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Report on the 2018 Perimeter Monitoring Program and Perimeter Extraction System

Parkland Burnaby Refinery

Parkland Refining (B.C.) Ltd.

Project number: 60569856

November 7, 2019

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AECOM: 2015-04-13

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Executive Summary

On behalf of Parkland Refining (B.C.) Ltd. (Parkland), AECOM Canada Ltd. (AECOM) completed monitoring and sampling as part of the Perimeter Monitoring Program (PMP) and performed operations, maintenance and monitoring of the Perimeter Extraction System (PES), at the Burnaby Refinery (Refinery) throughout 2018. The PMP and PES are performed under the oversight of the British Columbia Ministry of Environment and Climate Change Strategy (ENV). This report summarizes the activities associated with the 2018 PMP and PES programs.

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

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

Perimeter Monitoring Program

The purpose of the PMP is to monitor groundwater environmental conditions along the down gradient boundary of the Refinery. The PMP is executed once in the wet season (high groundwater table) and once in the dry season (low groundwater table). The two events in 2018 were completed over the following periods:

- Wet Season Event – April 9 to May 30, 2018
- Dry Season Event – August 20 to September 25, 2018

Site-Specific Screening Levels (SSSLs) for select parameters were developed to evaluate potential risks resulting from impacted Site groundwater to Burrard Inlet. The results of the PMP groundwater samples are compared to the SSSLs as well as the Contaminated Sites Regulation (CSR) standards for the "protection of marine aquatic life" (AW) (CSR standards). SSSLs are trigger concentrations which indicate the need for further investigation/evaluation or remedial action. For those parameters where SSSLs are not available, the CSR standards are used to assess the need for further investigation or remedial action.

Areas 1 and 3 Perimeter Monitoring Program Summary

The sampling program and results for the Areas 1 and 3 PMP for 2018 are summarized below.

Total number of monitoring wells included in the PMP for Areas 1 and 3:	31
Total number of monitoring wells sampled during the wet event:	31
Total number of monitoring wells sampled during the dry event:	30*
Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for petroleum hydrocarbons (PHCs[1]) and/or polycyclic aromatic hydrocarbons (PAHs) parameters for both events	26
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs, but above the CSR AW standards for PHCs and/or PAHs for either one or both events	3
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs and/or PAHs parameters for either one or both events	2

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

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

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The two monitoring wells where sample concentrations above the SSSLs were observed in 2018 are located within the historical influence of the Air Sparge (AS) system. In October of 2015, the Air Sparge (AS) remediation system located in Area 3 was temporarily turned off to assess whether further active remediation in the area was required. Based on subsequent assessments and monitoring data, the AS system remained on permanent standby throughout 2018.

In these two instances where reported concentrations were above the SSSLs, one instance (U07-10S) represents a previously investigated area of isolated contamination where nearby monitoring wells have continued to demonstrate vertical and horizontal delineation is maintained. The second instance represents a location where a detectable concentration of acenaphthene was reported above the SSSL for the first time since this well (A3MW02-07) was added to the PMP in 2005. As the SSSL exceedance was reported in the dry season sampling event, an additional sampling event was completed approximately 20 days later to investigate the SSSL exceedance. All reported concentrations were below the SSSLs in the follow-up sampling event.

The concentration of contaminants of concern in samples collected as part of the 2018 PMP for Areas 1 and 3 do not indicate an immediate need for additional investigation, evaluation, or remediation. Ongoing monitoring of Area 3 will continue without the influence of the AS system; the AS system will remain off but on standby through 2019. AECOM recommends that the Area 1 and 3 PMP continue in 2019 with a similar scope of work as completed in 2018.

Area 2 Perimeter Monitoring Program Summary

The sampling program and results for the Area 2 PMP for 2018 are summarized in the table below.

Total number of monitoring wells included in the PMP for Area 2:	39
Total number of monitoring wells sampled during the wet event:	30*
Total number of monitoring wells sampled during the dry event:	17*
Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for PHCs, PAHs, and/or dissolved metal parameters for both events	31
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs but above the CSR AW standards for PHCs and/or PAHs for either one or both events	7
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs and/or PAHs for either one or both events	1

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

The single SSSL exceedance was associated with the reported xylenes concentration in a well (A2MW09-11) located down gradient of the central section of the PES. Samples from this well have historically contained elevated concentrations of xylenes above the SSSL but have generally demonstrated a decreasing trend. Due to insufficient water in this well, sampling of this well is typically only possible during the wet season event. Therefore, the xylenes concentration detected in the wet season sampling event could not be verified during the subsequent 2018 dry season sampling event.

The results of the 2018 PMP for Area 2 do not indicate an immediate need for additional investigation, evaluation, or remediation other than the continued operation of the PES.

AECOM recommends the Area 2 PMP continue in 2019 with a similar scope of work as completed in 2018, but without dissolved metals analyses on samples from five monitoring wells that have historically demonstrated metal concentrations below the CSR standards. Dissolved copper analysis will continue at one well (MW11-4S) that contained dissolved copper concentrations above the CSR standard in previous years, however not in 2018.

Area 2 Perimeter Extraction System

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

Throughout 2018, a water column measuring one meter above the pump intake during pump operation was used as a trigger for troubleshooting and/or replacement of a groundwater extraction pump. If the pump did not function following troubleshooting or demonstrated poor reliability, then it was removed and replaced with a working pump from the spare pump inventory.

An annual average water column of less than one meter was sustained at 34 of the 40 extractions wells, indicating satisfactory performance. Of the six extraction wells with average water columns greater than one meter, five were located in the eastern section of the PES and demonstrated an average annual water column greater than one meter but less than three meters. The other location is the western most extraction well which also had an average water column less than three meters. In all instances, these wells are outside of the known NAPL plume in Area 2. The 2018 average annual water column data represents improved PES performance from previous years, particularly in the eastern section of the PES where pump fouling has been more prevalent.

In 2018, the PES collected a total fluid volume of 32,402 cubic meters. Of that volume, 190 litres are estimated to represent NAPL.

In 2018, the PES operated within acceptable limits for controlling the off-site migration of NAPL and dissolved phase PHCs based on:

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

It is recommended that the PES continue to be operated in 2019 in a similar manner as 2018.

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1. INTRODUCTION

The objective of this report is to document the following information to the British Columbia (BC) Ministry of Environment and Climate Change Strategy (ENV):

- 2018 groundwater results from the Refinery Perimeter Monitoring Program (PMP) (wet and dry season events), and
- 2018 performance of the Refinery Area 2 Perimeter Extraction System (PES) located along the perimeter of the Parkland (formerly Chevron) Burnaby Refinery (Refinery).

AECOM Canada Ltd. (AECOM) has prepared this report on behalf of Parkland Refining (B.C.) Ltd.

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

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

2. GEOLOGY AND HYDROGEOLOGY OVERVIEW

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

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

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

Monitoring wells on-site have a total depth ranging between 1.2 meters (m) and 26.9 m below the top of monitoring well casing. Groundwater depths vary with land surface elevation. In general, the depth to groundwater is shallower near the Foreshore and deeper in upland areas (URS 2012).

The hydraulic conductivities for the PES area range from 5×10^{-6} meters per second (m/s) to 1×10^{-10} m/s with a geometric mean of 5×10^{-7} m/s (URS 2013a). The estimated time required for groundwater to

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

- Hydraulic conductivity of 1.1 x 10^{-6} m/s. This represents the highest measured conductivity from the central section of the PES where the majority of non-aqueous phase liquid (NAPL) is encountered.
- Calculated groundwater velocity of 30.5 meters/year (m/yr.) under non-pumping conditions.
- The distance from the PES extraction wells on the Upper Bench to the Refinery property line is approximately 15 m.

