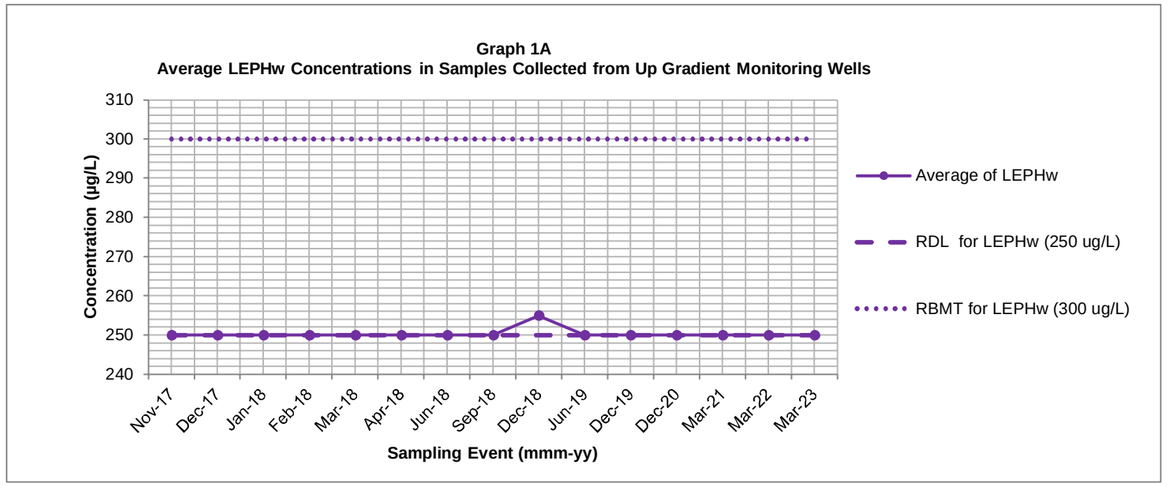
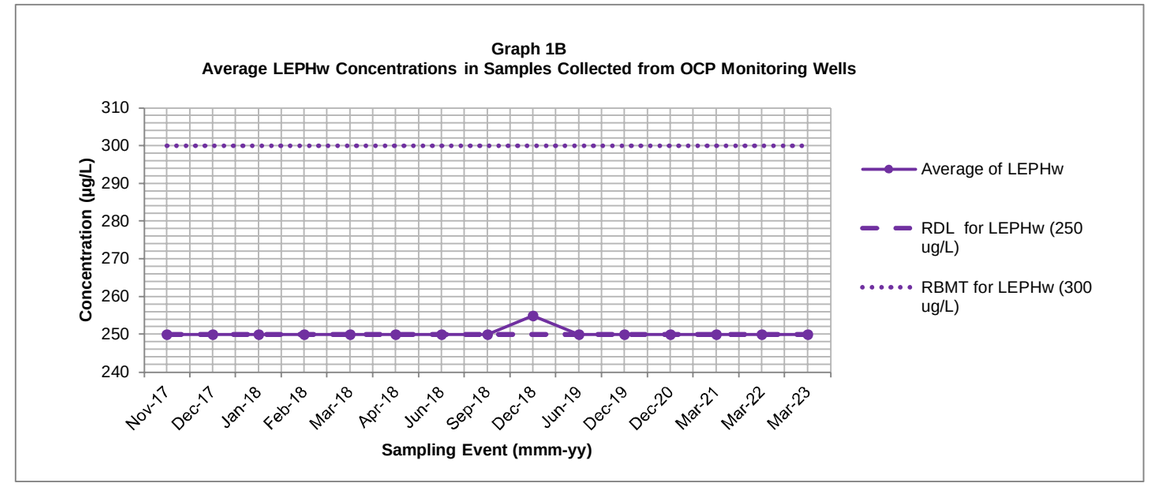
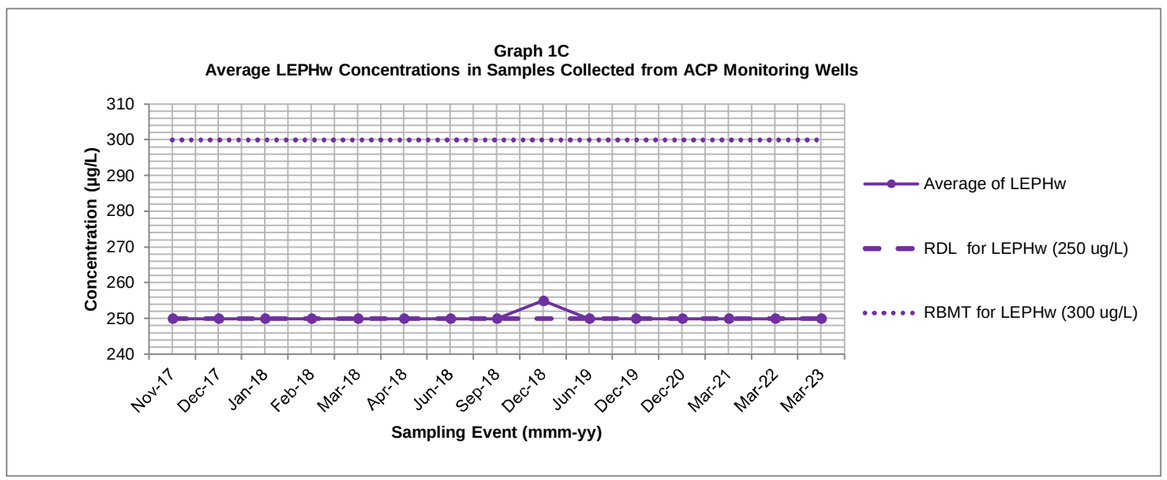
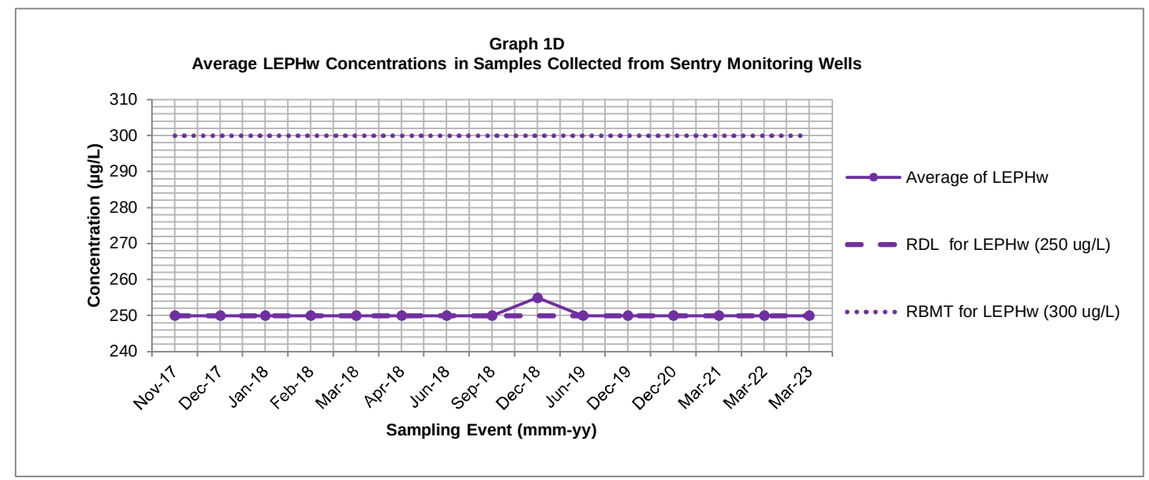
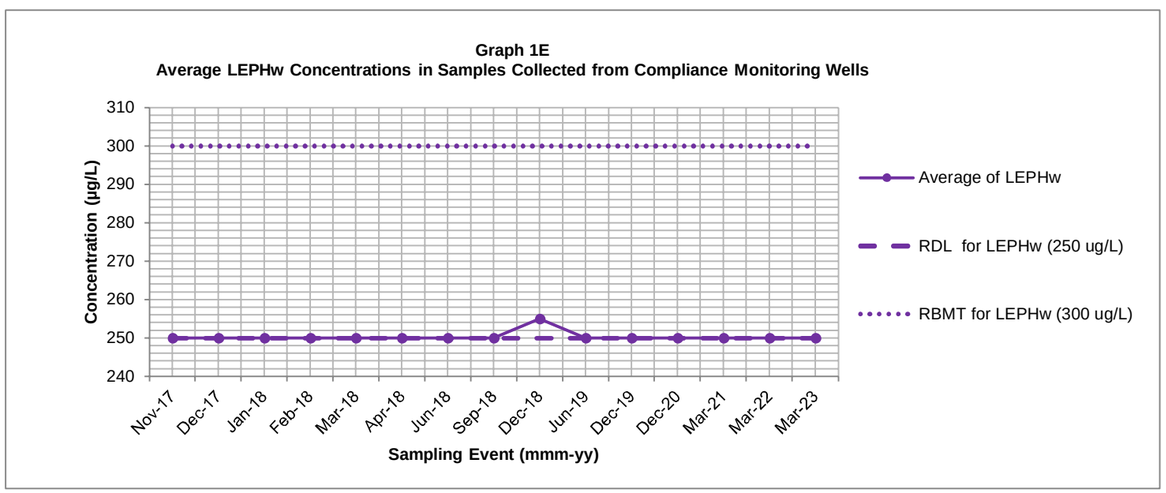

Graph 1A
Average LEPHw Concentrations in Samples Collected from Up Gradient Monitoring Wells
Concentration (µg/L)
310
300
290
280
270
260
250
240
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Jun-18
Sep-18
Dec-18
Jun-19
Dec-19
Dec-20
Mar-21
Mar-22
Mar-23
Sampling Event (mmm-yy)
Average of LEPHw
RDL for LEPHw (250 ug/L)
RBMT for LEPHw (300 ug/L)


Graph 1B
Average LEPHw Concentrations in Samples Collected from OCP Monitoring Wells
Concentration (µg/L)
310
300
290
280
270
260
250
240
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Jun-18
Sep-18
Dec-18
Jun-19
Dec-19
Dec-20
Mar-21
Mar-22
Mar-23
Sampling Event (mmm-yy)
Average of LEPHw
RDL for LEPHw (250 ug/L)
RBMT for LEPHw (300 ug/L)


Graph 1C
Average LEPHw Concentrations in Samples Collected from ACP Monitoring Wells
Concentration (µg/L)
310
300
290
280
270
260
250
240
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Jun-18
Sep-18
Dec-18
Jun-19
Dec-19
Dec-20
Mar-21
Mar-22
Mar-23
Sampling Event (mmm-yy)
Average of LEPHw
RDL for LEPHw (250 ug/L)
RBMT for LEPHw (300 ug/L)


Graph 1D
Average LEPHw Concentrations in Samples Collected from Sentry Monitoring Wells
Concentration (µg/L)
310
300
290
280
270
260
250
240
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Jun-18
Sep-18
Dec-18
Jun-19
Dec-19
Dec-20
Mar-21
Mar-22
Mar-23
Sampling Event (mmm-yy)
Average of LEPHw
RDL for LEPHw (250 ug/L)
RBMT for LEPHw (300 ug/L)


Graph 1E
Average LEPHw Concentrations in Samples Collected from Compliance Monitoring Wells
Concentration (µg/L)
310
300
290
280
270
260
250
240
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
Jun-18
Sep-18
Dec-18
Jun-19
Dec-19
Dec-20
Mar-21
Mar-22
Mar-23
Sampling Event (mmm-yy)
Average of LEPHw
RDL for LEPHw (250 ug/L)
RBMT for LEPHw (300 ug/L)

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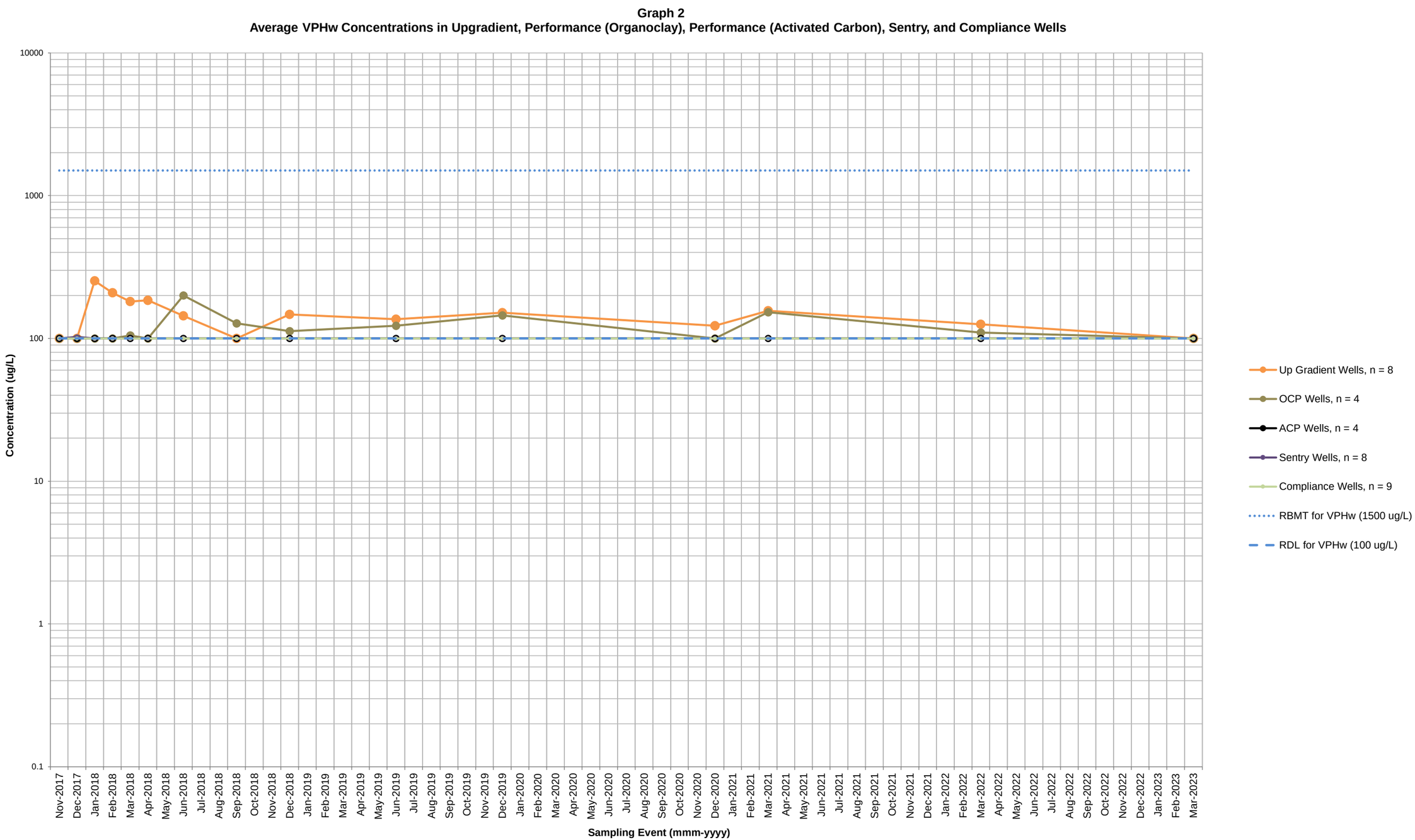
Graph 2
Average VPHw Concentrations in Upgradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells
Concentration (ug/L)
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
Jun-2018
Jul-2018
Aug-2018
Sep-2018
Oct-2018
Nov-2018
Dec-2018
Jan-2019
Feb-2019
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May-2019
Jun-2019
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May-2020
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Jul-2020
Aug-2020
Sep-2020
Oct-2020
Nov-2020
Dec-2020
Jan-2021
Feb-2021
Mar-2021
Apr-2021
May-2021
Jun-2021
Jul-2021
Aug-2021
Sep-2021
Oct-2021
Nov-2021
Dec-2021
Jan-2022
Feb-2022
Mar-2022
Apr-2022
May-2022
Jun-2022
Jul-2022
Aug-2022
Sep-2022
Oct-2022
Nov-2022
Dec-2022
Jan-2023
Feb-2023
Mar-2023
Up Gradient Wells, n = 8
OCP Wells, n = 4
ACP Wells, n = 4
Sentry Wells, n = 8
Compliance Wells, n = 9
RBMT for VPHw (1500 ug/L)
RDL for VPHw (100 ug/L)

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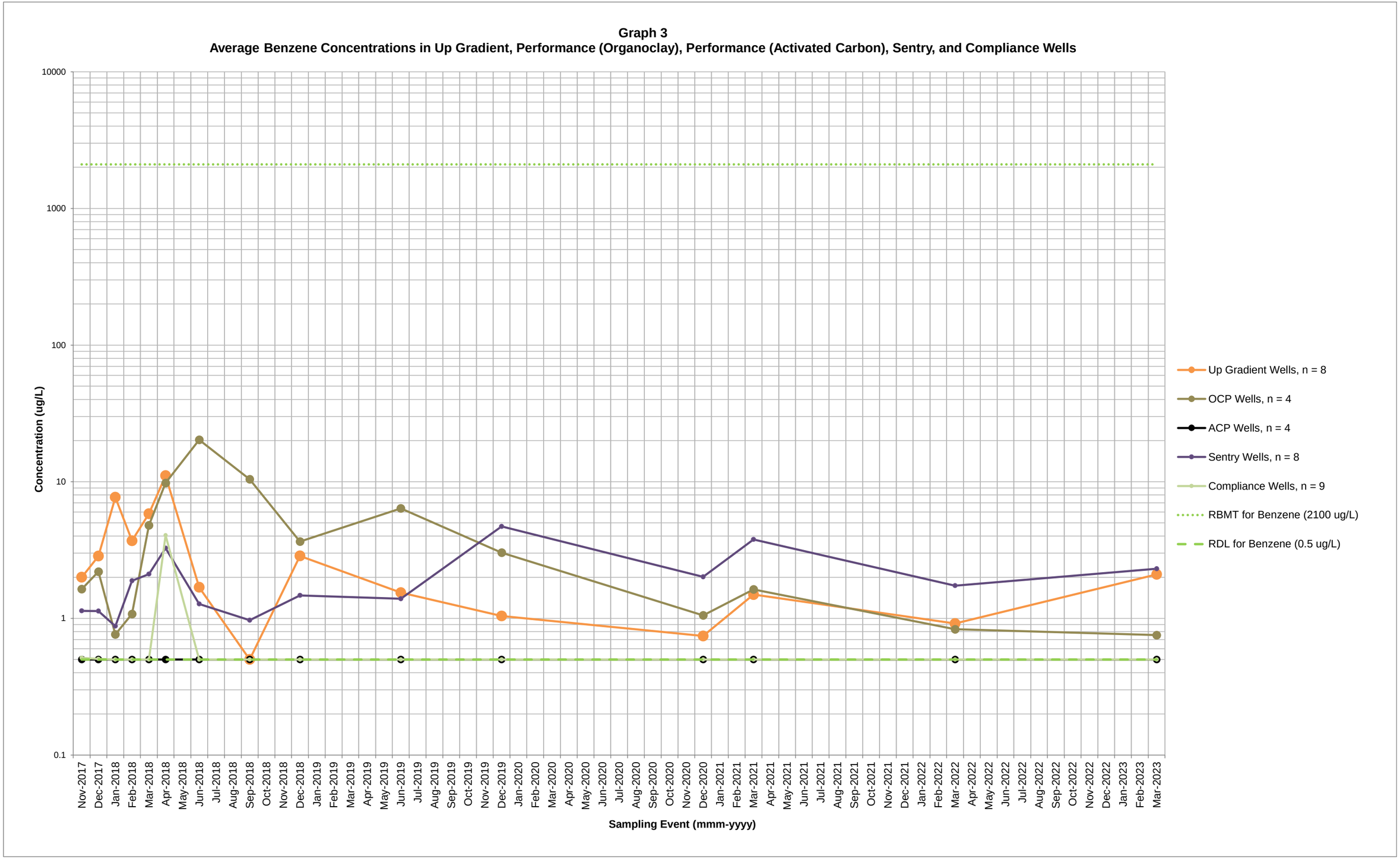
Graph 3
Average Benzene Concentrations in Up Gradient, Performance (Organoclay), Performance (Activated Carbon), Sentry, and Compliance Wells
Concentration (ug/L)
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
Jun-2018
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Jun-2022
Jul-2022
Aug-2022
Sep-2022
Oct-2022
Nov-2022
Dec-2022
Jan-2023
Feb-2023
Mar-2023
Up Gradient Wells, n = 8
OCP Wells, n = 4
ACP Wells, n = 4
Sentry Wells, n = 8
Compliance Wells, n = 9
RBMT for Benzene (2100 ug/L)
RDL for Benzene (0.5 ug/L)

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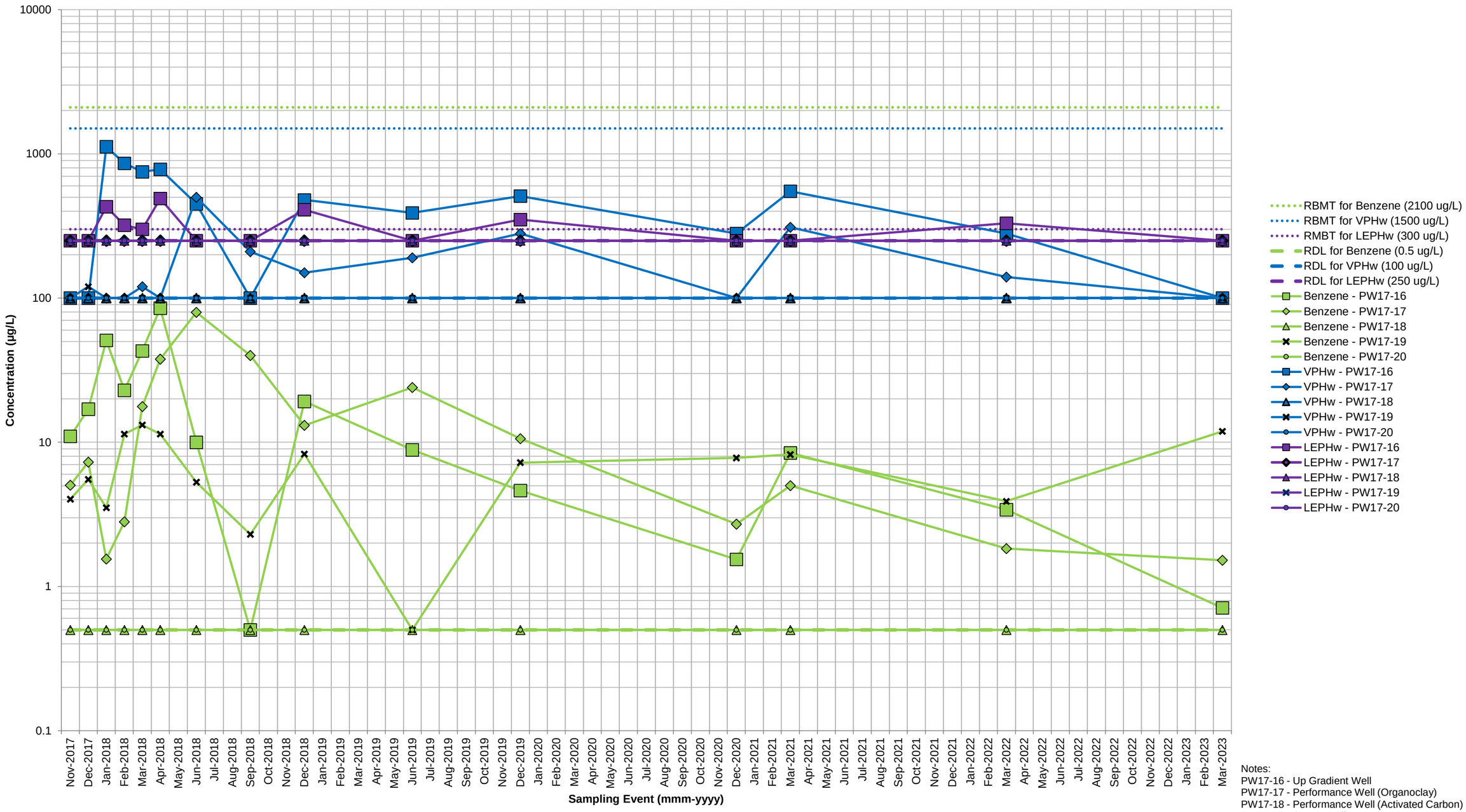
Graph 4
Concentrations of Benzene, VPHw and LEPHw in Porewater Wells (PW17-16, PW17-17, PW17-18, PW17-19 and PW17-20)



Notes:
PW17-16 - Up Gradient Well
PW17-17 - Performance Well (Organoclay)
PW17-18 - Performance Well (Activated Carbon)
PW17-19 - Sentry Well
PW17-20 - Compliance Well

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Graph 5
Concentrations of Benzene, VPHw and LEPHw in Performance (OC) Wells (PW17-5, PW17-17, PW17-22 and PW17-27)
Concentration (µg/L)
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
Jun-2018
Jul-2018
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Oct-2022
Nov-2022
Dec-2022
Jan-2023
Feb-2023
Mar-2023
RBMT for Benzene (2100 ug/L)
RBMT for VPHw (1500 ug/L)
RMBT for LEPHw (300 ug/L)
RDL for Benzene (0.5 ug/L)
RDL for VPHw (100 ug/L)
RDL for LEPHw (250 ug/L)
Benzene - PW17-5
Benzene - PW17-17
Benzene - PW17-22
Benzene - PW17-27
VPHw - PW17-5
VPHw - PW17-17
VPHw - PW17-22
VPHw - PW17-27
LEPHw - PW17-5
LEPHw - PW17-17
LEPHw - PW17-22
LEPHw - PW17-27

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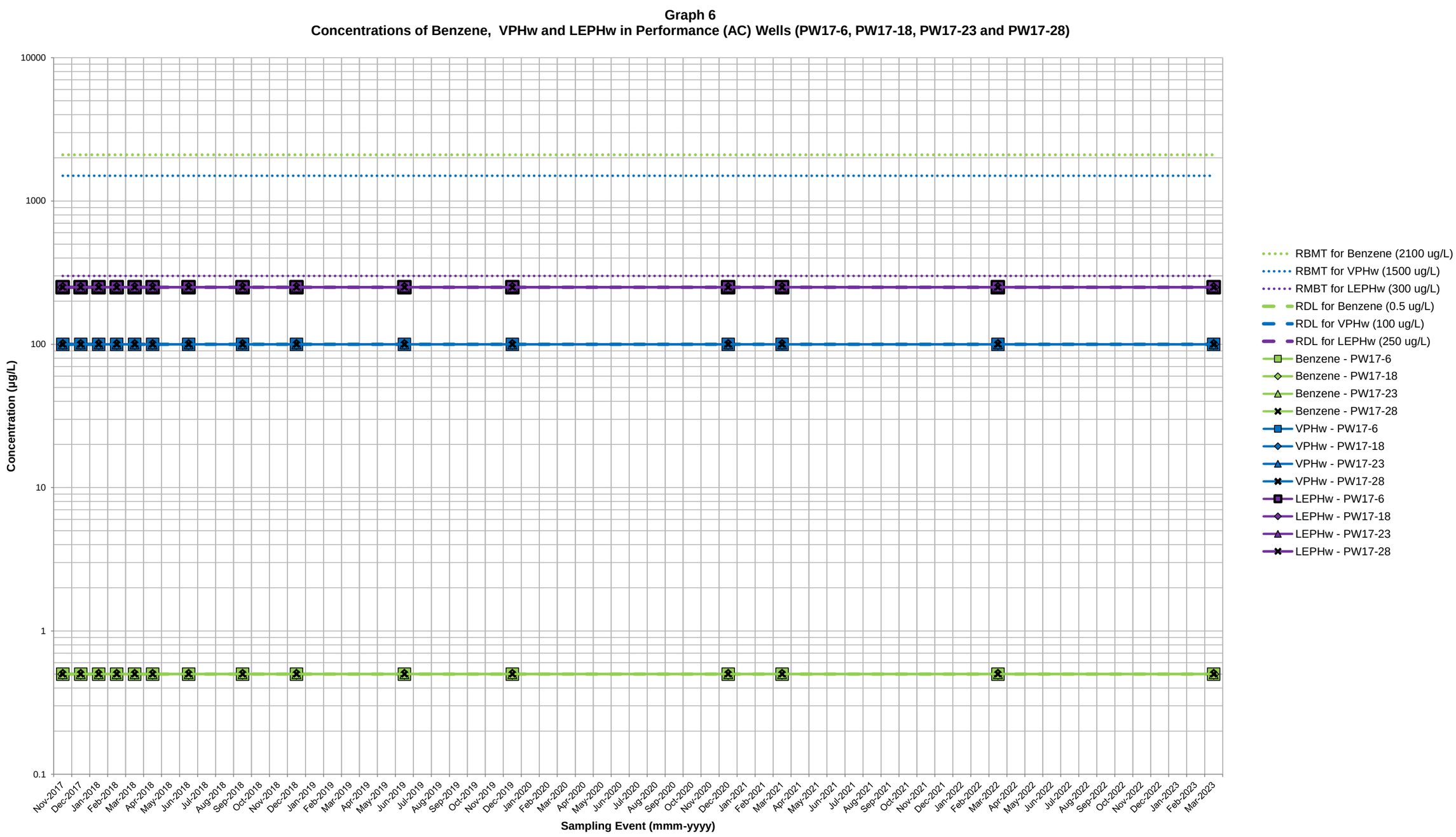
Graph 6
Concentrations of Benzene, VPHw and LEPHw in Performance (AC) Wells (PW17-6, PW17-18, PW17-23 and PW17-28)
Concentration (µg/L)
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
Jun-2018
Jul-2018
Aug-2018
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Oct-2018
Nov-2018
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Nov-2022
Dec-2022
Jan-2023
Feb-2023
Mar-2023
RBMT for Benzene (2100 ug/L)
RBMT for VPHw (1500 ug/L)
RMBT for LEPHw (300 ug/L)
RDL for Benzene (0.5 ug/L)
RDL for VPHw (100 ug/L)
RDL for LEPHw (250 ug/L)
Benzene - PW17-6
Benzene - PW17-18
Benzene - PW17-23
Benzene - PW17-28
VPHw - PW17-6
VPHw - PW17-18
VPHw - PW17-23
VPHw - PW17-28
LEPHw - PW17-6
LEPHw - PW17-18
LEPHw - PW17-23
LEPHw - PW17-28