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

3. BACKGROUND

3.1 Perimeter Monitoring Program Background

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

- The scope of the original semi-annual groundwater monitoring and sampling program was outlined to the British Columbia (BC) Ministry of Environment (ENV) by Chevron Canada Limited (CCL) in their letter entitled, *Chevron Refinery Well Monitoring Program*, dated October 31, 2003.
- Sentry wells are monitoring wells typically located outside of known Areas of Environmental Concern (AECs).
- Monitoring wells located in the AECs are monitored as part of separate investigation, mitigation, and/or remediation programs. Several of the Area 2 Sentry wells are within the influence of remedial activities.
- Following the 2016 PMP, monitoring and sampling of the methyl tert-butyl ether (MTBE) AEC was reduced from 22 monitoring wells to five monitoring wells in 2017. Based on evaluation of the groundwater quality in the Report on the 2015 and 2016 PMP and PES, the remediation in the MTBE AEC is considered complete. The system status was changed to dormant and the area is no longer considered an AEC (AECOM, 2017).
- Consistent with the intent of the PMP, AECOM monitored 70 “Sentry” monitoring wells at the Refinery perimeter in 2018.

Additional details are presented in Appendix A (Areas 1 and 3 Perimeter Monitoring Program) and Appendix B (Area 2 Perimeter Monitoring Program).

3.2 Perimeter Extraction System Background

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

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

- In the summer of 2010, the initial portion of the PES was installed along the northern perimeter of Area 2 consisting of 10 total fluid pumps and associated extraction wells. This installation is currently

referred to as the central section (Figure 4). Since 2010, all these extraction wells have been replaced with deeper extraction wells to improve the hydraulic capture in this area.

- In the summer of 2011, the PES was expanded to the east to include the Flare Stack Area. The expansion included the installation of an additional 17 pumping locations and associated infrastructure. This installation is currently referred to as the eastern section (Figure 4).
- In the summer of 2012, the PES was expanded to the west to the edge of the ponds area. The expansion included the installation of an additional 13 pumping locations and associated infrastructure. This installation is currently referred to as the western section (Figure 4).
- In 2015, the common header of the eastern section of the PES was enlarged.
- In 2016, the common header of the western and central sections of the PES were enlarged.
- In 2017, the PES process was expanded to include an effluent oil water separator (OWS), including a NAPL storage tank and effluent flow meter, and a sequestering agent dosing system.

Further details on the PES are presented in Appendix C.

3.3 Air Sparge and MTBE Systems Summary

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

Table 1 - Summary of Air Sparge and MTBE Systems

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

NA - Not applicable

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

4. REGULATORY CONTEXT

The *Environmental Management Act* (EMA) was brought into force on July 8, 2004. The applicable regulation under the EMA is the Contaminated Sites Regulation (CSR). The CSR came into effect April 1, 1997 and provides a framework to investigate, assess, and remediate contaminated sites in BC. Twelve amendments to the CSR have been completed since 1997, with the most recent being the Stage 12, which came into effect on January 24, 2019.

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

4.1 Groundwater Site-Specific Screening Levels

Site-Specific Screening Levels (SSSLs) for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of Parkland and AECOM, to evaluate potential risks resulting from impacted Site groundwater to Burrard Inlet. The SSSLs were based on the CSR Stage 10 Omnibus Amendments in addition to the Updated Screening Levels (USLs) and Risk-Based Management Targets

(RBMTs) developed for application along the Foreshore downslope of Area 2 of the Refinery. Upon the release of subsequent housekeeping amendments (Stage 11 and Stage 12), these SSSLs were verified and no updates were warranted.

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

Table 2 - Site-Specific Screening Levels

PHCs	
PCOC	**SSSL (µg/L)**
LEPHw	3000
VPHw	15000
$EPHw_{10-19}$	5000
VHw (C6-C10)	15000
Benzene	21000
Ethylbenzene	3200
Styrene	720
Toluene	7700
Xylenes	3300

PAHs	
PCOC	**SSSL (µg/L)**
Acenaphthene	60
Acridine	30
Anthracene	40
Benz(a)anthracene	1
Benzo(a)pyrene	2.8
Chrysene	1
Fluoranthene	40
Fluorene	120
Naphthalene	440
Phenanthrene	3
Pyrene	40
Quinoline	34

Metals	
PCOC	**SSSL (µg/L)**
Antimony	2500
Arsenic	125
Barium	5000
Beryllium	1000
Boron	12000
Cadmium	90
Chromium	500
Cobalt	1100
Copper	62
Lead	1400
Molybdenum	10000
Nickel	750
Selenium	20
Thallium	3
Uranium	1000
Zinc	900

Notes:
PCOC - Potential Contaminants of Concern
µg/L – micrograms per litre

4.2 Applicable Standards and Screening Levels

The Site is zoned for heavy industrial use. The nearest surface water downgradient of the Site is Burrard Inlet, located approximately 10 m to the north of portions of Area 1, and 40 m north of Area 2. Area 3 borders Burrard Inlet and includes a water lot within the inlet. Assessment of the Site's hydrogeology and potential pathways for groundwater contamination, using the available data from numerous soil and groundwater investigations, indicate that CSR standards for the protection of marine aquatic life (AW) are applicable at the Site[2].

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

- A drinking water exemption was provided by ENV for Area 2 on May 15, 2017. A copy of the letter is included in Appendix D.

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

- Completed CSR Protocol 21 drinking water flowcharts (Figures 1 and 4 in Protocol 21) for Areas 1 and 3 indicate the drinking water standard is not applicable; therefore, direct approval from ENV is not required. The completed flow charts are included in Appendix D.

The results of the PMP groundwater samples were compared to the SSSLs and the CSR AW standards. SSSLs represent a concentration which will indicate the need for further assessment/evaluation or remedial action. For those parameters where SSSLs are not available, the CSR standards will be the basis for evaluating the need for further assessment or remedial action.

5. SCOPE OF WORK

The 2018 scope of work included:

- Updating and following the Refinery-wide AECOM Health and Safety Plan (HASP).
- Completion of the 2018 PMP in accordance with the work plan submitted to ENV on October 31, 2003 and AECOM's work plan dated March 29, 2004. In general, this work included:
    - Completion of two groundwater monitoring and sampling events per year, one during the wet season (high water table) and the other during the dry season (low water table),
    - Submission of groundwater samples for laboratory chemical analysis of petroleum hydrocarbon (PHC) related parameters (refer to Table 5), polycyclic aromatic hydrocarbons (PAHs), and dissolved metals, and
    - Comparison of the analytical results to applicable standards.
- Operating, monitoring, and maintaining the PES in accordance with the PES Operations, Monitoring and Maintenance Plan (AECOM 2016), which consisted of monitoring pump operation twice a month and quarterly groundwater and effluent monitoring. Additional detail is provided in Appendix C.

The 2018 monitoring programs were completed by Mr. Justin Becker, E.I.T, Ms. Sofia Ramos Ajas, G.I.T., Stephen Maley, B.I.T, and Mr. Albert Wang, P.Eng. The report was led by Mr. Stephen Sumsion, P.Eng with contributions by Mr. Justin Becker, E.I.T and Ms. Sofia Ramos Ajas, G.I.T; senior reviews were conducted by Mr. Robert Dickin, M.Sc., P.Geo. CSAP, FGC., Robert Horwath, CA PG, and Leslie Southern M.Sc, P.Ag.

6. AREAS 1 AND 3 PERIMETER MONITORING RESULTS

The monitoring wells sampled as part of the Areas 1 and 3 2018 PMP are shown on Figure 2. The 2018 PMP groundwater monitoring and sampling program analytical data and data analysis plots are provided in Appendix A.

The total number of monitoring wells sampled for each of the two PMP seasonal events, are provided in Table 3 below.