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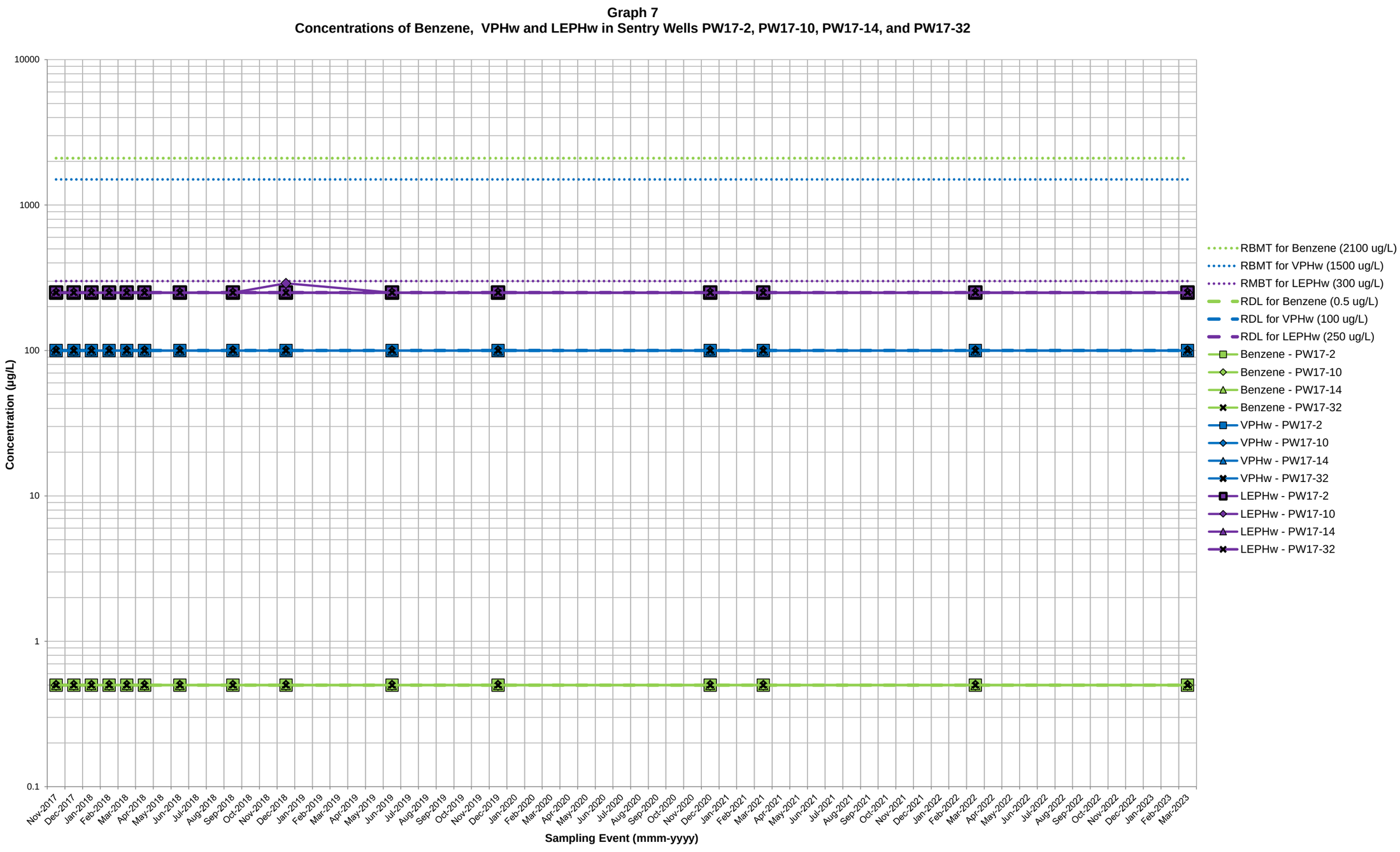
Graph 7
Concentrations of Benzene, VPHw and LEPHw in Sentry Wells PW17-2, PW17-10, PW17-14, and PW17-32
Concentration (µg/L)
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
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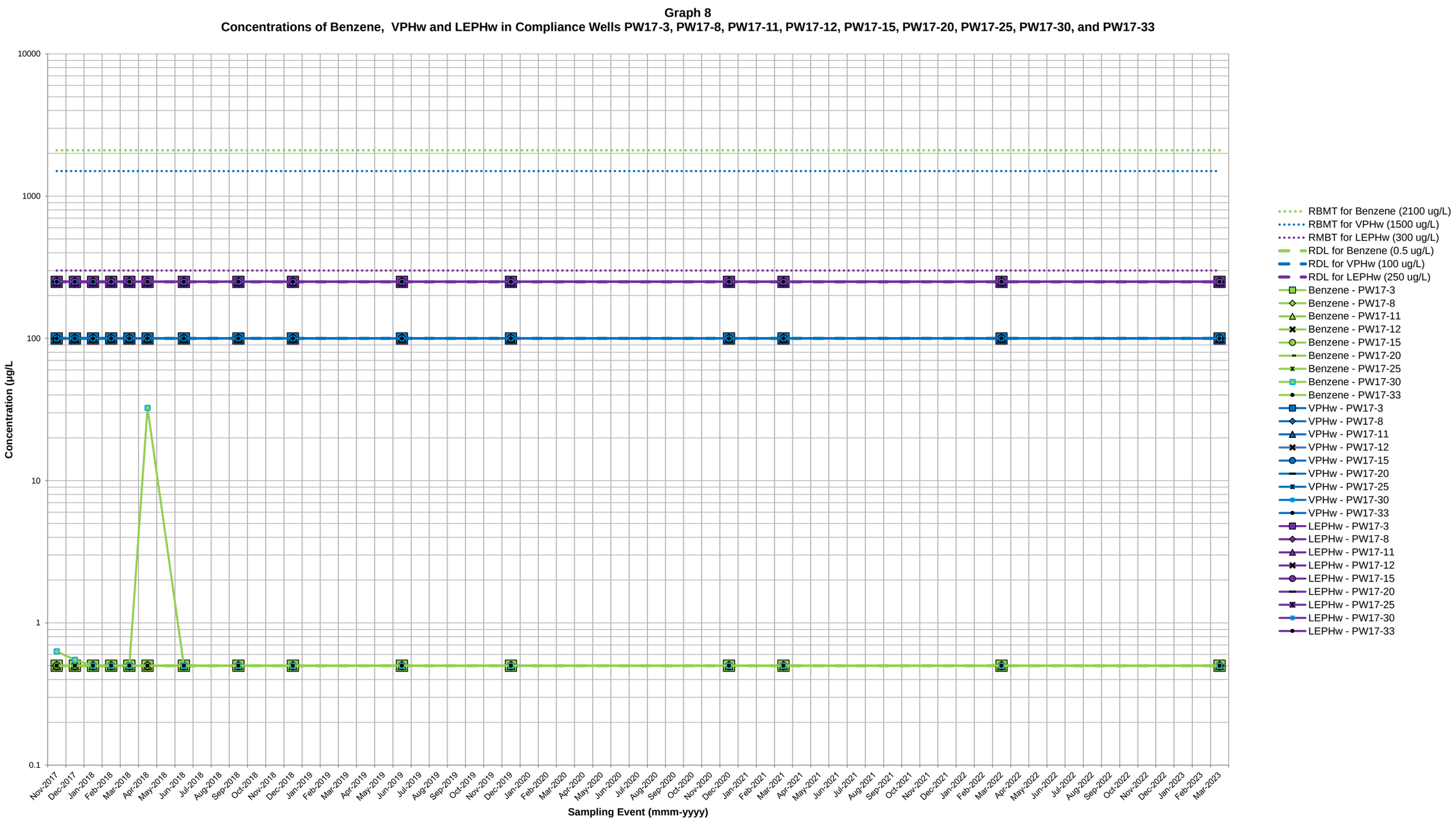
Feb-2023
Mar-2023
RBMT for Benzene (2100 ug/L)
RBMT for VPHw (1500 ug/L)
RMBT for LEPHw (300 ug/L)
RDL for Benzene (0.5 ug/L)
RDL for VPHw (100 ug/L)
RDL for LEPHw (250 ug/L)
Benzene - PW17-2
Benzene - PW17-10
Benzene - PW17-14
Benzene - PW17-32
VPHw - PW17-2
VPHw - PW17-10
VPHw - PW17-14
VPHw - PW17-32
LEPHw - PW17-2
LEPHw - PW17-10
LEPHw - PW17-14
LEPHw - 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
Concentration (µg/L
10000
1000
100
10
1
0.1
Sampling Event (mmm-yyyy)
Nov-2017
Dec-2017
Jan-2018
Feb-2018
Mar-2018
Apr-2018
May-2018
Jun-2018
Jul-2018
Aug-2018
Sep-2018
Oct-2018
Nov-2018
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May-2019
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Feb-2021
Mar-2021
Apr-2021
May-2021
Jun-2021
Jul-2021
Aug-2021
Sep-2021
Oct-2021
Nov-2021
Dec-2021
Jan-2022
Feb-2022
Mar-2022
Apr-2022
May-2022
Jun-2022
Jul-2022
Aug-2022
Sep-2022
Oct-2022
Nov-2022
Dec-2022
Jan-2023
Feb-2023
Mar-2023
RBMT for Benzene (2100 ug/L)
RBMT for VPHw (1500 ug/L)
RMBT for LEPHw (300 ug/L)
RDL for Benzene (0.5 ug/L)
RDL for VPHw (100 ug/L)
RDL for LEPHw (250 ug/L)
Benzene - PW17-3
Benzene - PW17-8
Benzene - PW17-11
Benzene - PW17-12
Benzene - PW17-15
Benzene - PW17-20
Benzene - PW17-25
Benzene - PW17-30
Benzene - PW17-33
VPHw - PW17-3
VPHw - PW17-8
VPHw - PW17-11
VPHw - PW17-12
VPHw - PW17-15
VPHw - PW17-20
VPHw - PW17-25
VPHw - PW17-30
VPHw - PW17-33
LEPHw - PW17-3
LEPHw - PW17-8
LEPHw - PW17-11
LEPHw - PW17-12
LEPHw - PW17-15
LEPHw - PW17-20
LEPHw - PW17-25
LEPHw - PW17-30
LEPHw - PW17-33

Appendix A

Post FPTS Construction Water Analytical Tables, 2017-2022

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	NA	E FPTS	SW	SW	SW	---	14-Jun-18	L2112693	<250.	<100.	<0.5	<0.5	<0.5	<0.75
P6-12-O	Surface Water	PW17-20	ALS	Hexane	NA	E FPTS	SW	SW	SW	---	12-Sep-18	L2163427	<250.	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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-5 (P6-12-O)	Surface Water	PW17-20	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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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**						
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	**2.51**	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-01	Porewater	PW17-01	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-01	Porewater	PW17-01	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-02	Porewater	PW17-02	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-02	Porewater	PW17-02	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-03	Porewater	PW17-03	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-03	Porewater	PW17-03	ALS	Hexane	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

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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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**						
PW17-03	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
PW17-03	Porewater	PW17-03	ALS	GC-MS/FID	C	W FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-04	Porewater EAZ	PW17-04	ALS	GC-MS/FID	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	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	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-05	Porewater EAZ	PW17-05	ALS	GC-MS/FID	P	W FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-06	Porewater	PW17-06	ALS	GC-MS/FID	P	W FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.50
PW17-07	Porewater EAZ	PW17-07	ALS	Hexane	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	Hexane	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

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
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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**						
PW17-07	Porewater EAZ	PW17-08	ALS	Hexane	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	Hexane	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	Hexane	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
PW17-07	Porewater EAZ	PW17-08	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-07	Porewater EAZ	PW17-07	ALS	GC-MS/FID	S	W FPTS	0.70-1.00	0.7	1	Beach sand	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-08	Porewater	PW17-08	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-08	Porewater	PW17-08	ALS	GC-MS/FID	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-09	Porewater	PW17-09	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-09	Porewater	PW17-09	ALS	GC-MS/FID	U	W FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-10	Porewater	PW17-10	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Dec-18	L2205028	<250	---	---	---	---	---
PW17-10	Porewater	PW17-10	ALS	Hexane	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	Hexane	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

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FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
PW17-10	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
PW17-10	Porewater	PW17-10	ALS	GC-MS/FID	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-11	Porewater	PW17-11	ALS	Hexane	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
PW17-11	Porewater	PW17-11	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-11	Porewater	PW17-11	ALS	GC-MS/FID	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-12	Porewater	PW17-12	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-12	Porewater	PW17-12	ALS	GC-MS/FID	C	IBA	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-13	Porewater	PW17-13	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-13	Porewater	PW17-13	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-14	Porewater	PW17-14	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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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**						
PW17-14	Porewater	PW17-14	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
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
PW17-14	Porewater	PW17-14	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-15	Porewater	PW17-15	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-15	Porewater	PW17-15	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	**11.**	**9.62**	<0.5	**4.46**
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	<250.	<100.	**17.**	**13.**	<0.5	**2.85**
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	**430.**	**1120.**	**50.9**	**120.**	**0.91**	**19.**
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	**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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-16	Porewater EAZ	PW17-16	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	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	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	Hexane	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	Hexane	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	Hexane	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

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PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
QA/QC RPD											13-Dec-17		---	---	4.4%	---	---	---
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	<250.	<100.	**1.55**	<0.5	<0.5	<0.75
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	<250.	<100.	**1.59**	<0.5	<0.5	<0.75
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	<250.	<100.	**2.81**	<0.5	<0.5	<0.75
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	<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	Hexane	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	Hexane	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
DUP-2(PW17-17)	Porewater EAZ	PW17-17	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-17	Porewater EAZ	PW17-17	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	8-Mar-22	VA22A4771	**250.**	**140.**	**1.83**	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-18	Porewater	PW17-18	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-19	Porewater	PW17-19	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
PW17-19	Porewater	PW17-19	ALS	Hexane	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	Hexane	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	Hexane	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
PW17-19	Porewater	PW17-19	ALS	GC-MS/FID	S	E FPTS	0.87-1.15	0.87	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	<250	<100	**3.9**	<0.50	<0.50	<0.75
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	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	Hexane	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	Hexane	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
PW17-20	Porewater EAZ	PW17-20	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-20	Porewater EAZ	PW17-20	ALS	GC-MS/FID	C	E FPTS	0.64-1.00	0.64	1	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-21	Porewater EAZ	PW17-21	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-21	Porewater EAZ	PW17-21	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											13-Dec-17		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											16-Jan-18		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											15-Feb-18		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**						
QA/QC RPD											22-Mar-18		---	---	---	---	---	---
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Dec-18		---	---	---	---	---	---
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Jun-19		---	---	---	---	---	---
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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	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
PW17-22	Porewater EAZ	PW17-22	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	**1.08**	**0.9**
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											6-Dec-18		---	---	---	---	---	---
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
QA/QC RPD											5-Jun-19		---	---	---	---	---	---
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-23	Porewater	PW17-23	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-24	Porewater	PW17-24	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-24	Porewater	PW17-24	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-25	Porewater	PW17-25	ALS	Hexane	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	Hexane	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		---	---	---	---	---	---

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
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
PW17-25	Porewater	PW17-25	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	**150.**	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-26	Porewater EAZ	PW17-26	ALS	GC-MS/FID	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	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	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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 (2017-2022)
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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**						
PW17-27	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		---	---	---	---	---	---
PW17-27	Porewater EAZ	PW17-27	ALS	GC-MS/FID	P	E FPTS	0.64-1.00	0.64	1	Imported sand and AG/OC	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250.	<100.	<0.5	<0.5	<0.5	<0.75
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	<250	<100	<0.50	<0.50	**0.5**	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<250	<100	<0.50	<0.50	<0.50	<0.75
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	<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
PW17-28	Porewater	PW17-28	ALS	GC-MS/FID	P	E FPTS	0.84-1.20	0.84	1.2	Imported sand and AG/PAC	9-Mar-22	VA22A4919	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-29	Porewater	PW17-29	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-29	Porewater	PW17-29	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Weathered Colluvium	7-Mar-22	VA22A4673	<250	<100	**6.99**	<0.50	<0.50	<0.75

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-30	Porewater	PW17-30	ALS	GC-MS/FID	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-31	Porewater	PW17-31	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-31	Porewater	PW17-31	ALS	GC-MS/FID	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	---	NS	NS	NS	NS	NS	NS
PW17-32	Porewater	PW17-32	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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
PW17-32	Porewater	PW17-32	ALS	GC-MS/FID	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<250	<100	<0.50	<0.50	<0.50	<0.75
PW17-33	Porewater	PW17-33	ALS	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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	Hexane	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

TABLE A1
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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	Hexane	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	Hexane	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
PW17-33	Porewater	PW17-33	ALS	Hexane	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
PW17-33	Porewater	PW17-33	ALS	GC-MS/FID	C	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	<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
R-BLANK-1	NA	NA	ALS	GC-MS/FID	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	8-Mar-22	VA22A4771	<250	<100	<0.50	<0.50	<0.50	<0.75
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

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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**						
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
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

TABLE A1
CONCENTRATIONS OF PETROLEUM HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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-5	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-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
TRAVEL BLANK-1	NA	NA	ALS	GC-MS/FID	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	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	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	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	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.
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 HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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 HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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-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 HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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
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 HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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
PW17-01	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	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
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

TABLE A2
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PARKLAND BURNABY REFINERY
FORESHORE 2023 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	<0.0050	<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	<0.0050	<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	<0.0050	<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	<0.0050	<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
PW17-03	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	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
PW17-04	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	15-Nov-17	L2023092	<0.005	<0.05
PW17-05	z	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

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CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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
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
PW17-05	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	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
PW17-06	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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-07	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
PW17-07	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	16-Nov-17	L2023753	<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-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
PW17-08	Porewater	PW17-08	ALS	Hexane	C	W FPTS	0.84-1.20	0.84	1.2	Beach sand				
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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-09	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
PW17-09	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	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
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
PW17-10	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	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
PW17-11	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	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

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CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
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PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-12	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
PW17-12	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	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
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
PW17-13	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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-14	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
PW17-14	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	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
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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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
PW17-16	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	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
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
PW17-17	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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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
PW17-18	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	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
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
PW17-19	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	14-Nov-17	L2022366	<0.005	<0.05

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-20	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
PW17-20	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	14-Nov-17	Monitoring well not sampled - infilled with sediment		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	12-Dec-17	Monitoring well not sampled - infilled with sediment		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	16-Jan-18	Monitoring well not sampled - infilled with sediment		
PW17-21	Porewater EAZ	PW17-21	ALS	---	U	E FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Feb-18	Monitoring well not sampled - infilled with sediment		
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
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
PW17-21	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	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	<0.005	<0.05
QA/QC RPD											13-Dec-17		---	---
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	<0.005	<0.05
QA/QC RPD											16-Jan-18		---	---
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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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	<0.005	<0.05
QA/QC RPD											15-Feb-18		---	---
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	<0.005	<0.05
QA/QC RPD											22-Mar-18		---	---
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	<0.005	<0.05
QA/QC RPD											14-Jun-18		---	---
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	<0.005	<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	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	<0.0050	<0.050
QA/QC RPD											5-Dec-18		---	---
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	<0.0050	<0.050
QA/QC RPD											5-Jun-19		---	---
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	<0.0050	<0.050
QA/QC RPD											12-Dec-19		---	---
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	<0.0050	<0.050
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
PW17-22	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	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
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	<0.0050	<0.050
QA/QC RPD											6-Dec-18		---	---

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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	<0.0050	<0.050
QA/QC RPD											5-Jun-19		---	---
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
PW17-23	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	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
PW17-24	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	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	<0.005	<0.05
QA/QC RPD											14-Nov-17		---	---
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
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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
PW17-25	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	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		---	---
PW17-26	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(PW17-276)	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		---	---

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
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		---	---
PW17-27	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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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
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	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
PW17-29	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	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
PW17-30	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
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
PW17-31	Porewater	PW17-31	ALS	Hexane	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	---	NS	NS
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
PW17-32	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	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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-33	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
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
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
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

TABLE A2
CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBON PARAMETERS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		

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 - 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 (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
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**
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.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
P6-6-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
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

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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**		
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
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.

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FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
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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**		
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			---	---
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

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PARKLAND BURNABY REFINERY
FORESHORE 2023 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-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
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.**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-01	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**
PW17-01	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	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
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
PW17-02	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	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**
PW17-03	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	U	W FPTS	0.45-0.75	0.45	0.75	Weathered Colluvium	15-Nov-17	L2023092	D	<4.	<20.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-04 @	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**
PW17-04	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	<0.20
QA/QC RPD										8-Mar-22			---	---
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**
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
PW17-05	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	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.

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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**		
PW17-06	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
PW17-06	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	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**
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	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**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
PW17-08	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	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
PW17-09	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	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**
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**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
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PARKLAND BURNABY REFINERY
FORESHORE 2023 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	CRC ICPMS	S	W FPTS	0.85-1.15	0.85	1.15	Beach sand	3-Mar-21	VA21A3930	D	**0.62**	**1.9**
PW17-10	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	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
PW17-11	Porewater	PW17-11	CRC ICPMS	C	W FPTS	0.74-1.10	0.74	1.1	Beach sand	7-Mar-22	VA22A4673	D	<2	<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

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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**		
PW17-12	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	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**
PW17-13	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	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**
PW17-14	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	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.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
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
PW17-15	Porewater	PW17-15	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	D	<2	<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

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FORESHORE 2023 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-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
PW17-16	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	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%	---
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
PW17-17	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	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**

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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**		
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%
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
PW17-18	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	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**

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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**		
PW17-19	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	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**
PW17-20	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	14-Nov-17	---	---	---	---
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
PW17-21	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	15-Nov-17	L2023092	D	**1.22**	<5.

TABLE A3
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PARKLAND BURNABY REFINERY
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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**		
PW17-22	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
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
PW17-22	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

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
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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**		
PW17-23	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
PW17-23	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	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.
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
PW17-24	Porewater	PW17-24	CRC ICPMS	S	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	VA22A4673	D	<2	<1.0

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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**		
PW17-25	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**
PW17-25	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	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**
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**

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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 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
PW17-26	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	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
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
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.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
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PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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**
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
PW17-28	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	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**
PW17-29	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

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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.
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**
PW17-30	Porewater	PW17-30	CRC ICPMS	C	E FPTS	0.84-1.20	0.84	1.2	Beach sand	7-Mar-22	VA22A4673	D	<2	<1.0
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**
PW17-31	Porewater	PW17-31	CRC ICPMS	U	E FPTS	0.85-1.15	0.85	1.15	Beach sand	7-Mar-22	---	D	NS	NS
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**

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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**		
PW17-32	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**
PW17-32	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	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.
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**
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	<1.0
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.

TABLE A3
CONCENTRATIONS OF DISSOLVED METALS IN POREWATER SAMPLES (2017-2022)
FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 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	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
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
R-BLANK-2	NA	NA	CRC ICPMS	NA	NA	NA	NA	NA	NA	4-Mar-21	VA21A4107	D	<0.20	<1.0
R-BLANK-2	NA	NA	CRC ICPMS (HMI)	NA	NA	NA	NA	NA	NA	8-Mar-22	VA22A4771	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

TABLE A3
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FORESHORE POST FPTS CONSTRUCTION
PARKLAND BURNABY REFINERY
FORESHORE 2023 MONITORING REPORT

													Copper	Zinc
Upper Cap Concentrations[1]													200	1,000
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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**		

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	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
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
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)
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[8]; 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.

[8] 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 14 amendments, March 1, 2023); 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; fourteen amendments to the CSR have been completed since 1997, with the most recent being the Stage 14, which came into effect on March 1, 2023. 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[9]. 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 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

[9] 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

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 Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6238**	Page	: 1 of 12
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	: 60704318/15405	Date Samples Received	: 22-Mar-2023 16:50
PO	: 5737161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: 20-1014514	Issue Date	: 06-Apr-2023 15:51
Sampler	: ----		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Qualifiers

Qualifier	*Description*
DLA	*Detection Limit adjusted for required dilution.*
DLCI	*Detection Limit Raised: Chromatographic interference due to co-elution.*
SUR-ND	*Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.*

Analytical Results

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

				Client sample ID	PW17-9_20230322|REG|GW	PW17-10_20230322|REG|GW	PW17-11_20230322|REG|GW	PW17-12_20230322|REG|GW	PW17-13_20230322|REG|GW
				Client sampling date / time	22-Mar-2023 14:35	22-Mar-2023 14:16	22-Mar-2023 14:18	22-Mar-2023 14:01	22-Mar-2023 13:58
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-001	VA23A6238-002	VA23A6238-003	VA23A6238-004	VA23A6238-005
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	3700000	4850000	4200000	4780000	2900000
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	0.54	<0.50	<0.50	1.24
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	2.3
Dissolved metals filtration location	----	EP421S	-	-	Field	Field	Field	Field	Field
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
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 surrogate)	392-83-6	E601A	1.0	%	91.3	92.8	99.6	96.9	96.1
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	93.2	90.2	83.5	86.5	64.8 SUR-ND
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	91.6	92.6	93.3	92.4	91.1
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.6	98.8	99.5	98.7	99.1
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: Water (Matrix: Water)				Client sample ID	PW17-9_20230322|REG|GW	PW17-10_20230322|REG|GW	PW17-11_20230322|REG|GW	PW17-12_20230322|REG|GW	PW17-13_20230322|REG|GW
				Client sampling date / time	22-Mar-2023 14:35	22-Mar-2023 14:16	22-Mar-2023 14:18	22-Mar-2023 14:01	22-Mar-2023 13:58
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-001	VA23A6238-002	VA23A6238-003	VA23A6238-004	VA23A6238-005
					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	%	73.3	75.4	74.6	69.5	79.6
Naphthalene-d8	1146-65-2	E641A	0.1	%	97.9	110	110	103	112
Phenanthrene-d10	1517-22-2	E641A	0.1	%	94.9	105	102	93.6	107

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

Analytical Results

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

				Client sample ID	PW17-14_2023 0322|REG|GW	PW17-15_2023 0322|REG|GW	PW17-16_2023 0322|REG|GW	PW17-17_2023 0322|REG|GW	PW17-18_2023 0322|REG|GW
				Client sampling date / time	22-Mar-2023 13:48	22-Mar-2023 13:53	22-Mar-2023 12:15	22-Mar-2023 12:15	22-Mar-2023 12:42
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-006	VA23A6238-007	VA23A6238-008	VA23A6238-009	VA23A6238-010
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	----	----	----	330	----
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	4110000	4530000	1830000	----	1870000
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	<0.50	<0.50	----	<0.50
Copper, dissolved	7440-50-8	E421	0.00020	mg/L	----	----	----	<0.00040 DLA	----
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	2.0	<1.0	1.1	----	2.7
Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	----	----	----	<0.0020 DLA	----
Dissolved metals filtration location	----	EP421S	-	-	Field	Field	Field	----	Field
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	0.71	1.52	<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
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 surrogate)	392-83-6	E601A	1.0	%	98.4	94.7	91.4	83.4	86.2
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	91.6	75.8	88.6	84.2	86.2
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	94.4	92.3	95.8	93.6	95.3
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.5	98.7	98.9	99.0	100.0

Analytical Results

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

				Client sample ID	PW17-14_2023 0322|REG|GW	PW17-15_2023 0322|REG|GW	PW17-16_2023 0322|REG|GW	PW17-17_2023 0322|REG|GW	PW17-18_2023 0322|REG|GW
				Client sampling date / time	22-Mar-2023 13:48	22-Mar-2023 13:53	22-Mar-2023 12:15	22-Mar-2023 12:15	22-Mar-2023 12:42
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-006	VA23A6238-007	VA23A6238-008	VA23A6238-009	VA23A6238-010
					Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	<0.010	0.099	<0.010	<0.010
Acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	<0.010	0.010	<0.010	<0.010
Acridine	260-94-6	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Anthracene	120-12-7	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	<0.015	<0.015	<0.015	<0.015
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Chrysene	218-01-9	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Fluorene	86-73-7	E641A	0.010	µg/L	<0.010	<0.010	0.140	<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	0.025	0.013	<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	<0.350 DLCI	<0.200 DLCI	<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	<0.250 DLCI	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<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	<0.351	<0.202	<0.060
PAHs, total (EPA 16)	n/a	E641A	0.065	µg/L	<0.065	<0.065	<0.352	<0.204	<0.065
Polycyclic Aromatic Hydrocarbons Surrogates									
Chrysene-d12	1719-03-5	E641A	0.1	%	76.7	74.5	77.5	71.9	73.0
Naphthalene-d8	1146-65-2	E641A	0.1	%	108	107	108	103	104
Phenanthrene-d10	1517-22-2	E641A	0.1	%	101	100	106	99.1	99.0

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

Analytical Results

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

				Client sample ID	PW17-19_2023 0322|REG|GW	PW17-20_2023 0322|REG|GW	PW17-21_2023 0322|REG|GW	PW17-22_2023 0322|REG|GW	Dup-02_202303 22|FD|GW
				Client sampling date / time	22-Mar-2023 13:05	22-Mar-2023 13:02	22-Mar-2023 11:41	22-Mar-2023 11:44	22-Mar-2023 13:58
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-011	VA23A6238-012	VA23A6238-013	VA23A6238-014	VA23A6238-015
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	0.50	mg/L	----	----	474	----	----
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	2210000	3400000	----	1870000	4670000
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	0.88	----	2.56	<0.50
Copper, dissolved	7440-50-8	E421	0.00020	mg/L	----	----	<0.00100 DLA	----	----
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	1.4	2.2	----	3.7	<1.0
Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	----	----	<0.0050 DLA	----	----
Dissolved metals filtration location	----	EP421S	-	-	Field	Field	----	Field	Field
Dissolved metals filtration location	----	EP421	-	-	Field	Field	Field	Field	Field
Volatile Organic Compounds [Fuels]									
Benzene	71-43-2	E611A	0.50	µg/L	11.9	<0.50	13.1	<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
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 surrogate)	392-83-6	E601A	1.0	%	96.0	92.3	77.9	88.9	90.7
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	84.7	84.4	76.2	78.1	93.2
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	93.6	95.3	91.8	93.2	96.5
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.7	99.7	99.4	99.1	97.8

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	PW17-19_2023 0322|REG|GW	PW17-20_2023 0322|REG|GW	PW17-21_2023 0322|REG|GW	PW17-22_2023 0322|REG|GW	Dup-02_202303 22|FD|GW
				Client sampling date / time	22-Mar-2023 13:05	22-Mar-2023 13:02	22-Mar-2023 11:41	22-Mar-2023 11:44	22-Mar-2023 13:58
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-011	VA23A6238-012	VA23A6238-013	VA23A6238-014	VA23A6238-015
					Result	Result	Result	Result	Result
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
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	<0.075 DLCI	<0.050	<0.050
B(a)P total potency equivalents [B(a)P TPE]	----	E641A	0.010	µg/L	<0.010	<0.010	<0.010	<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	%	67.8	74.8	75.6	71.3	85.2
Naphthalene-d8	1146-65-2	E641A	0.1	%	104	109	88.3	97.7	102
Phenanthrene-d10	1517-22-2	E641A	0.1	%	99.0	105	93.9	106	101

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	R-Blank-1_20230322	Trip Blank-1	Trip Blank-2	----	----
				Client sampling date / time	22-Mar-2023 16:07	22-Mar-2023 16:10	22-Mar-2023 16:10	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-016	VA23A6238-017	VA23A6238-018	--------	--------
					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	----	----
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 surrogate)	392-83-6	E601A	1.0	%	80.3	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	75.0	83.9	89.0	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	93.1	91.5	92.3	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.5	100	99.0	----	----
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)				Client sample ID	R-Blank-1_20230322	Trip Blank-1	Trip Blank-2	----	----
				Client sampling date / time	22-Mar-2023 16:07	22-Mar-2023 16:10	22-Mar-2023 16:10	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6238-016	VA23A6238-017	VA23A6238-018	--------	--------
					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	%	87.9	----	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%	95.0	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%	95.4	----	----	----	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6238**	Page	: 1 of 16
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	: 60704318/15405	Date Samples Received	: 22-Mar-2023 16:50
PO	: 5737161	Issue Date	: 06-Apr-2023 15:51
C-O-C number	: 20-1014514		
Sampler	: ----		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Test sample Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Regular Sample Surrogates