Table 3 - Summary of PMP Sampling Program for Areas 1 and 3

Total number of monitoring wells included in the PMP for Areas 1 and 3:	31
Wet Season Event – April 9 to May 7, 2018 - Total number of monitoring wells sampled during the wet event: - Total number of dry monitoring wells monitored during the wet event: - Total number of monitoring wells that could not be sampled due to other reasons:	 31 0 0
Dry Season Event – August 28 to October 15, 2018 - Total number of monitoring wells sampled during the dry event: - Total number of dry monitoring wells monitored during the dry event: - Total number of monitoring wells that were not sampled due to other reasons:	 30 1 0

The summary of water quality for Areas 1 and 3 is provided in Table 4 and associated notes below.

Table 4 - Summary of PMP Results for Areas 1 and 3

Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for PHCs and/or PAHs parameters for both events.	26
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs, but above the CSR AW standards for PHCs and/or PAHs parameters for either one or both events	3
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs and/or PAHs parameters for either one or both events	2

- Reported concentrations for samples collected from 29 of the 31 monitoring wells sampled in Areas 1 and 3 were below the SSSLs.
- Reported concentrations above the SSSLs were from groundwater samples collected from monitoring wells A3MW02-07 and U07-10S in Area 3.
- The acenaphthene concentration (69.8 µg/L) in the sample collected from monitoring well A3MW02-07, exceeded the SSSL (60 µg/L) during the September 25, 2018 sampling event. The reported acenaphthene concentration in this sample represents the highest acenaphthene concentration since this well was added to the PMP in 2005. The concentrations of anthracene, fluoranthene, and pyrene reported in the September 2018 sample were also the highest concentrations since the well was added to the PMP in 2005, however these concentrations were below the SSSLs. A time series graph of these parameters is provided as Graph A-1 in Appendix A. To investigate the observed increase of acenaphthene and other PAH parameters in A3MW02-07, an additional sample was collected on October 15, 2018. The sample collected on October 15, 2018 from A3MW02-07 contained reported concentrations below the CSR AW standards for acenaphthene, anthracene, fluoranthene, and naphthalene parameters. The reported pyrene concentration remained above the CSR AW standard (but below the SSSL). Additional monitoring is required to continue to monitor trends.
- In all instances the reported concentrations above Site standards were within historical ranges observed in samples collected from U07-10S. Time series graphs for these parameters are provided as Graph A-2 and Graph A-6 in Appendix A. A sample from this well was collected during the wet sampling event but analytical data was not available due to a laboratory handling and reporting error (refer to Appendix G for a corrective action report provided by the project laboratory). The missing data is not anticipated to affect the findings or recommendations of this report due to the delineated status of the contamination in this well and that all parameters reported in 2018 were within historical ranges.
- Well U07-10S is part of a nested installation near the wharf approach in Area 3 of the Refinery. The two other nested monitoring wells in this cluster (U07-10I and U07-10D) are screened at deeper intervals. The concentrations of parameters exceeding the SSSLs in samples from U07-10S are below the SSSLs in samples collected from U07-10I and U07-10D, providing vertical delineation.

- Samples collected from monitoring wells (A3MW03-01, A3MW03-02, A3MW03-03 and A3MW02-05) located adjacent and downgradient to U07-10S all contained concentrations below the SSSLs providing horizontal delineation between U07-10S and waters of Burrard Inlet.
- Samples with concentrations of pyrene above the CSR AW standards, but below the SSSLs were collected from two monitoring wells (A3MW02-06 and A3MW02-08). In both instances the observed pyrene concentrations were within ranges previously reported in samples from these two wells. Time series graphs illustrating the pyrene concentration at A3MW02-06 and A3MW02-08 are provided in Appendix A as Graph A-3 and Graph A-4, respectively. In both instances the trends observed during the operation of the AS system differ from the trends observed from 2017 to present. Although concentrations of pyrene appear to be increasing, they remain marginally above the CSR AW standard and two orders of magnitude below the SSSL.
- A sample with a concentration of LEPHw above the CSR AW standards, but below the SSSLs was collected from A3MW03-02. The reported concentrations of LEPHw in samples from this well are within the historical range and general trends. A time series graph illustrating the LEPHw concentration in samples collected from A3MW03-02 is provided in Appendix A as Graph A-5.

The results of the 2018 PMP for Areas 1 and 3 do not indicate an immediate need for additional investigation or remediation. The monitoring wells will continue to be monitored during 2019 without the influence of the Area 3 AS system.

7. AREA 2 PERIMETER MONITORING RESULTS

The monitoring wells sampled as part of the 2018 PMP for Area 2 are shown on Figure 3. The details of the Area 2 2018 PMP groundwater monitoring and sampling program and associated results are included in Appendix B.

The total number of monitoring wells sampled for each of the two PMP seasonal events is provided in Table 5.

Table 5 - Summary of PMP Sampling Program for Area 2

Total number of monitoring wells included in the PMP for Area 2:	39
Wet Season Event – April 19 to May 30, 2018 - Total number of monitoring wells sampled during the wet event: - Total number of dry monitoring wells monitored during the wet event: - Total number of monitoring wells not sampled due to other reasons:	 30 7 2*
Dry Season Event – August 20 to September 25, 2018 - Total number of monitoring wells sampled during the dry event: - Total number of dry monitoring wells monitored during the dry event: - Total number of monitoring wells that were not sampled due to other reasons:	 17 22 0

Note:

** During the wet season monitoring event, monitoring wells G2-3B and G2-3C were omitted from the program. The wells were returned to the program for the 2018 dry season event.*

The summary of water quality for Area 2 is provided in Table 6 and associated notes below.

Table 6 - Summary of PMP Results for Area 2

Total number of monitoring wells characterized by groundwater sample concentrations below CSR AW standards for PHCs and/or PAHs parameters for both events	31
Total number of monitoring wells characterized by groundwater sample concentrations below SSSLs, but above the CSR AW standards for PHCs and/or PAHs parameters for either one or both events	7
Total number of monitoring wells characterized by groundwater sample concentrations above SSSLs for PHCs, PAHs, MTBE, and/or dissolved metals parameters for either one or both events	1

- In addition to PHC and PAH parameters, six monitoring wells (MW11-3S, MW11-3I, MW11-3D, MW11-4S, MW11-4I and MW11-4D) in the Flare Stack Area were also analyzed for dissolved metals. The reported concentrations of dissolved metals were below their CSR AW standards in all 2018 samples. Historically reported dissolved copper concentrations have only exceeded the CSR standards in samples collected from MW11-4S.
- In addition to PHCs and PAHs parameters, five monitoring wells (G2-9A, G2-9B, G2-10, G2-11A, and G2-11B) during the wet event and seven monitoring wells (five plus G2-3B and G2-3C) during the dry event across Area 2 were also analyzed for MTBE. None of the MTBE reported concentrations were greater than the CSR AW standards.

Reported concentrations in groundwater samples above the Site standards for at least one sampling event in 2018 are summarized in Table 7 and associated notes below. Interpretation of groundwater quality trends with respect to the PES operation is included in Section 9 - PES Performance Discussion.

Table 7 - Summary of Samples with Concentrations above the Site Standards

Monitoring Well ID	**Parameter below SSSLs but Greater Than the CSR AW Standards**	**Parameters Greater Than the SSSLs**
U9	LEPHw	-
MW03-03	LEPHw	-
A2MW09-05I	LEPHw	-
A2MW09-06I	LEPHw, Acridine*, and Pyrene	-
A2MW09-11	LEPHw, VPHw, and Naphthalene	Xylenes
A2MW09-15	LEPHw	-
G2-3B	Pyrene	-
G2-10	Pyrene	-

Notes:

**The RDL for acridine in A2MW09-06I was raised above the CSR AW standard.*

- The single Area 2 SSSL exceedance in 2018 was the reported xylenes concentration in the sample collected from A2MW09-11 during the wet season event. A2MW09-11 could not be sampled during the dry season sampling event due to insufficient water in the well. In all instances the reported concentrations were within the historical ranges observed in samples from this well between 2016 and 2017 for their respective parameters. A time series graph for these parameters is provided in Appendix B as Graph B-4. This well is located down gradient of the central section of the PES in the vicinity of UEIB-46.
- U9 was sampled once in 2018 during the wet season event; U9 could not be sampling during the dry sampling event due to insufficient water. The 2018 reported concentration of LEPHw (560 µg/L) was the highest reported concentration since the 2012 wet season event. U9 is located down gradient of the central section of the PES in the vicinity of UEIB-51 and UEIB-52.

- MW03-03 was sampled once in 2018 during the wet season event. The reported concentration of LEPHw was lower than the 2017 wet season sampling event and within the range of historical concentrations. This well is located downgradient of the eastern section of the PES in the vicinity of UEIB-29.
- A2MW09-05I was sampled twice during the wet season event and once during the dry season event. Quality assurance parent and a duplicate sample were collected and analyzed for LEPH/HEPH, VPH, BTEX, and PAH parameters. The relative percent differences (RPDs) between the parent and duplicate sample were acceptable (i.e. <10.6%), except for LEPHw/HEPHw where there was an RPD of approximately 125%. Due to this discrepancy, A2MW09-05I was re-sampled on May 30, 2018. At that time a parent and duplicate sample were collected and acceptable RPDs were observed between the parent and duplicate samples. Of the three parent samples collected in 2018, the reported concentration of LEPHw in the sample collected on April 26, 2018 represents the single CSR AW exceedance. In this instance, the reported concentration of LEPHw was within the historical range observed at this sample location. Additionally, the reported concertation of LEPHw in the two subsequent samples was less than the CSR AW standard. This monitoring well is located downgradient of the central section of the PES in the vicinity of UEIB-51.
- A2MW09-06I was sampled in 2018 during both events. During the 2018 wet season event, the highest reported concentrations for LEPHw and pyrene were observed. Also, during the wet sampling event, the RDL for acridine was raised above the CSR AW standard. During the dry season event, the reported concentrations of LEPHw, acridine, and pyrene were below the CSR AW standards and generally consistent with historically concentrations collected from this monitoring well. This monitoring well is located down gradient of the west section of the PES in the vicinity of UEIB-32.
- A2MW09-15 was sampled once in 2018 during the wet season event. The reported concentration of LEPHw was generally consistent with samples historically collected from this monitoring well. This well is located down gradient of the eastern section of the PES in the vicinity of UEIB-56.
- G2-3B was sampled once in 2018 during the dry season event. The reported concentration of pyrene was above CSR AW standards and generally consistent with samples collected historically from this monitoring well. G2-3B is located west of the PES and outside of its influence.
- The concentration of pyrene in samples collected from G2-10 in May and August 2018 was 0.296 µg/L and 0.015 µg/L, respectively. These represent the first detections of pyrene at this location since PAH analyses were added to the program for this well in 2015. The reported concentration of pyrene from the August 2018 sample is below the CSR AW standard as well as the reported detection limit historically reported for pyrene. This monitoring well is located east of the PES and outside of its influence.

Based on comparison of analytical results collected during the 2018 PMP to recent historical data, the Site perimeter groundwater quality conditions are generally similar to historical concentrations. The results of the 2018 PMP for Area 2 do not indicate an immediate need for additional investigation, evaluation, or remediation aside from the ongoing operation of the PES.

8. PES OPERATIONS AND PERFORMANCE

The purpose of the PES is to provide a hydraulic barrier to intercept and preclude the off-site migration of NAPL and PHCs in groundwater originating from the Area 2 NAPL plume. The PES, relative to NAPL measured in 2018, is shown on Figure 4. Additional details of PES operation, maintenance, monitoring, and system performance are summarized in Appendix C.

In 2018, the system was operated in accordance with the PES Operation Maintenance and Monitoring Plan (AECOM, 2016). This included the completion of:

- Semi-monthly system monitoring,

- Quarterly performance assessments,
- Quarterly effluent characterization and groundwater monitoring, and
- Annual and semi-annual maintenance events.

Throughout 2018, the average water column above the pump was evaluated over each quarter to identify underperforming pumps as well as an indicator of overall PES reliability.

The water column measuring one meter above the pump intake was used as a trigger for trouble shooting and / or replacement of a groundwater extraction pump. If the pump did not function following troubleshooting, it was removed and replaced with a working pump from the spare pump inventory. If the pump worked following troubleshooting but subsequent monitoring demonstrated poor reliability, the pump was also replaced with a functioning spare pump. This is an improvement from prior years where three meters was used as the trigger for pump maintenance.

Semi-monthly system monitoring activities verified consistent groundwater drawdown in active extraction wells through 2018 across the entire PES, except between the beginning of February to mid-March when access to the Refinery was suspended during a scheduled maintenance turnaround and monitoring could not be completed. Semi-monthly monitoring identified instances throughout 2018 where isolated drawdown was reduced due to poor pump performance at a single location, however, once identified these pumps were promptly replaced with functioning spare pumps. Despite instances throughout each quarter where an average water column of greater than three meters was observed in a specific extraction well, the pump replacement approach was effective at maintaining the average annual water column less than 3 m above the pump intake at all 40 extraction wells throughout 2018.

The reliability of the entire PES is further demonstrated by an average annual 2018 water column above the pump intake of less than 1 meter at 34 of the 40 extraction wells. Of the six locations (UEIB-17, UEIB-18, UEIB-27, UEIB-29, UEIB-43, and UEIB-55) with an average annual water column between 1-3 m above the pump intake, five are located in the eastern section of the PES. The other location (UEIB-43) is the western most extraction well. In all instances these wells are outside of the known NAPL plume in Area 2 and generally represent an improved performance from previous years, particularly the eastern section of the PES where pump fouling was historically more prevalent.

The quarterly performance assessments and supporting groundwater level monitoring events were completed to verify the influence of the PES on surrounding monitoring wells as the basis of the capture interpretation. In general, the groundwater elevations along the Upper and Lower Benches remained below the 2012 reference baseline elevations. These 2012 elevations have historically been used as the baseline to demonstrate the influence (i.e. drawdown which correlates with better capture) of the PES. Based on the reference elevations, a drawdown influence was present across the entire PES, despite the periodic events throughout 2018 when reduced drawdown was observed in isolated extraction wells. The complete evaluation of the PES performance, along with the results of the PMP, is discussed in Section 9 of this report.

Quarterly effluent characterization was performed to estimate the total fluid extracted by the PES as well as the total volume of NAPL collected. A summary of the total fluids and NAPL removed by the PES, by year, is listed in Table 8.

Table 8 - Summary of Total Fluids and NAPL Removed by the PES

Year	Total fluids extracted	NAPL extracted
2018	32,402 m^3	~ 190 L[2]
2017	38,642 m^3	~ 210 L[2]
2016[1]	33,369 m^3	~ 200 L[2]
2015[1]	43,218 m^3	~ 240 L[2]
2014[1]	54,213 m^3	~ 500 L[2]
2013[1]	48,491 m^3	~ 300 L[2]
2012[1]	40,159 m^3	~ 500 L[2]
2011	12,900 m^3	~21,700 L[3]

Note:

[1] - Historically reported volumes have been corrected in this report to include only the total fluids collected by the PES. Previous totals also include total fluids collected by pumps located in EX-1 to EX-4, and U2-5.

[2] - NAPL Extracted = 0.01% x the total volume of water collected from an extraction well during a quarter where NAPL or sheen was observed during the drum test for that extraction well.

[3] - NAPL Extracted = 0.1% x the total volume of water collected from an extraction well during a quarter where NAPL or sheen was observed during the drum test for that extraction well.

Although an indication of system performance, the total amount of fluid and NAPL extracted does not consider precipitation or the effects of sustained dewatering. As a result, it is not a complete indication of system performance. The difference between 2017 and 2018 volumes when reviewed in conjunction with drawdown are not anticipated to represent a performance concern. Starting the third quarter of 2018, NAPL collected by the PES was also determined by measuring the volume of NAPL within the NAPL storage container (Lube Cube) associated with the OWS. Over the two quarters of 2018, a total of 212 L of NAPL was collected by the OWS as compared to 190 L that is summarized in Table 8. The two PES NAPL removal estimation approaches will continue throughout 2019 for comparison purposes.