Sub-Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Result	Limits	Comment
Samples Submitted							
Hydrocarbons Surrogates	VA23A6238-005	PW17-13_20230322|REG|GW	Dichlorotoluene, 3,4-	95-75-0	64.8 %	70.0-130 %	Recovery less than lower data quality objective

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
Dup-02_20230322|FD|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-10_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-11_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-12_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-13_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-14_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-15_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-16_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-18_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-19_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-20_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-22_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved) PW17-9_20230322|REG|GW	E465S	22-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	9 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) R-Blank-1_20230322	E421	22-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	180 days	2 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) PW17-21_20230322|REG|GW	E421	22-Mar-2023	25-Mar-2023	----	----		25-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved) PW17-17_20230322|REG|GW	E421	22-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	4 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-10_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-11_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-12_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-13_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-14_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-15_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-18_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-19_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-20_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-9_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
Dup-02_20230322|FD|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-21_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-22_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
R-Blank-1_20230322	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-16_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-17_20230322|REG|GW	E601A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Dup-02_20230322|FD|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-10_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-11_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-12_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-13_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-14_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-15_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-16_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-17_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-18_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-19_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-20_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-21_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-22_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-9_20230322|REG|GW	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) R-Blank-1_20230322	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Trip Blank-1	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Trip Blank-2	E581.VH+F1	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-10_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-11_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: 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)										
PW17-12_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-13_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-14_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-15_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-18_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-19_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-20_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-9_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	8 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
Dup-02_20230322|FD|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: 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_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-17_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-21_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-22_20230322|REG|GW	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
R-Blank-1_20230322	E641A	22-Mar-2023	31-Mar-2023	14 days	9 days	✓	31-Mar-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Dup-02_20230322|FD|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-10_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-11_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-12_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-13_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-14_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-15_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-16_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-17_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-18_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-19_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-20_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-21_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-22_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-9_20230322|REG|GW	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
R-Blank-1_20230322	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Trip Blank-1	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Trip Blank-2	E611A	22-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	9 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	882728	1	18	5.5	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	874823	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	874555	3	30	10.0	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	874818	0	0	0.0	5.0	×
VH and F1 by Headspace GC-FID	E581.VH+F1	882727	1	18	5.5	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	882510	2	28	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	882728	1	18	5.5	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	874823	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	874555	2	30	6.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	874818	0	0	0.0	5.0	×
PAHs by Hexane LVI GC-MS	E641A	882509	2	23	8.7	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	882727	1	18	5.5	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	882510	2	28	7.1	5.0	✓
BTEX by Headspace GC-MS	E611A	882728	1	18	5.5	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	874823	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	874555	2	30	6.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	874818	0	0	0.0	5.0	×
PAHs by Hexane LVI GC-MS	E641A	882509	2	23	8.7	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	882727	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	882728	1	18	5.5	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	874823	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	874555	2	30	6.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	874818	0	0	0.0	5.0	×
VH and F1 by Headspace GC-FID	E581.VH+F1	882727	1	18	5.5	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Seawater samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Triple Quadrupole ICPMS.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Seawater Filtration	EP421S Vancouver - Environmental	Water	PUGET SOUND PROTOCOLS, EPA 6020A	This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by Collision/Reaction Cell ICPMS.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Canada Ltd.

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QUALITY CONTROL REPORT

Work Order	: **VA23A6238**	Page	: 1 of 9
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704318/15405	Date Samples Received	: 22-Mar-2023 16:50
PO	: 5737161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: 20-1014514	Issue Date	: 06-Apr-2023 15:51
Sampler	: ---- 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Ilnaz Badbezanchi	Supervisor - Metals Prep & Mercury	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sukhman Khosa	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 874555)											
KS2300883-001	Anonymous	Copper, dissolved	7440-50-8	E421	0.00040	mg/L	<0.00040	<0.00040	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0020	mg/L	0.0120	0.0128	0.0008	Diff <2x LOR	----
Dissolved Metals (QC Lot: 874612)											
VA23A6274-001	Anonymous	Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
VA23A6274-001	Anonymous	Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 874823)											
VA23A6238-001	PW17-9_20230322|REG|GW	Copper, dissolved	7440-50-8	E465S	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E465S	0.0010	mg/L	<1.0 µg/L	0.0012	0.0002	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 882728)											
VA23A6238-001	PW17-9_20230322|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	----
Hydrocarbons (QC Lot: 882727)											
VA23A6238-001	PW17-9_20230322|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 874555)						
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: 874612)						
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: 874823)						
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 882728)						
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: 882507)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 882510)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 882727)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882508)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 882508) - continued						
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882509)						
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: 874555)									
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	95.8	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	100	80.0	120	----
Dissolved Metals (QCLot: 874612)									
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	99.2	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	105	80.0	120	----
Dissolved Metals (QCLot: 874823)									
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	0.25 mg/L	97.3	80.0	120	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	0.5 mg/L	97.2	80.0	120	----
Volatile Organic Compounds (QCLot: 882728)									
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	100	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.9	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	102	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	99.0	70.0	130	----
Hydrocarbons (QCLot: 882507)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	121	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	118	70.0	130	----
Hydrocarbons (QCLot: 882510)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	124	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	121	70.0	130	----
Hydrocarbons (QCLot: 882727)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	108	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882508)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	109	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	109	60.0	130	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 882508) - continued									
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	103	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	129	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	117	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	120	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	117	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	117	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	112	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	115	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	115	60.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882509)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	106	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	106	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	118	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	106	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	115	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	116	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	113	60.0	130	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 874555)										
KS2300883-002	Anonymous	Copper, dissolved	7440-50-8	E421	0.0354 mg/L	0.04 mg/L	88.6	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.704 mg/L	0.8 mg/L	88.0	70.0	130	----
Dissolved Metals (QCLot: 874612)										
VA23A6285-005	Anonymous	Copper, dissolved	7440-50-8	E421	0.0178 mg/L	0.02 mg/L	89.2	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.372 mg/L	0.4 mg/L	92.9	70.0	130	----
Dissolved Metals (QCLot: 874823)										
VA23A6238-002	PW17-10_20230322|REG|GW	Copper, dissolved	7440-50-8	E465S	0.368 mg/L	0.4 mg/L	91.9	70.0	130	----
		Zinc, dissolved	7440-66-6	E465S	6.75 mg/L	8 mg/L	84.4	70.0	130	----
Volatile Organic Compounds (QCLot: 882728)										
VA23A6238-002	PW17-10_20230322|REG|GW	Benzene	71-43-2	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Ethylbenzene	100-41-4	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Styrene	100-42-5	E611A	83.7 µg/L	100 µg/L	83.7	60.0	140	----
		Toluene	108-88-3	E611A	104 µg/L	100 µg/L	104	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	210 µg/L	200 µg/L	105	60.0	140	----
		Xylene, o-	95-47-6	E611A	103 µg/L	100 µg/L	103	60.0	140	----
Hydrocarbons (QCLot: 882727)										
VA23A6238-003	PW17-11_20230322|REG|GW	VHw (C6-C10)	----	E581.VH+F1	3940 µg/L	6310 µg/L	62.5	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1014514

Canada Toll Free: 1 800 668 9878

Page 1 of 2

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Environmental Division Vancouver
Work Order Reference
VA23A6238

Telephone : +1 604 253 4188

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 Refining (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: raymund.sampaga@aecom.com
Email 3:

Invoice Recipients

Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: christopher.boys@parklandca
Email 2:

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. Additio may apply to rush requests on weekends, statutory holidays and non-rout

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please co

Project Information

ALS Account # / Quote #:
Job #: 60704318 / 15405
PO / AFE:
LSD: Burnaby Refinery
ALS Lab Work Order # (ALS use only): 6238

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:
Major/Minor Code: Routing Code:
Requisitioner:
Location:
ALS Contact: Dean Watt Sampler: RS, AH, AGE, MM

Analysis Req

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

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 (no MTBE) P	LEPH/HW P	PAHs P	Dissolved Cu, Zn with HMT F	Hardness (all metal samples) F	Brackish water									SAMPLES ON HOLD	EXTENDED STORAGE REQ	SUSPECTED HAZARD (see
	PW17-9_20230322	22-Mar-23	13:01	~~PW~~ PW	5	X	X	X	X	X	X											
	PW17-10_20230322		13:08																			
	PW17-11_20230322		13:15																			
	PW17-12_20230322		12:55																			
	PW17-13_20230322		12:50																			
	PW17-14_20230322		12:45																			
	PW17-15_20230322		12:39																			
	PW17-16_20230322		12:02																			
	PW17-17_20230322		12:09																			
	PW17-18_20230322		12:15								X											
	PW17-19_20230322		12:23								X											
	PW17-20_20230322		12:28								X											

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

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

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

BC CSR
Please analyze brackish samples as seawater (HMT)

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			
				10			

SHIPMENT RELEASE (client use)

Released by: Raymund Sampaga Date: March 22, 2023 Time: 16:45

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: CJ Date: MAR-22 Time: 16:50

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 - 1014513

Page 2 of 2

Canada Toll Free: 1 800 668 9878

ALS www.alsglobal.com

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: raymund.sampaga@aecom.com

Email 3:

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 #: 60704318 / 15405

PO / AFE:

LSD: Burnaby Refinery

ALS Lab Work Order # (ALS use only):

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Dean Watt

Sampler: RS AH AGF MM

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/AUNTBE (P)	LEPHW (P)	PAHs (P)	Dissolved Cu, Zn + HMT (F)	Hardness (all metal samples) (F)	Brackish Water	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-21-20230322	22-Mar-23	11:41	PW ~~GW~~	5	X	X	X	X	X	[illegible]			
	PW17-22-20230322	↓	11:44	↓	5	X	X	X	X	X	X			
	DUP-02-20230322	↓	13:58	↓	5	X	X	X	X	X	X			
	R-Blank-1-20230322	↓	16:07	↓	5	X	X	X	X	X				
	Trip Blank-1	↓	16:10	↓	1	X								
	Trip Blank-2	↓	16:10	↓	1	X								

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

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human consumption/ use? ☐ YES ☒ NO

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

BC CSR

Please analyze brackish samples as seawater (HMI)

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: 10

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 22/23	Time: 16:45	Received by:	Date:	Time:	Received by: RJ	Date: 07 MAR-22	Time: 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 Canada Ltd.

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right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6313**	Page	: 1 of 12
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	: 60704318/15405	Date Samples Received	: 23-Mar-2023 15:40
PO	: 5737161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 15:53
Sampler	: AGE, AH, MM, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Organics, Burnaby, British Columbia

General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	PW17-31_2023 0323|REG|GW	PW17-26_2023 0323|REG|GW	PW17-28_2023 0323|REG|GW	PW17-33_2023 0323|REG|GW	PW17-30_2023 0323|REG|GW
				Client sampling date / time	23-Mar-2023 11:42	23-Mar-2023 12:06	23-Mar-2023 12:25	23-Mar-2023 12:40	23-Mar-2023 12:55
					VA23A6313-001	VA23A6313-002	VA23A6313-003	VA23A6313-004	VA23A6313-005
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L	----	64600	----	----	----
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	1600000	----	757000	3190000	4390000
Dissolved Metals									
Copper, dissolved	7440-50-8	E421	0.20	µg/L	----	<0.20	----	----	----
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	0.64	----	<0.50	<0.50	0.87
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	1.8	----	<1.0	<1.0	<1.0
Zinc, dissolved	7440-66-6	E421	1.0	µg/L	----	<1.0	----	----	----
Dissolved metals filtration location	----	EP421S	-	-	Field	----	Field	Field	Field
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
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 surrogate)	392-83-6	E601A	1.0	%	94.1	94.4	91.1	93.4	87.6
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	94.6	77.1	93.4	88.6	103
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	96.7	95.5	96.4	94.6	97.5

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	PW17-31_2023 0323|REG|GW	PW17-26_2023 0323|REG|GW	PW17-28_2023 0323|REG|GW	PW17-33_2023 0323|REG|GW	PW17-30_2023 0323|REG|GW
				Client sampling date / time	23-Mar-2023 11:42	23-Mar-2023 12:06	23-Mar-2023 12:25	23-Mar-2023 12:40	23-Mar-2023 12:55
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-001	VA23A6313-002	VA23A6313-003	VA23A6313-004	VA23A6313-005
					Result	Result	Result	Result	Result
Volatile Organic Compounds Surrogates									
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.4	100.0	100	99.1	99.8
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
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	%	106	111	102	101	114
Naphthalene-d8	1146-65-2	E641A	0.1	%	102	107	96.1	94.4	109

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	PW17-31_2023 0323|REG|GW	PW17-26_2023 0323|REG|GW	PW17-28_2023 0323|REG|GW	PW17-33_2023 0323|REG|GW	PW17-30_2023 0323|REG|GW
				Client sampling date / time	23-Mar-2023 11:42	23-Mar-2023 12:06	23-Mar-2023 12:25	23-Mar-2023 12:40	23-Mar-2023 12:55
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-001	VA23A6313-002	VA23A6313-003	VA23A6313-004	VA23A6313-005
					Result	Result	Result	Result	Result
Polycyclic Aromatic Hydrocarbons Surrogates									
Phenanthrene-d10	1517-22-2	E641A	0.1	%	96.8	104	93.6	92.0	109

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

Analytical Results

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

				Client sample ID	PW17-24_20230323|REG|GW	PW17-23_20230323|REG|GW	DUP-3_20230323|FD|GW	PW17-3_20230323|REG|GW	PW17-7_20230323|REG|GW
				Client sampling date / time	23-Mar-2023 13:15	23-Mar-2023 13:30	23-Mar-2023 11:42	23-Mar-2023 13:32	23-Mar-2023 13:49
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-006	VA23A6313-007	VA23A6313-008	VA23A6313-009	VA23A6313-010
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	2600000	1800000	1640000	4880000	3140000
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	<0.50	0.68	0.65	<0.50
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	<1.0	3.1	1.6	<1.0	<1.0
Dissolved metals filtration location	----	EP421S	-	-	Field	Field	Field	Field	Field
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
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 surrogate)	392-83-6	E601A	1.0	%	90.2	91.8	90.0	89.7	93.1
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	93.3	89.2	93.6	88.9	84.5
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	94.3	94.6	96.1	94.4	94.7
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.7	99.8	100	99.4	98.5
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

Analytical Results

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

				Client sample ID	PW17-24_20230323|REG|GW	PW17-23_20230323|REG|GW	DUP-3_20230323|FD|GW	PW17-3_20230323|REG|GW	PW17-7_20230323|REG|GW
				Client sampling date / time	23-Mar-2023 13:15	23-Mar-2023 13:30	23-Mar-2023 11:42	23-Mar-2023 13:32	23-Mar-2023 13:49
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-006	VA23A6313-007	VA23A6313-008	VA23A6313-009	VA23A6313-010
					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	<0.010
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	%	99.0	109	96.0	110	101
Naphthalene-d8	1146-65-2	E641A	0.1	%	96.4	101	92.6	105	105
Phenanthrene-d10	1517-22-2	E641A	0.1	%	97.0	100	91.0	103	94.6