In addition to normal operation and maintenance, Parkland completed PES improvements to increase the capture, reliability, and performance of the PES. The improvements completed in 2018 include:

- On-going commissioning of the sequestering system, that should reduce biofouling of pumps and well screens. Sustained efforts to commission the sequestering system were completed through spring, summer, and fall of 2018. The system was winterized in November 2018 and will be returned to service in the spring of 2019.
- Installation of pumps and associated down well tubing in UEIB-56 and UEIB-51 during May of 2018. The installation of a pump in UEIB-51, located between wells between UEIB-52 and UEIB-32, improved drawdown in the known NAPL plume in Area 2. The installation at UEIB-56 replaced UEIB-20 as an extraction well (due to an underperforming pump stuck in the well).
- Repair and operation of the PES air compressor dryer unit as of October 24, 2018 following troubleshooting efforts by Wiseworth Canada, Parkland, and AECOM. Repairs included replacement of the desiccant, inlet and outlet filters, check valves and multiple exhaust mufflers. It is anticipated that providing dry, compressed air to the extraction pumps will extend the operating time and reliability of the pumps.

9. PES PERFORMANCE DISCUSSION

As summarized in Section 8 and Appendix C, reliable drawdown across the entire the PES was maintained for 2018. As a result, it is anticipated that the PES effectively precluded the off-site migration of NAPL and contaminated groundwater from the Site.

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

Although there is uncertainty inherent in the following evaluation for the reasons previously stated, the benefit of such a discussion is to evaluate a secondary line of evidence. This discussion also includes evaluation of relevant monitoring wells identified by the ENV in their comments received on December 22, 2016 for the 2014 PMP report. In their comments, the ENV indicated that there were no concerns with the report, except for the apparent increasing concentrations of contaminants of concern (COC) in monitoring wells A2MW09-5I, A2MW09-11, A2MW09-10, A2MW09-6S, MW02-04 and MW03-03. ENV recognized that system improvements were planned to stabilize or reduce the concentrations of the contaminants of concern.

Western PES Section

The PMP groundwater monitoring results and associated analytical from wells below the western section of the PES generally indicated that hydraulic control was maintained across this section throughout 2018.

Down gradient wells PW03-5, PW03-2A, PW03-2B, and PW03-4, A2MW09-06S remained under the influence of the PES as indicated by lack of water for sampling purposes in most instances throughout 2018. In the one instance where a sample was collected (PW03-5) the concentrations of PHCs and PAHs were below the reported detection limit.

A sample collected from A2MW09-06I was the only sample below the west section of the PES that exceeded CSR AW standards. A2MW09-06I is located down gradient of UEIB-32 and UEIB-33 which both operated reliably throughout 2018. This well is located near the western boundary of the central section of the PES. A2MW09-06I was sampled in 2018 during both events. During the wet sampling event, the highest reported concentrations for LEPHw and pyrene were observed at this well; however, during the dry sampling event the reported concentration of LEPHw was below the RDL and the concentration of pyrene was within historical ranges and below the CSR AW standard. Due to the reliable drawdown in UEIB-32 and UEIB-33 and the unsustained concentrations of LEPHw and Pyrene, a relationship between the observed increase in LEPHw and pyrene concentrations in samples from A2MW09-06I and the PES performance is not readily apparent.

Central PES Section

Other than indicated below, the general stability of the groundwater quality down gradient of the central section of the PES generally indicated that hydraulic control was maintained across this section throughout 2018. The installation of an extraction pump in UEIB-51 in May 2018 is anticipated to further improved hydraulic capture along this section. The benefit of this operational improvement on down gradient groundwater quality, particularly in A2MW09-05I and U9, will continue to be monitored through 2019.

During the wet season sampling event (April 2018) concentrations of LEPHw in samples collected from A2MW09-05I and U9 exceeded the CSR AW standard. The LEPHw concentration observed in the parent (920 µg/L) and duplicate sample (4,000 µg/L) collected from A2MW09-05I had an RPD of 125% and was

therefore resampled in May 2018 due to quality assurance and quality control concerns. This sampling event occurred after the installation of the extraction pump in UEIB-51. In the May 2018 sample, the LEPHw concentration in both the parent (360 µg/L) and duplicate sample (350 µg/L) were below the CSR AW standard. The August 2018 sample collected from this well contained a LEPHw concentration of 420 µg/L, also below the CSR AW standard.

The sustained reduction of LEPHw in samples collected in May and August from A2MW09-05I, are consistent with the reliable pumping performance recorded for the central section of the PES, particularly following the installation of a pump in UEIB-51. Due to insufficient water, a sample could not be collected from U9 during the dry event. Concentrations of PHCs at these locations will continue to be monitored and compared to PES performance.

In 2018, concentrations of PHCs and naphthalene exceed the CSR AW standards in A2MW09-11, located hydraulically downgradient of UEIB-46; concentrations have remained stable to generally decreased in this well as indicated in the time series graph for A2MW09-11 (Graph B-4, Appendix B). Results from the wet season sample collected in 2018 indicated an increase of volatile hydrocarbons above the 2017 concentrations (but below the 2016 concentrations), and sustained, slightly decreasing concentrations of LEPHw. The drawdown observed at UEIB-46 has been historically reliable except for a single event in September 2017, when a single event of reduced drawdown was observed. Due to the historically reliability drawdown at UEIB-46, a link between the reduced drawdown observed in September 2017 at UEIB-46 and the corresponding groundwater elevation and concentration increase observed in April 2018 at A2MW09-11 can not be correlated.

Eastern PES Section

The PMP groundwater monitoring results and associated analytical from wells below the eastern section of the PES generally indicated that hydraulic control was maintained across this section throughout 2018.

Historically, biofouling has been present in the eastern section of the PES. The accumulation of the biofoul on the internal pump controls resulted in reduced pump performance and reliability. The pump replacement program implemented in 2018 resulted in a quicker response time to underperforming pumps. The replacement of the underperforming pumps with refurbished spares resulted in an increase of sustained drawdown across the eastern section of the PES. For example, the drawdown of UEIB-29 is graphed alongside the UEIB-29 pump elevation, groundwater elevation in downgradient monitoring well MW03-03, and PHC concentrations in MW03-03 in Graph C-1 (Appendix C). The graph illustrates the reliable drawdown of UEIB-29 and a reduction in both VPH and LEPH in the sample collected from MW03-03. Increased frequency of dry wells downgradient of the PES across this section is also observed (e.g. MW02-02) and attributed to the improved PES reliability across this section.

Additionally, to improve hydraulic capture up gradient of A2MW09-15, a pump was installed in May 2018 in UEIB-56; the replacement well for UEIB-20. Due to insufficient water, A2MW09-15 could not be sampled during the dry season event.

10. AIR SPARGE and MTBE SYSTEMS

A brief status of each system and other pertinent information regarding the ongoing operation of the other remediation systems is summarized in the following subsections.

10.1 Area 3 Air Sparge System

To facilitate ongoing monitoring of Area 3 without the influence of the AS system, the system remained off through 2018. Despite increases of acenaphthene and pyrene in A3MW02-06, A3MW02-07, and A3MW02-08 the Area 3 AS system will remain off but on standby through 2019 to continue to monitor groundwater trends.

10.2 Area 2 Air Sparge System

Due to the up-gradient influence of the PES system, the AS system will continue to remain on standby throughout 2019.

10.3 Area 2 MTBE Remediation Area

The remediation of MTBE in Area 2 is considered complete (AECOM, 2017). Sampling activities in this area were reduced in 2017. Ongoing groundwater quality sampling of seven wells (G2-3B, G2-3C, G2-9A, G2-9B, G2-10, WS2-D, and WS2-D2) will continue as part of the PMP.

11. CONCLUSIONS

Perimeter Monitoring Program (PMP)

Areas 1 and 3

The semi-annual PMP was successfully completed in Areas 1 and 3 of the Parkland Burnaby Refinery. Except for select reported parameters for two of 31 monitoring wells (A3MW02-07 and U07-10S), all reported concentrations were below the SSSLs established for the Refinery.

The concentrations above the SSSLs at U07-10S occurred in a previously investigated area of isolated contamination where nearby monitoring wells have continued to demonstrate that vertical and horizontal delineation is maintained. The concentration of acenaphthene above the SSSL at well A3MW02-07 was the first detection of this compound at this location since 2005. An additional sampling event was completed approximately 20 days after the dry season sampling exceedance and concentrations were below the SSSL.

The two monitoring wells where sample concentrations exceeded the SSSLs are located within the historical influence of the Air Sparge (AS) system. The AS remediation system was temporarily turned off in October of 2015 to assess whether further active remediation in Area 3 is required. The AS system remained on permanent standby throughout 2018. Based on historical PAH data for samples from A3MW02-06, A3MW02-07, and A3MW02-08, the Area 3 AS System appears to have contributed to the control of PAHs, namely acenaphthene and pyrene, in groundwater at these locations. Over the last two years the concentrations of select PAHs have been trending upwards at these locations. However, except for the single acenaphthene concentration in A3MW02-07, none of these concentrations have historically exceeded the SSSLs, including pre-remediation concentrations.

The observed concentration changes may be attributable to contaminant rebound following the extended dormancy of the Area 3 AS system. Additional monitoring without the influence of the Area 3 AS system will be continued to observe groundwater quality in this area.

The concentration of contaminants of concern in samples collected as part of the 2018 PMP for Areas 1 and 3 do not indicate an immediate need for additional investigation, evaluation, or remediation. It is recommended that ongoing monitoring of Area 3 continue without the influence of the AS system; the AS system will remain off but on standby through 2019. AECOM recommends that the Area 1 and 3 PMP continue in 2019 with a similar scope of work as completed in 2018.

Area 2

Thirty-nine monitoring wells were monitored as part of the 2018 Area 2 PMP. During the wet season, 30 monitoring wells were sampled; during the dry season, 17 monitoring wells were sampled. The reported concentrations of parameters of concern were below SSSLs established for the Site in samples collected from all monitoring wells except for the sample collected from A2MW09-11.

The single SSSL exceedance was associated with the reported xylenes concentration in a well (A2MW09-11) located down gradient of the PES. Samples from this well have historically contained elevated concentrations of xylenes above the SSSL but have generally demonstrated a decreasing trend. Due to insufficient water in this well, sampling of this well is typically only possible during the wet season event. Therefore, the xylenes concentration could not be verified during the subsequent 2018 dry season sampling event.

The results of the 2018 PMP for Area 2 do not indicate an immediate need for additional investigation, evaluation, or remediation other than the continued operation of the PES.

AECOM recommends that the Area 2 PMP continue in 2019 with a similar scope of work as completed in 2018, but without dissolved metals analyses on samples from five monitoring wells that have historically demonstrated metal concentrations below the CSR standards. Dissolved copper analysis will continue at one well (MW11-4S) in Area 2 that contained dissolved copper concentrations above the CSR standard in previous years, however not in 2018.

Perimeter Extraction System (PES) Operation

Semi-monthly and quarterly system monitoring activities to: a) verify consistent groundwater drawdown in active extraction wells, b) collect groundwater extraction data, and, c) collect surrounding groundwater elevation data, were completed for 2018 (except for semi-monthly monitoring events between the beginning of February to mid-March when access to the Refinery was suspended during a scheduled maintenance turnaround). This information was collected to evaluate the influence of the hydraulic barrier along the northern perimeter of the Refinery.

Throughout 2018, a water column measuring one meter above the pump intake during pump operation was used as a trigger for trouble shooting and / or replacement of a groundwater extraction pump. If the pump did not function following troubleshooting or demonstrated poor reliability, then it was removed and replaced with a working pump from the spare pump inventory.

An annual average water column of less than one meter was sustained at 34 of the 40 extractions wells in 2018, indicating satisfactory performance. Of the six extraction wells with average water columns greater than one meter, five were located in the eastern section of the PES and demonstrated an average annual water column greater than one meter but less than three meters. The other location is the western most extraction well which also had an average water column less than three meters. In all instances, these wells are outside of the known NAPL plume in Area 2. The 2018 average annual water column data represents improved PES performance from previous years, particularly the eastern section of the PES where pump fouling has been more prevalent.

In addition to normal operation and maintenance, Parkland completed PES improvements to increase the capture, reliability, and performance of the PES. The improvements completed in 2018 include:

- On-going commissioning of the sequestering system. Sustained efforts to commission the sequestering system were completed through spring, summer, and fall of 2018. The system was winterized in November 2018 and will be returned to service in the spring of 2019.
- Installation of pumps and associated down well tubing in UEIB-56 and UEIB-51 during May of 2018. This installation of a pump in UEIB-51 improved drawdown in the known NAPL plume in Area 2 and decreased the wells spacing between UEIB-52 and UEIB-32. The installation at UEIB-56 replaced UEIB-20 as an extraction well (due to an underperforming pump stuck in the well).
- Repair and operation of the PES air compressor dryer unit as of October 24, 2018 following troubleshooting efforts by Wiseworth Canada, Parkland, and AECOM. Repairs included replacement of the desiccant, inlet and outlet filters, check valves and multiple exhaust mufflers. It is expected that providing dry, compressed air to the extraction pumps will extend the operating time and reliability of the pumps.

In 2018, the PES operated within acceptable limits for controlling the off-site migration of NAPL and dissolved phase PHC concentrations based on:

- reference elevations collected prior to the PES operation;
- the groundwater contouring (including particle path evaluations) performed on a quarterly basis; and,
- general stability of the groundwater quality down gradient of the PES.

It is recommended that the PES continue to be operated in 2019 in a similar manner to 2018.

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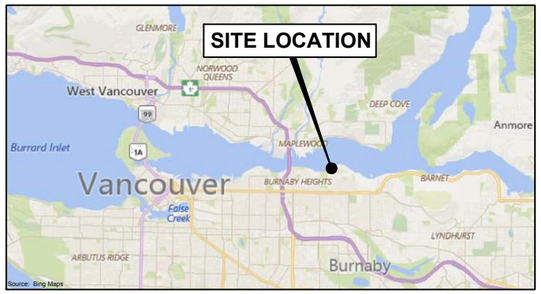
FIGURES



BURRARD INLET

PARKLAND REFINERY AREA 2

Parkland Wharf

AREA 3

CP Rail

Rainbow Creek

Rainbow Trib 1

Parkland Right-of-Way

PARKLAND REFINERY AREA 1

CONFEDERATION PARK

Carleton Avenue

McGill Street

Eton Street

Madison Avenue

Rosser Avenue

Willingdon Avenue

Penzance Drive

LEGEND:

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

NOTE: Zoning information taken from City of Burnaby website, BurnabyMap. (February 28, 2018)