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	PW17-32_2023 0323|REG|GW	PW17-27_2023 0323|REG|GW	PW17-29_2023 0323|REG|GW	PW17-25_2023 0323|REG|GW	PW17-8_20230 323|REG|GW
				Client sampling date / time	23-Mar-2023 11:54	23-Mar-2023 12:21	23-Mar-2023 12:50	23-Mar-2023 13:12	23-Mar-2023 13:56
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-011	VA23A6313-012	VA23A6313-013	VA23A6313-014	VA23A6313-015
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L	----	494000	----	----	----
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	1880000	----	3550000	5050000	4520000
Dissolved Metals									
Copper, dissolved	7440-50-8	E421	0.20	µg/L	----	1.37	----	----	----
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	----	<0.50	0.88	<0.50
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	2.1	----	<1.0	<1.0	<1.0
Zinc, dissolved	7440-66-6	E421	1.0	µg/L	----	1.3	----	----	----
Dissolved metals filtration location	----	EP421S	-	-	Field	----	Field	Field	Field
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	3.54	<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
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 surrogate)	392-83-6	E601A	1.0	%	91.4	90.8	88.5	89.9	97.4
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	88.1	77.8	91.1	90.3	91.1
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	96.2	94.9	96.4	95.0	94.2
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	98.8	99.1	98.5	98.9	98.7

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	PW17-32_20230323|REG|GW	PW17-27_20230323|REG|GW	PW17-29_20230323|REG|GW	PW17-25_20230323|REG|GW	PW17-8_20230323|REG|GW
				Client sampling date / time	23-Mar-2023 11:54	23-Mar-2023 12:21	23-Mar-2023 12:50	23-Mar-2023 13:12	23-Mar-2023 13:56
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-011	VA23A6313-012	VA23A6313-013	VA23A6313-014	VA23A6313-015
					Result	Result	Result	Result	Result
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
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	%	96.6	102	90.1	95.9	106
Naphthalene-d8	1146-65-2	E641A	0.1	%	94.8	103	91.0	96.8	102
Phenanthrene-d10	1517-22-2	E641A	0.1	%	95.2	101	90.4	90.1	97.2

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	Travel Blank-3	Travel Blank-4	R-Blank-2_2023 0323	----	----
				Client sampling date / time	23-Mar-2023 14:30	23-Mar-2023 14:32	23-Mar-2023 14:20	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-016	VA23A6313-017	VA23A6313-018	--------	--------
					Result	Result	Result	----	----
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	600	µg/L	----	----	<600	----	----
Dissolved Metals									
Copper, dissolved	7440-50-8	E421	0.20	µg/L	----	----	<0.20	----	----
Zinc, dissolved	7440-66-6	E421	1.0	µg/L	----	----	<1.0	----	----
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	----	----
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 surrogate)	392-83-6	E601A	1.0	%	----	----	89.4	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	83.2	81.4	88.2	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	93.4	93.4	97.1	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.3	98.2	100	----	----
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)				Client sample ID	Travel Blank-3	Travel Blank-4	R-Blank-2_20230323	----	----
				Client sampling date / time	23-Mar-2023 14:30	23-Mar-2023 14:32	23-Mar-2023 14:20	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6313-016	VA23A6313-017	VA23A6313-018	--------	--------
					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	%	----	----	113	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%	----	----	104	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%	----	----	99.1	----	----

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

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6313**	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	: 60704318/15405	Date Samples Received	: 23-Mar-2023 15:40
PO	: 5737161	Issue Date	: 06-Apr-2023 15:53
C-O-C number	: ----		
Sampler	: AGE, AH, MM, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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 Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
DUP-3_20230323|FD|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-23_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-24_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-25_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-28_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-29_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-3_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-30_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-31_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-32_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-33_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-7_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-8_20230323|REG|GW	E465S	23-Mar-2023	25-Mar-2023	----	----		31-Mar-2023	180 days	8 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
PW17-26_20230323|REG|GW	E421	23-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
PW17-27_20230323|REG|GW	E421	23-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	3 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE - dissolved (lab preserved)										
R-Blank-2_20230323	E421	23-Mar-2023	25-Mar-2023	----	----		26-Mar-2023	180 days	3 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-3_20230323|FD|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-23_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-24_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-25_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-26_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-27_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-28_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-29_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-3_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-30_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-31_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-32_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-33_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-7_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-8_20230323|REG|GW	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
R-Blank-2_20230323	E601A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	1 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
R-Blank-2_20230323	E581.VH+F1	23-Mar-2023	28-Mar-2023	----	----		28-Mar-2023	14 days	5 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-3_20230323|FD|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-23_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-24_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-25_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-26_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-27_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-28_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-29_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-3_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-30_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-31_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-32_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-33_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-7_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) PW17-8_20230323|REG|GW	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-3	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate) Travel Blank-4	E581.VH+F1	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) DUP-3_20230323|FD|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-23_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: 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) PW17-24_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-25_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-26_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-27_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-28_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-29_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-3_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-30_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate) PW17-31_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: 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)										
PW17-32_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-33_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-7_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-8_20230323|REG|GW	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
R-Blank-2_20230323	E641A	23-Mar-2023	30-Mar-2023	14 days	7 days	✓	30-Mar-2023	40 days	0 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
R-Blank-2_20230323	E611A	23-Mar-2023	28-Mar-2023	----	----		28-Mar-2023	14 days	5 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
DUP-3_20230323|FD|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-23_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-24_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis: Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-25_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-26_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-27_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-28_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-29_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-3_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-30_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-31_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-32_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-33_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-7_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
PW17-8_20230323|REG|GW	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Travel Blank-3	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate)										
Travel Blank-4	E611A	23-Mar-2023	29-Mar-2023	----	----		29-Mar-2023	14 days	6 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	879058	2	25	8.0	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	875571	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	875830	1	19	5.2	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	875563	0	0	0.0	5.0	×
VH and F1 by Headspace GC-FID	E581.VH+F1	879059	2	28	7.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	881030	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	879058	2	25	8.0	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	875571	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	875830	1	19	5.2	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	875563	0	0	0.0	5.0	×
PAHs by Hexane LVI GC-MS	E641A	881029	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	879059	2	28	7.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	881030	1	18	5.5	5.0	✓
BTEX by Headspace GC-MS	E611A	879058	2	25	8.0	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	875571	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	875830	1	19	5.2	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	875563	0	0	0.0	5.0	×
PAHs by Hexane LVI GC-MS	E641A	881029	1	20	5.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	879059	2	28	7.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	879058	2	25	8.0	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	875571	1	13	7.6	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	875830	1	19	5.2	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	875563	0	0	0.0	5.0	×
VH and F1 by Headspace GC-FID	E581.VH+F1	879059	2	28	7.1	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Water by CRC ICPMS	E421 Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Seawater samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Triple Quadrupole ICPMS.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Water Filtration	EP421 Vancouver - Environmental	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.
Dissolved Metals Seawater Filtration	EP421S Vancouver - Environmental	Water	PUGET SOUND PROTOCOLS, EPA 6020A	This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by Collision/Reaction Cell ICPMS.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

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QUALITY CONTROL REPORT

Work Order	: **VA23A6313**	Page	: 1 of 8
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704318/15405	Date Samples Received	: 23-Mar-2023 15:40
PO	: 5737161	Date Analysis Commenced	: 25-Mar-2023
C-O-C number	: ----	Issue Date	: 06-Apr-2023 15:53
Sampler	: AGE, AH, MM, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

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

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Anshim Anshim	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Paul Cushing	Team Leader - Organics	Vancouver Organics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 875571)											
VA23A6313-001	PW17-31_20230323|REG|GW	Copper, dissolved	7440-50-8	E465S	0.00050	mg/L	0.64 µg/L	0.00070	0.00006	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E465S	0.0010	mg/L	1.8 µg/L	0.0019	0.0001	Diff <2x LOR	----
Dissolved Metals (QC Lot: 875830)											
FJ2300645-001	Anonymous	Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	0.0226	0.0227	0.686%	20%	----
Volatile Organic Compounds (QC Lot: 878014)											
VA23A6268-001	Anonymous	Benzene	71-43-2	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Styrene	100-42-5	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611A	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Xylene, m+p-	179601-23-1	E611A	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611A	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 879058)											
VA23A6313-018	R-Blank-2_20230323	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: 878013)											
VA23A6268-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	100	0.0%	30%	----
Hydrocarbons (QC Lot: 879059)											
VA23A6313-018	R-Blank-2_20230323	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 875571)						
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	<0.0010	----
Dissolved Metals (QCLot: 875830)						
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: 878014)						
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: 879058)						
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: 878013)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 879059)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Hydrocarbons (QCLot: 881030)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Polycyclic Aromatic Hydrocarbons (QCLot: 881029)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 881029) - continued						
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: 875571)									
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	0.25 mg/L	95.9	80.0	120	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	0.5 mg/L	86.0	80.0	120	----
Dissolved Metals (QCLot: 875830)									
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.25 mg/L	92.8	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.5 mg/L	94.0	80.0	120	----
Volatile Organic Compounds (QCLot: 878014)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	98.0	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	96.0	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	99.4	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	100	70.0	130	----
Volatile Organic Compounds (QCLot: 879058)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	97.0	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	98.2	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	98.7	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	100	70.0	130	----
Hydrocarbons (QCLot: 878013)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	80.7	70.0	130	----
Hydrocarbons (QCLot: 879059)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	75.2	70.0	130	----
Hydrocarbons (QCLot: 881030)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	117	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	112	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 881029)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	98.1	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	97.3	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	118	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: 881029) - continued									
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	95.8	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	94.7	60.0	130	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.5 µg/L	96.6	60.0	130	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.5 µg/L	97.2	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	118	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	102	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	101	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	100	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	102	60.0	130	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	104	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	105	50.0	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	100	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	122	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: 875571)										
VA23A6313-003	PW17-28_20230323|REG|GW	Copper, dissolved	7440-50-8	E465S	0.391 mg/L	0.4 mg/L	97.8	70.0	130	----
		Zinc, dissolved	7440-66-6	E465S	8.19 mg/L	8 mg/L	102	70.0	130	----
Dissolved Metals (QCLot: 875830)										
FJ2300645-002	Anonymous	Copper, dissolved	7440-50-8	E421	0.0342 mg/L	0.04 mg/L	85.4	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.720 mg/L	0.8 mg/L	89.9	70.0	130	----
Volatile Organic Compounds (QCLot: 878014)										
VA23A6313-001	PW17-31_20230323|REG|GW	Benzene	71-43-2	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Ethylbenzene	100-41-4	E611A	108 µg/L	100 µg/L	108	60.0	140	----
		Styrene	100-42-5	E611A	101 µg/L	100 µg/L	101	60.0	140	----
		Toluene	108-88-3	E611A	106 µg/L	100 µg/L	106	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	220 µg/L	200 µg/L	110	60.0	140	----
		Xylene, o-	95-47-6	E611A	106 µg/L	100 µg/L	106	60.0	140	----
Volatile Organic Compounds (QCLot: 879058)										
VA23A6313-018	R-Blank-2_20230323	Benzene	71-43-2	E611A	99.7 µg/L	100 µg/L	99.7	60.0	140	----
		Ethylbenzene	100-41-4	E611A	102 µg/L	100 µg/L	102	60.0	140	----
		Styrene	100-42-5	E611A	96.4 µg/L	100 µg/L	96.4	60.0	140	----
		Toluene	108-88-3	E611A	99.3 µg/L	100 µg/L	99.3	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	206 µg/L	200 µg/L	103	60.0	140	----
		Xylene, o-	95-47-6	E611A	100 µg/L	100 µg/L	100	60.0	140	----
Hydrocarbons (QCLot: 878013)										
VA23A6313-002	PW17-26_20230323|REG|GW	VHw (C6-C10)	----	E581.VH+F1	5420 µg/L	6310 µg/L	85.9	60.0	140	----
Hydrocarbons (QCLot: 879059)										
VA23A6566-001	Anonymous	VHw (C6-C10)	----	E581.VH+F1	5140 µg/L	6310 µg/L	81.4	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

ALS www.alsglobal.com

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: raymund.sampaga@aecom.com

Email 3:

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 #: 60704318 / 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: RS, AH, AGE, MM

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 (no MTBE) P	LEPHw P	PAHs P	Dissolved Cu, Zn with ~~(HWI)~~ F	Hardness (all metals samples)	Brackish Water	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-31_20230323	23-Mar-23	11:42	PW	5	X	X	X	X	X	X		
	PW17-26_20230323	↓	12:06	↓	↓	↓	↓	↓	↓	↓			
	PW17-28_20230323		12:25								X		
	PW17-33_20230323		12:40								X		
	PW17-30_20230323		12:55								X		
	PW17-24_20230323		13:15								X		
	PW17-23_20230323		13:30								X		
	DUP-3_20230323		11:42								X		
	PW17-3_20230323		13:32								X		
	PW17-7_20230323		13:49								X		
	PW17-32_20230323		11:54								X		
	PW17-27_20230323	↓	12:21	↓	↓	↓	↓	↓	↓	↓			

Environmental Division Vancouver
Work Order Reference
VA23A6313

Telephone : +1 604 253 4188

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

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

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

BC CSR

Please analyze brackish samples as seawaters ~~(HMI)~~

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				9	9		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 23, 2023	Time: 15:27	Received by:	Date:	Time:	Received by: CW	Date: Mar 23	Time: 1540

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

COC Number: 23 -

Canada Toll Free: 1 800 668 9878

ALS www.alsglobal.com

Report To	Contact and company name below will appear on the final report
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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: raymund.sampaga@aecom.com

Email 3:

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Project Information

ALS Account # / Quote #:

Job #: 60704318 / 15405

PO / AFE:

LSD: Burnaby Refinery

Oil and Gas Required Fields (client use)

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Requisitioner:

Location:

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ALS Contact: Dean Walt

Sampler: RS, AH, AGE, MM

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

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	PW17-31_20230323	23-Mar-23	11:42	PW	5	X	X	X	X	X	X											
	PW17-26-20230323		12:06																			
	PW17-28_20230323		12:25								X											
	PW17-33-20230323		12:40								X											
	PW17-30_20230323		12:55								X											
	PW17-24_20230323		13:15								X											
	PW17-23-20230323		13:30								X											
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	PW17-3_20230323		13:32								X											
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Environmental Division Vancouver
Work Order Reference
VA23A6313
Telephone : +1 604 253 4188

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INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				9	9		

SHIPMENT RELEASE (client use)

Released by: Raymund Sampaga Date: March 23, 2023 Time: 15:27

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: CW Date: Mar 23 Time: 1540

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Invoice To	Same as Report To ☐ YES ☑ NO
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Contact:	Christopher Boys

Reports / Recipients

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Project Information

ALS Account # / Quote #:	
Job #:	60704318 / 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: RS, AGE, AH, MM

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 (no MTBE) P	LEPHw P	PAHs P	Dissolved Cu, Zn with [illegible] F	Hardness (all metals samples)	Brackish Water	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	PW17-29_20230323	23-Mar-23	12:50	PW	5	X	X	X	X	X	X			
	PW17-25_20230323	↓	13:12	↓	↓	X	X	X	X	X	X			
	PW17-8_20230323		13:56			X	X	X	X	X	X			
	Travel Blank-3		14:30		1	X								
	Travel Blank-4		14:32		1	X								
	R-Blank-2_20230323		14:20		5	X	X	X	X	X				

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

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☑ NO

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

BC CSR

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SAMPLE RECEIPT DETAILS (ALS use only)

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

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

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymond Sampaga	Date: March 23, 2023	Time: 15:27	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A6459**	Page	: 1 of 7
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	: 60704318/15405	Date Samples Received	: 24-Mar-2023 14:40
PO	: 5737161	Date Analysis Commenced	: 27-Mar-2023
C-O-C number	: 20-1014512	Issue Date	: 06-Apr-2023 18:03
Sampler	: AH, MM, 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*
Erin Sanchez		Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia

General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Analytical Results

Sub-Matrix: Water
(Matrix: Water)

Analyte	CAS Number	Method	LOR	Unit	PW17-1|REG|GW	PW17-2|REG|GW	PW17-4|REG|GW	PW17-5|REG|GW	PW17-6|REG|GW
				Client sampling date / time	24-Mar-2023 13:19	24-Mar-2023 13:25	24-Mar-2023 13:05	24-Mar-2023 13:00	24-Mar-2023 12:45
					VA23A6459-001	VA23A6459-002	VA23A6459-003	VA23A6459-004	VA23A6459-005
					Result	Result	Result	Result	Result
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	4290000	4220000	3240000	3010000	2770000
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	<0.50	<0.50	1.27	<0.50
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	1.7	<1.0	<1.0	3.0	1.3
Dissolved metals filtration location	----	EP421S	-	-	Field	Field	Field	Field	Field
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
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 surrogate)	392-83-6	E601A	1.0	%	87.4	93.9	86.4	84.9	87.7
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	104	98.5	101	98.9	99.1
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	98.9	99.3	98.5	96.7	98.5
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.0	99.2	98.7	98.5	99.2
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: **Water**
(Matrix: **Water**)

				Client sample ID	PW17-1|REG|GW	PW17-2|REG|GW	PW17-4|REG|GW	PW17-5|REG|GW	PW17-6|REG|GW
				Client sampling date / time	24-Mar-2023 13:19	24-Mar-2023 13:25	24-Mar-2023 13:05	24-Mar-2023 13:00	24-Mar-2023 12:45
Analyte	CAS Number	Method	LOR	Unit	VA23A6459-001	VA23A6459-002	VA23A6459-003	VA23A6459-004	VA23A6459-005
					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	%	84.3	94.5	86.9	90.7	77.3
Naphthalene-d8	1146-65-2	E641A	0.1	%	101	115	98.8	115	105
Phenanthrene-d10	1517-22-2	E641A	0.1	%	92.8	115	109	115	115

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

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	DUP-1|FD|GW	Travel Blank-5	----	----	----
				Client sampling date / time	24-Mar-2023 13:19	24-Mar-2023 13:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6459-006	VA23A6459-007	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
Hardness (as CaCO3), dissolved	----	EC100	500	µg/L	4070000	----	----	----	----
Dissolved Metals									
Copper, dissolved	7440-50-8	E465S	0.50	µg/L	<0.50	----	----	----	----
Zinc, dissolved	7440-66-6	E465S	1.0	µg/L	1.3	----	----	----	----
Dissolved metals filtration location	----	EP421S	-	-	Field	----	----	----	----
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	----	----	----
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	----	----	----
VPHw	----	EC580A	100	µg/L	<100	<100	----	----	----
HEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
LEPHw	----	EC600A	250	µg/L	<250	----	----	----	----
Hydrocarbons Surrogates									
Bromobenzotrifluoride, 2- (EPH surrogate)	392-83-6	E601A	1.0	%	94.8	----	----	----	----
Dichlorotoluene, 3,4-	95-75-0	E581.VH+F1	1.0	%	99.8	99.9	----	----	----
Volatile Organic Compounds Surrogates									
Bromofluorobenzene, 4-	460-00-4	E611A	1.0	%	98.6	97.9	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611A	1.0	%	99.2	98.5	----	----	----
Polycyclic Aromatic Hydrocarbons									
Acenaphthene	83-32-9	E641A	0.010	µg/L	<0.010	----	----	----	----
Acenaphthylene	208-96-8	E641A	0.010	µg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: Water (Matrix: Water)				Client sample ID	DUP-1|FD|GW	Travel Blank-5	----	----	----
				Client sampling date / time	24-Mar-2023 13:19	24-Mar-2023 13:30	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA23A6459-006	VA23A6459-007	--------	--------	--------
					Result	Result	----	----	----
Polycyclic Aromatic Hydrocarbons									
Acridine	260-94-6	E641A	0.010	µg/L	<0.010	----	----	----	----
Anthracene	120-12-7	E641A	0.010	µg/L	<0.010	----	----	----	----
Benz(a)anthracene	56-55-3	E641A	0.010	µg/L	<0.010	----	----	----	----
Benzo(a)pyrene	50-32-8	E641A	0.0050	µg/L	<0.0050	----	----	----	----
Benzo(b+j)fluoranthene	n/a	E641A	0.010	µg/L	<0.010	----	----	----	----
Benzo(b+j+k)fluoranthene	n/a	E641A	0.015	µg/L	<0.015	----	----	----	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.010	µg/L	<0.010	----	----	----	----
Benzo(k)fluoranthene	207-08-9	E641A	0.010	µg/L	<0.010	----	----	----	----
Chrysene	218-01-9	E641A	0.010	µg/L	<0.010	----	----	----	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.0050	µg/L	<0.0050	----	----	----	----
Fluoranthene	206-44-0	E641A	0.010	µg/L	<0.010	----	----	----	----
Fluorene	86-73-7	E641A	0.010	µg/L	<0.010	----	----	----	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.010	µg/L	<0.010	----	----	----	----
Methylnaphthalene, 1-	90-12-0	E641A	0.010	µg/L	<0.010	----	----	----	----
Methylnaphthalene, 2-	91-57-6	E641A	0.010	µg/L	<0.010	----	----	----	----
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	%	86.0	----	----	----	----
Naphthalene-d8	1146-65-2	E641A	0.1	%	108	----	----	----	----
Phenanthrene-d10	1517-22-2	E641A	0.1	%	99.5	----	----	----	----

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

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A6459**	Page	: 1 of 9
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	: 60704318/15405	Date Samples Received	: 24-Mar-2023 14:40
PO	: 5737161	Issue Date	: 06-Apr-2023 18:03
C-O-C number	: 20-1014512		
Sampler	: AH, MM, RS		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- 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 Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
DUP-1|FD|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-1|REG|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-2|REG|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-4|REG|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-5|REG|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Dissolved Metals : Dissolved Metals in Seawater by Triple Quad ICPMS										
HDPE - dissolved (lab preserved)										
PW17-6|REG|GW	E465S	24-Mar-2023	27-Mar-2023	----	----		06-Apr-2023	180 days	13 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-1|FD|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-1|REG|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-2|REG|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-4|REG|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-5|REG|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : BC PHCs - EPH by GC-FID										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-6|REG|GW	E601A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
DUP-1|FD|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-1|REG|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-2|REG|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-4|REG|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-5|REG|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
PW17-6|REG|GW	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Hydrocarbons : VH and F1 by Headspace GC-FID										
Glass vial (sodium bisulfate)										
Travel Blank-5	E581.VH+F1	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
DUP-1|FD|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-1|REG|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-2|REG|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-4|REG|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-5|REG|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
PW17-6|REG|GW	E641A	24-Mar-2023	31-Mar-2023	14 days	7 days	✓	31-Mar-2023	40 days	0 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation: Preparation Date	Holding Times: Rec	Holding Times: Actual	Eval	Analysis: Analysis Date	Holding Times: Rec	Holding Times: Actual	Eval
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) DUP-1|FD|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-1|REG|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-2|REG|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-4|REG|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-5|REG|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) PW17-6|REG|GW	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓
Volatile Organic Compounds [Fuels] : BTEX by Headspace GC-MS										
Glass vial (sodium bisulfate) Travel Blank-5	E611A	24-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	7 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
BTEX by Headspace GC-MS	E611A	883634	1	7	14.2	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	876482	1	6	16.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	876481	0	0	0.0	5.0	✗
VH and F1 by Headspace GC-FID	E581.VH+F1	883635	1	9	11.1	5.0	✓
Laboratory Control Samples (LCS)							
BC PHCs - EPH by GC-FID	E601A	882510	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	883634	1	7	14.2	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	876482	1	6	16.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	876481	0	0	0.0	5.0	✗
PAHs by Hexane LVI GC-MS	E641A	882509	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	883635	1	9	11.1	5.0	✓
Method Blanks (MB)							
BC PHCs - EPH by GC-FID	E601A	882510	1	16	6.2	5.0	✓
BTEX by Headspace GC-MS	E611A	883634	1	7	14.2	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	876482	1	6	16.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	876481	0	0	0.0	5.0	✗
PAHs by Hexane LVI GC-MS	E641A	882509	1	11	9.0	5.0	✓
VH and F1 by Headspace GC-FID	E581.VH+F1	883635	1	9	11.1	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	883634	1	7	14.2	5.0	✓
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S	876482	1	6	16.6	5.0	✓
Dissolved Sodium and Silicon in Seawater by CRC ICPMS	E469S.NaSi	876481	0	0	0.0	5.0	✗
VH and F1 by Headspace GC-FID	E581.VH+F1	883635	1	9	11.1	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals in Seawater by Triple Quad ICPMS	E465S Vancouver - Environmental	Water	APHA 3030B/EPA 6020B (mod)	Seawater samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Triple Quadrupole ICPMS.
VH and F1 by Headspace GC-FID	E581.VH+F1 Vancouver - Environmental	Water	BC MOE Lab Manual / CCME PHC in Soil - Tier 1 (mod)	Volatile Hydrocarbons (VH and F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BC PHCs - EPH by GC-FID	E601A Vancouver - Environmental	Water	BC MOE Lab Manual	Sample extracts are analyzed by GC-FID for BC hydrocarbon fractions.
BTEX by Headspace GC-MS	E611A Vancouver - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS	E641A Vancouver - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
Dissolved Hardness (Calculated)	EC100 Vancouver - Environmental	Water	APHA 2340B	"Hardness (as CaCO3), dissolved" is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. "Total Hardness" refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
VPH: VH-BTEX-Styrene	EC580A Vancouver - Environmental	Water	BC MOE Lab Manual (VPH in Water and Solids) (mod)	Volatile Petroleum Hydrocarbons (VPH) is calculated as follows: VPHw = Volatile Hydrocarbons (VH6-10) minus benzene, toluene, ethylbenzene, xylenes (BTEX) and styrene.
LEPH and HEPH: EPH-PAH	EC600A Vancouver - Environmental	Water	BC MOE Lab Manual (LEPH and HEPH) (mod)	Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH) are calculated as follows: LEPH = Extractable Petroleum Hydrocarbons (EPH10-19) minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene; HEPH = Extractable Petroleum Hydrocarbons (EPH19-32) minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

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

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Dissolved Metals Seawater Filtration	EP421S Vancouver - Environmental	Water	PUGET SOUND PROTOCOLS, EPA 6020A	This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by Collision/Reaction Cell ICPMS.
VOCs Preparation for Headspace Analysis	EP581 Vancouver - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Vancouver - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

ALS Canada Ltd.

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QUALITY CONTROL REPORT

Work Order	: **VA23A6459**	Page	: 1 of 7
Client	: AECOM Canada Ltd.	Laboratory	: Vancouver - Environmental
Contact	: Leslie Southern	Account Manager	: Dean Watt
Address	: 1000 - 2025 Willingdon Avenue Burnaby BC Canada V5C 0J3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: 60704318/15405	Date Samples Received	: 24-Mar-2023 14:40
PO	: 5737161	Date Analysis Commenced	: 27-Mar-2023
C-O-C number	: 20-1014512	Issue Date	: 06-Apr-2023 18:03
Sampler	: AH, MM, RS 604-444-6400		
Site	: Burnaby Refinery		
Quote number	: AECOM/Parkland		
No. of samples received	: 7		
No. of samples analysed	: 7		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Erin Sanchez		Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 876482)											
VA23A6459-001	PW17-1|REG|GW	Copper, dissolved	7440-50-8	E465S	0.00050	mg/L	<0.50 µg/L	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E465S	0.0010	mg/L	1.7 µg/L	0.0015	0.0003	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 883634)											
VA23A6459-001	PW17-1|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	----
Hydrocarbons (QC Lot: 883635)											
VA23A6459-001	PW17-1|REG|GW	VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	<100	0.0%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 876482)						
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 883634)						
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: 882510)						
EPH (C10-C19)	----	E601A	250	µg/L	<250	----
EPH (C19-C32)	----	E601A	250	µg/L	<250	----
Hydrocarbons (QCLot: 883635)						
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	<100	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882509)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Acridine	260-94-6	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 882509) - continued						
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Quinoline	91-22-5	E641A	0.05	µg/L	<0.050	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 876482)									
Copper, dissolved	7440-50-8	E465S	0.0005	mg/L	0.25 mg/L	106	80.0	120	----
Zinc, dissolved	7440-66-6	E465S	0.001	mg/L	0.5 mg/L	95.1	80.0	120	----
Volatile Organic Compounds (QCLot: 883634)									
Benzene	71-43-2	E611A	0.5	µg/L	100 µg/L	92.1	70.0	130	----
Ethylbenzene	100-41-4	E611A	0.5	µg/L	100 µg/L	104	70.0	130	----
Styrene	100-42-5	E611A	0.5	µg/L	100 µg/L	99.1	70.0	130	----
Toluene	108-88-3	E611A	0.5	µg/L	100 µg/L	101	70.0	130	----
Xylene, m+p-	179601-23-1	E611A	0.4	µg/L	200 µg/L	104	70.0	130	----
Xylene, o-	95-47-6	E611A	0.3	µg/L	100 µg/L	102	70.0	130	----
Hydrocarbons (QCLot: 882510)									
EPH (C10-C19)	----	E601A	250	µg/L	6491 µg/L	124	70.0	130	----
EPH (C19-C32)	----	E601A	250	µg/L	3363 µg/L	121	70.0	130	----
Hydrocarbons (QCLot: 883635)									
VHw (C6-C10)	----	E581.VH+F1	100	µg/L	6310 µg/L	108	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 882509)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.5 µg/L	107	60.0	130	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.5 µg/L	108	60.0	130	----
Acridine	260-94-6	E641A	0.01	µg/L	0.5 µg/L	113	60.0	130	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.5 µg/L	112	60.0	130	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.5 µg/L	106	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	106	60.0	130	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.5 µg/L	122	60.0	130	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.5 µg/L	118	60.0	130	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.5 µg/L	114	60.0	130	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.5 µg/L	106	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: 882509) - continued									
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.5 µg/L	110	60.0	130	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.5 µg/L	115	50.0	130	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.5 µg/L	116	60.0	130	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.5 µg/L	116	60.0	130	----
Quinoline	91-22-5	E641A	0.05	µg/L	0.5 µg/L	113	60.0	130	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Dissolved Metals (QCLot: 876482)										
VA23A6459-002	PW17-2|REG|GW	Copper, dissolved	7440-50-8	E465S	0.376 mg/L	0.4 mg/L	93.9	70.0	130	----
		Zinc, dissolved	7440-66-6	E465S	7.41 mg/L	8 mg/L	92.6	70.0	130	----
Volatile Organic Compounds (QCLot: 883634)										
VA23A6459-002	PW17-2|REG|GW	Benzene	71-43-2	E611A	89.6 µg/L	100 µg/L	89.6	60.0	140	----
		Ethylbenzene	100-41-4	E611A	97.1 µg/L	100 µg/L	97.1	60.0	140	----
		Styrene	100-42-5	E611A	94.9 µg/L	100 µg/L	94.9	60.0	140	----
		Toluene	108-88-3	E611A	95.9 µg/L	100 µg/L	95.9	60.0	140	----
		Xylene, m+p-	179601-23-1	E611A	194 µg/L	200 µg/L	97.2	60.0	140	----
		Xylene, o-	95-47-6	E611A	96.8 µg/L	100 µg/L	96.8	60.0	140	----
Hydrocarbons (QCLot: 883635)										
VA23A6459-003	PW17-4|REG|GW	VHw (C6-C10)	----	E581.VH+F1	5200 µg/L	6310 µg/L	82.4	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 1014512

Canada Toll Free: 1 800 668 9878

Page 1 of 1

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Report To	Contact and company name below will appear on the final report
Company:	AECOM Canada Ltd
Contact:	Leslie Southern
Phone:	604-444-6408
	Company address below will appear on the final report
Street:	3292 Production Way
City/Province:	Burnaby, BC
Postal Code:	V5A 4R4
Invoice To	Same as Report To ☐ YES ☒ NO
	Copy of Invoice with Report ☐ YES ☒ NO
Company:	Parkland Refining (B.C.) Ltd.
Contact:	Christopher Boys

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 raymund.sampaga@aecom.com

Email 3

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 min

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge m

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge m

☐ 1 day [E] If received by 3pm M-F - 100% rush surcharge m

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge may apply to rush requests on weekends, statutory holidays and

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, p

Environmental Division Vancouver
Work Order Reference
VA23A6459
Telephone : +1 604 253 4188

Project Information

ALS Account # / Quote #:

Job #: 60704318 / 15405

PO / AFE:

LSD: Burnaby Refinery

ALS Lab Work Order # (ALS use only):

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Contact: Dean Watt Sampler: RS, AH, MM

Analys

Indicate Filtered (F), Preserved (P) or Filte

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/VFH (no MTBE) P	LEPH$_w$ P	PAHs P	Dissolved Cu, Zn F	Hardness (all metals samples)	Brackish water	SAMPLES ON	EXTENDED STO	SUSPECTED HAZARD (see notes)
	PW17-1_20230324	24-Mar-23	13:19	PW	5	X	X	X	X		X			
	PW17-2_20230324	↓	13:25	↓	↓	↓	↓	↓	↓		X			
	PW17-4_20230324	↓	13:05	↓	↓	↓	↓	↓	↓		X			
	PW17-5_20230324	↓	13:00	↓	↓	↓	↓	↓	↓		X			
	PW17-6_20230324	↓	12:45	↓	↓	↓	↓	↓	↓		X			
	DUP-1_20230324	↓	13:19	↓	↓	↓	↓	↓	↓		X			
	Travel Blank-5	↓	13:30	↓	1	X								

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

Are samples taken from a Regulated DW System? ☐ YES ☒ NO

Are samples for human consumption/ use? ☐ YES ☒ NO

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

BC CSR

Please analyze brackish samples as sea waters

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: 15

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Raymund Sampaga	Date: March 24, 2023	Time: 15:04	Received by:	Date:	Time:	Received by:	Date: Mar 24	Time: 1440

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.