N W E S

metres 0 150 300

AECOM

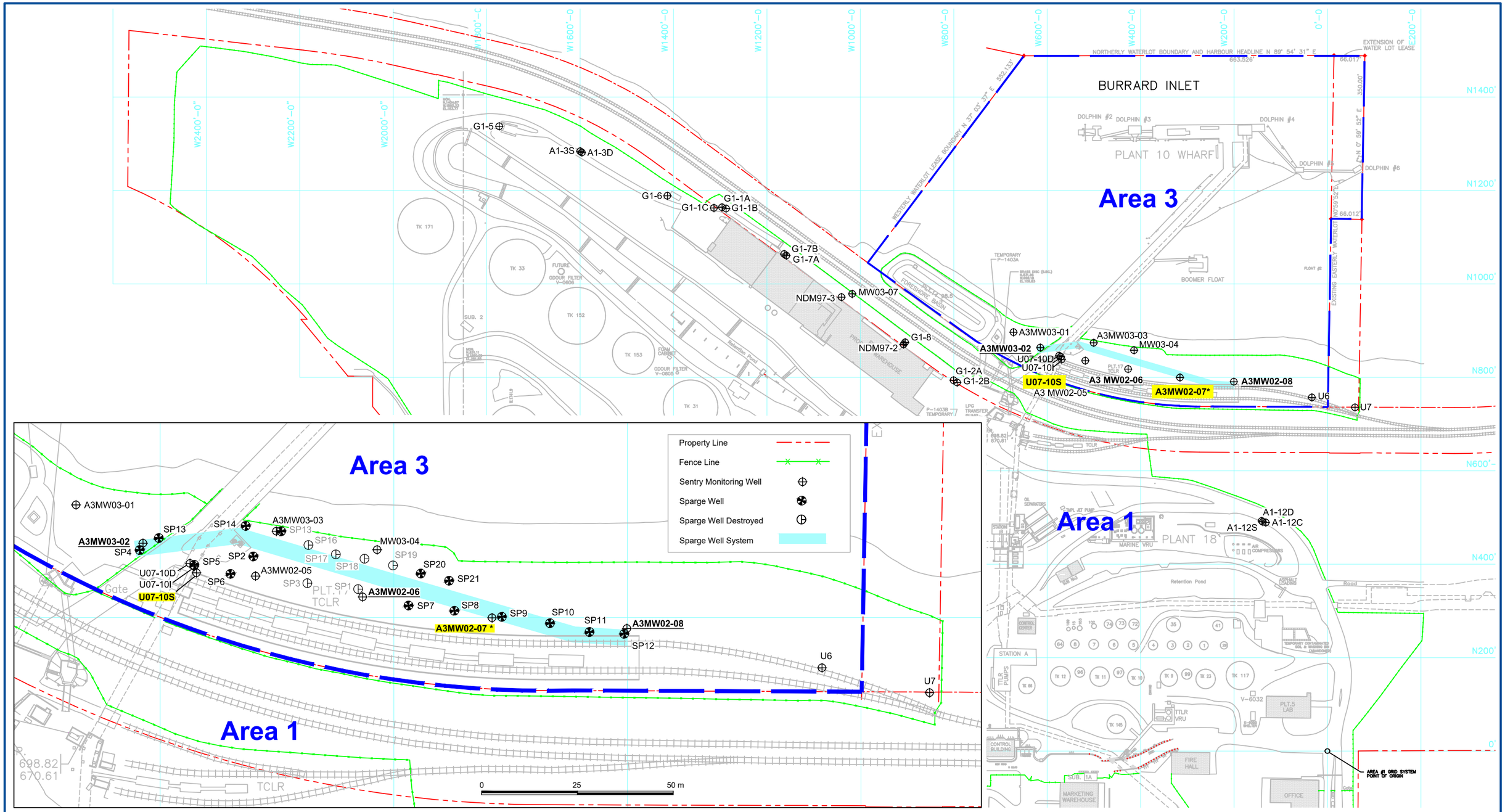
REFINERY SITE PLAN AND LOCATION MAP AREAS 1, 2 AND 3

The 2018 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
February 2019	60569853	TS	0	FIGURE 1

FILE NAME: U:\URS-CHEVRON\60569856 2018 Perimeter Monitoring\500-Deliverables\2018 Annual Report\Figures\01 Site Plan.dwg



LEGEND:

Property Line

Fence Line

Sentry Monitoring Well

Sparge Well System

Concentration exceeding CSR Standards, but below SSSLs; details in the report and tables of Appendix A — **A3MW03-02**

Concentration exceeding SSSL or CSR Standard in the absence of a SSSL; details in the report and tables of Appendix A — **U07-10S**

*September 2018 sample concentration exceeded CSR Standard for acenaphthene; a SSSL has not been developed for this parameter. The sample concentration of acenaphthene and all other analyzed parameters were below the SSSLs in the follow-up sampling event in October 2018. — **A3MW02-07 ***

ABBREVIATIONS:

CSR	Contaminated Sites Regulation
AW	Aquatic Life
NU	No Water Use
SSSL	Site-Specific Screening Level

GRID NORTH

N

W E

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AREAS 1 AND 3 SENTRY WELLS

The 2018 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
October 2019	60569856	NT	0	FIGURE 2

AECOM

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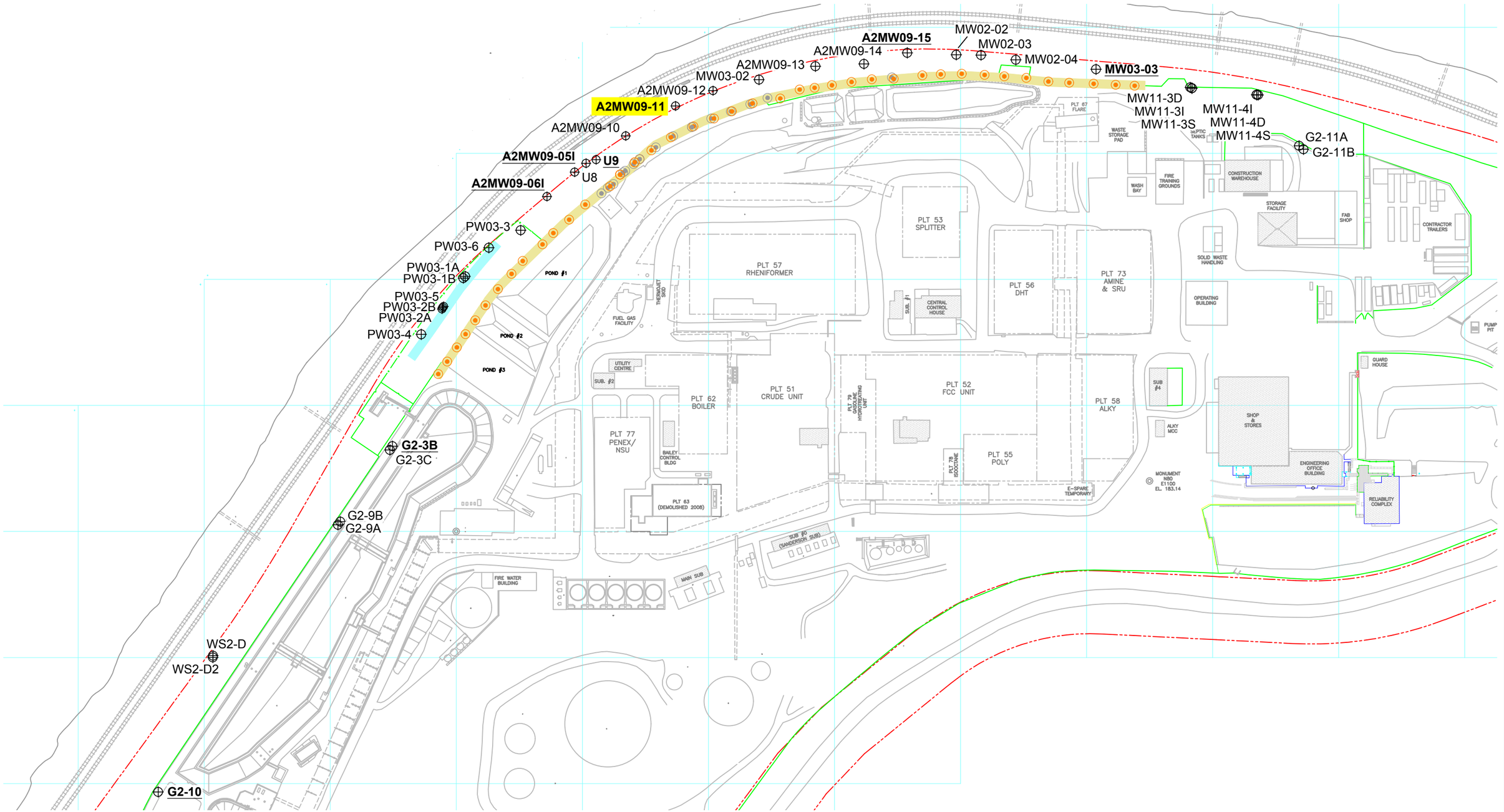