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[10], 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 and dissolved metals (BTEX, VPH_w, $LEPH_w$, copper and zinc).

Precision

For the annual event, a total of two 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.

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%.

RPDs could not be calculated for the duplicate samples as parent and duplicate sample concentrations were less than fives times the RDL.

[10] Throughout the 2023 sampling program, the decontaminated equipment used for the collection of the rinsate blanks included the oil/water interface meter.

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:** 60704318

Photo No. 1	**Date:** July 13, 2022

Direction Photo Taken:

North

Description:

Condition of historical wells, PR2-8S/I/D with caps missing, PVC well casings were full of sand and rocks.

Photo No. 2	**Date:** July 13, 2022

Direction Photo Taken:

West

Description:

Western Section looking west

APPENDIX E: PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project Number:**
Parkland Refining (B.C.) Ltd.	Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	60704318

Photo No.	**Date:**
3	July 13, 2022

Direction Photo Taken:

East

Description:

Eastern section looking east

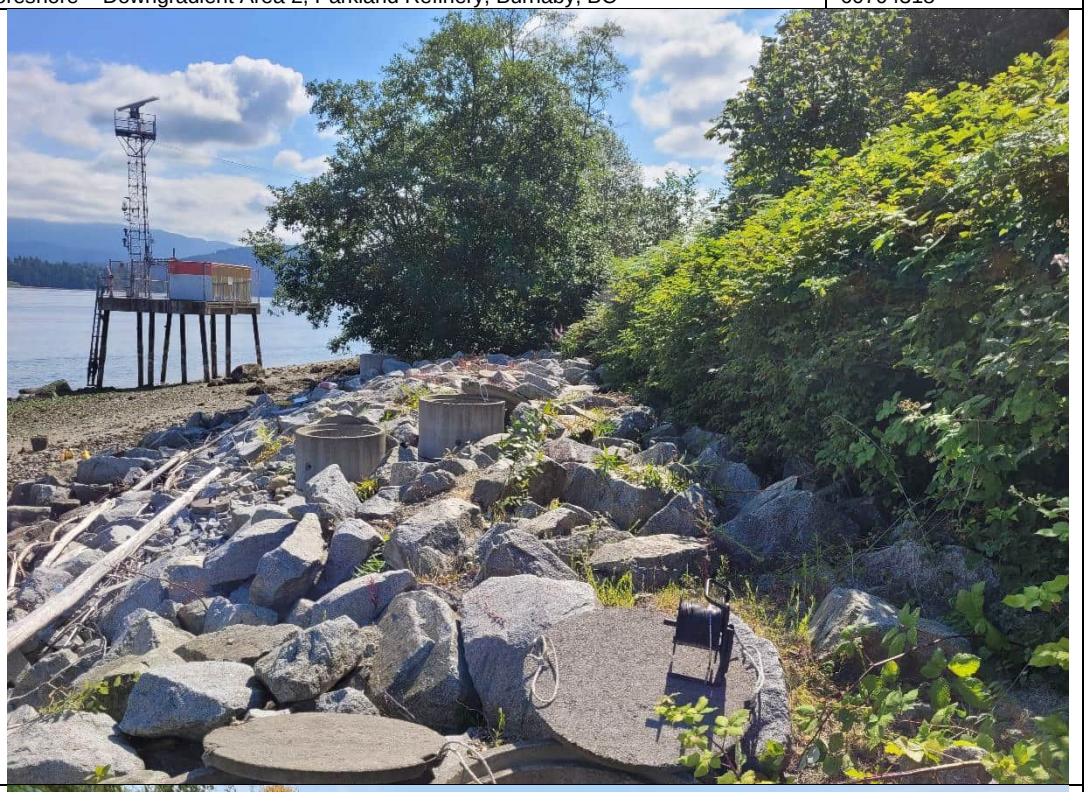


Photo No.	**Date:**
4	October 7, 2022

Direction Photo Taken:

South

Description:

Graffiti seen on sentry and compliance wells in eastern section

APPENDIX E: PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project Number:
Parkland Refining (B.C.) Ltd.	Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	60704318

Photo No.	Date:
5	October 7, 2023

Direction Photo Taken:

South

Description:

Graffiti on PW17-26 associated with the Eastern FPTS.

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

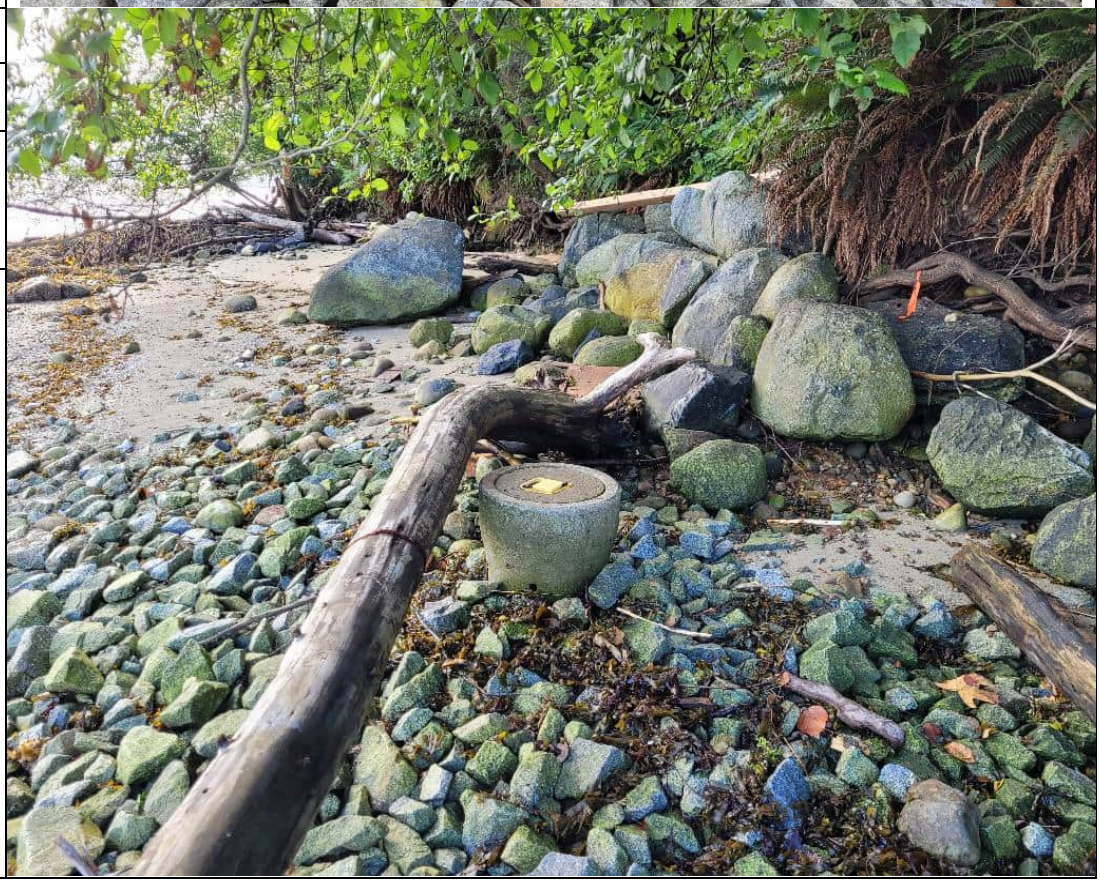
Photo No.	Date:
6	July 13, 2022

Direction Photo Taken:

East

Description:

PW17-31 uncovered from large wooden platform.



APPENDIX E: PHOTOGRAPHIC LOG

Client Name: Parkland Refining (B.C.) Ltd.	**Site Location:** Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	**Project Number:** 60704318

Photo No. 7	**Date:** July 13, 2022

Direction Photo Taken:

North

Description:

Damage following removal of wood plank over PW17-31

Client Name: Parkland Refining (B.C.) Ltd.	
Photo No. 8	**Date:** October 7, 2022

Direction Photo Taken:

North

Description:

Repair for PW17-31 Handle October 2022

APPENDIX E: PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project Number:
Parkland Refining (B.C.) Ltd.	Foreshore – Downgradient Area 2, Parkland Refinery, Burnaby, BC	60704318

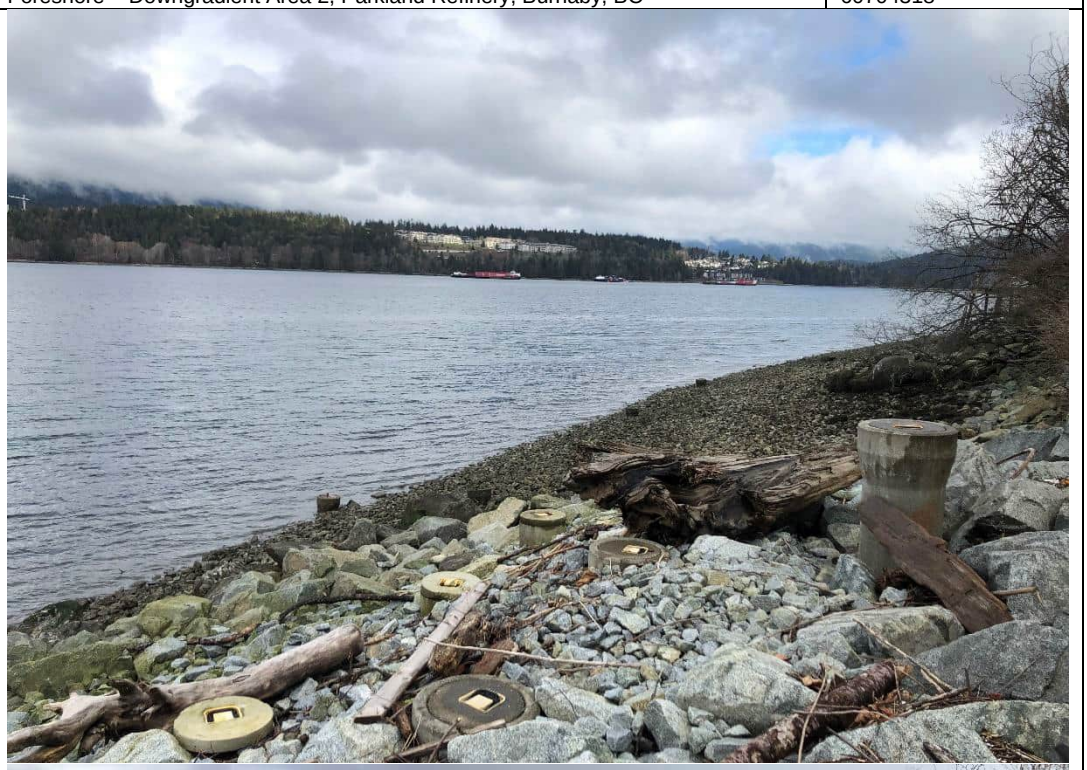
Photo No.	Date:
7	March 24, 2023

Direction Photo Taken:

Northeast

Description:

Western section of the FPTS facing northeast



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

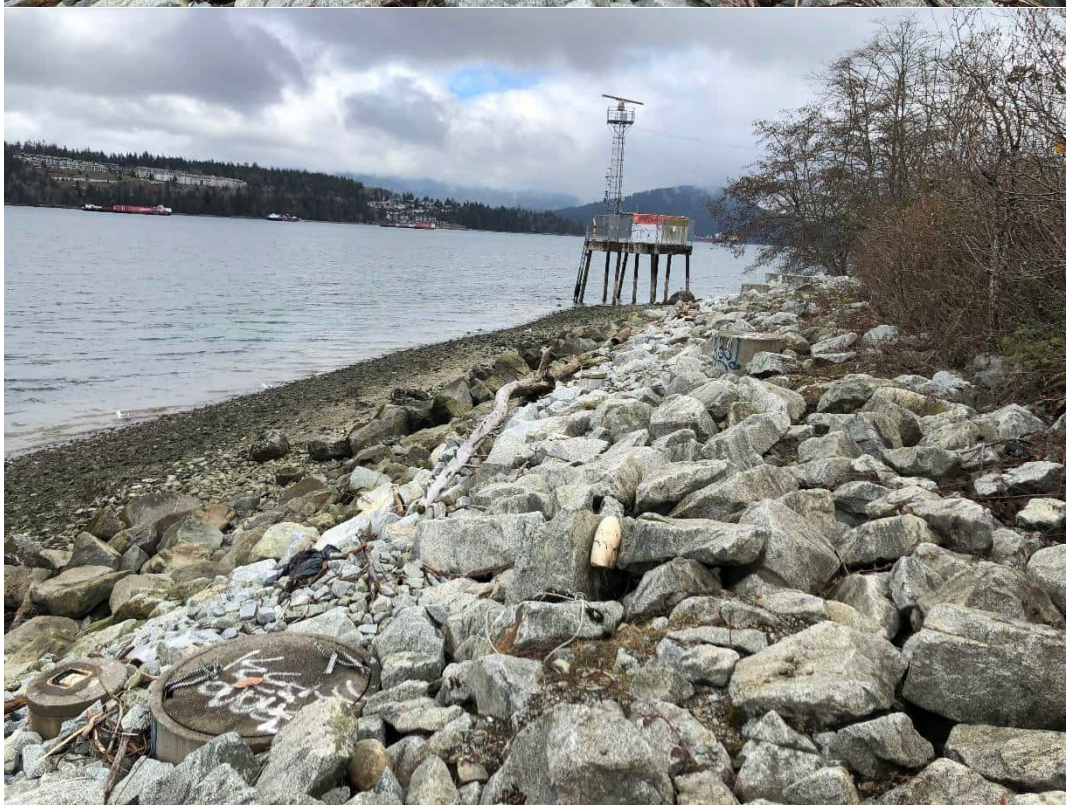
Photo No.	Date:
8	March 24, 2023

Direction Photo Taken:

East

Description:

Eastern section of FPTS facing east



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