LEGEND:

- Property Line
- Fence Line
- Sentry Monitoring Well
- Inactive Extraction Well
- Active Extraction Well
- Perimeter Extraction Well System
- Sparge Well System
- Concentration Exceeding CSR Standards but below SSSLs, details in the text and tables of Appendix B — **A2MW09-05I**
- Concentration Exceeding SSSL, details in the text and tables of Appendix B — **A2MW09-05I**

ABBREVIATIONS:

CSR	Contaminated Sites Regulation
AW	Aquatic Life
NU	No Water Use
SSSL	Site -Specific Screening Level
PMP	Perimeter Monitoring Program

GRID NORTH

N W E S

metres
0 50 100

AECOM

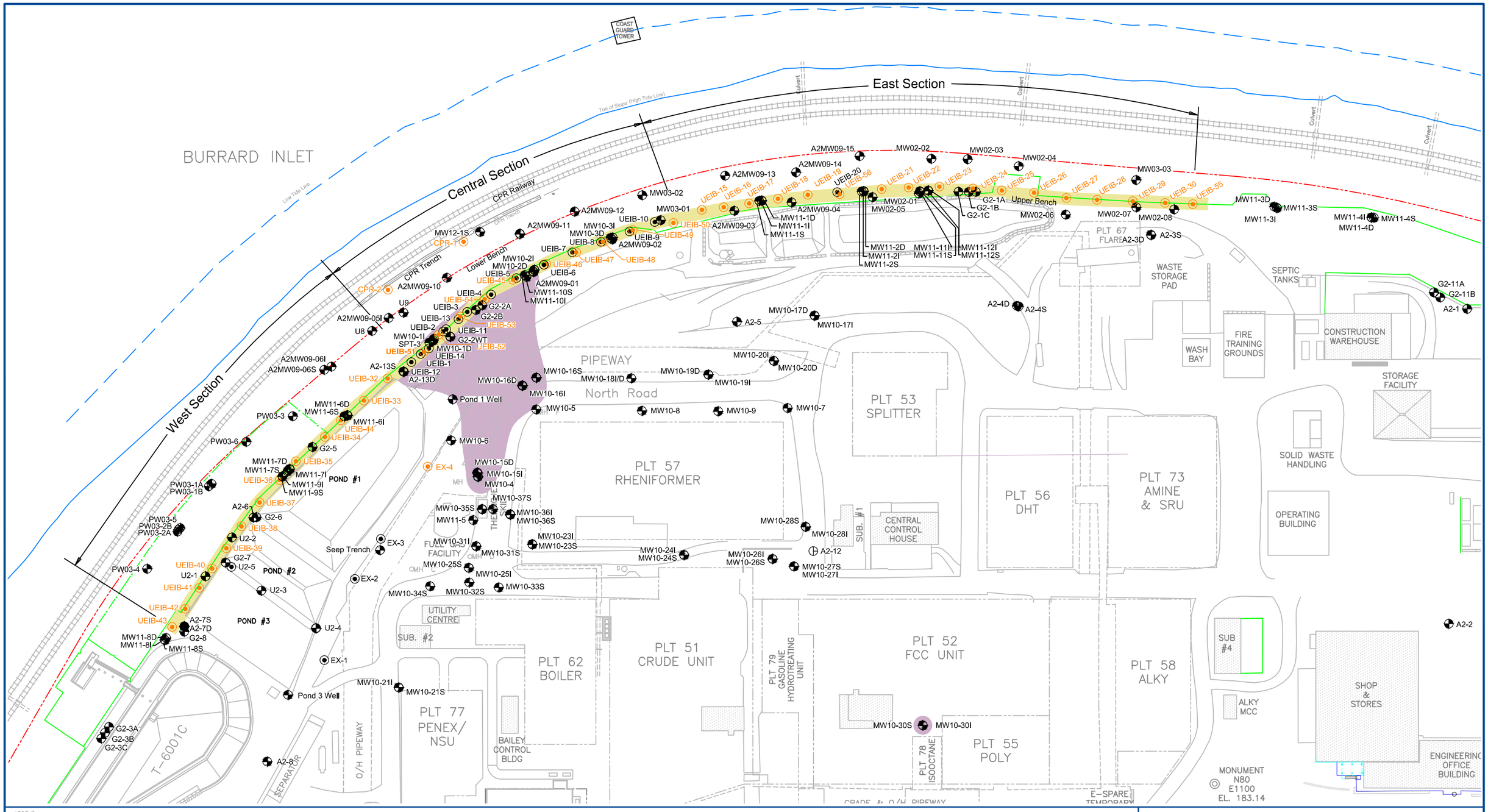
AREA 2
SENTRY WELLS

The 2018 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
March 2019	60569856	NT	0	FIGURE 3

FILE NAME: \\cabny1fp001\prod\1686\Projects\URS-CHEVRON\60569856 2018 Perimeter Monitoring\900-GIS CAD\03 Area 2 Sentry Wells.dwg



LEGEND:

- Property Line
- Fence Line
- Perimeter Well Extraction System
- Foreshore Passive Treatment System
- Monitoring Well
- Inactive Extraction Well
- Active Extraction Well
- Destroyed Monitoring Well Location
- NAPL Plume Extents 2018

GRID NORTH

N W E S

metres 0 20 40

AECOM

AREA 2 PERIMETER EXTRACTION SYSTEM

The 2018 Perimeter Monitoring Program and Perimeter Extraction System
Parkland Burnaby Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
March 2019	60569856	NT	0	FIGURE 4

FILE NAME: \\cabny1fp001\prod\1686\Projects\URS-CHEVRON\60569856 2018 Perimeter Monitoring\900-GIS CAD\04 Area 2 Perimeter Extraction System.dwg

Appendix A Area 1 and 3 Perimeter Monitoring Program

1 SCOPE OF WORK

In 2018, AECOM completed two groundwater monitoring and sampling events as part of the semi-annual Perimeter Monitoring Program (PMP) in Areas 1 and 3 of the Parkland Burnaby Refinery (Refinery). The planning and execution of the events were scheduled such that one event was completed during the wet season and the other event was completed during the dry season. The dates of the 2018 sampling events are provided in Table 1.

Table 1 - Schedule

Event	Period
Wet Season	April 9 to May 7, 2018
Dry Season	August 28 to September 25, 2019*

** excludes resampling of A2-MW02-07 on October 15, 2019*

The Areas 1 and 3 PMP include the monitoring and sampling (when sufficient water is present) of 31 groundwater monitoring wells. Each well is monitored and sampled in accordance with the field program methods (Appendix E). The monitoring wells included in the 2018 PMP for Areas 1 and 3 are included in Table 2.

Table 2 - Areas 1 and 3 Monitoring Wells Included in the 2018 PMP (Figure 2)

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

2 MONITORING SUMMARY

As part of the PMP, each groundwater monitoring well was monitored for headspace vapours, depth to product if present, depth to water, and total depth of the monitoring well. If sufficient water was present, the following parameters were measured in the field (current and historical data are provided in Table A-1):

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

During the 2018 PMP, all 31 monitoring wells were sampled in the wet season. In the dry season sampling event, 30 monitoring wells were sampled, as A1-3S contained insufficient groundwater.

The field monitoring data collected for Areas 1 and 3 monitoring wells are presented in Table A-1.

3 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples collected as part of the 2018 PMP were analyzed for one or more of the following parameters of concern:

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

The current and historical reported analytical results for groundwater samples from these monitoring wells are presented in Table A-2 and Table A-3. For reference, the laboratory Certificates of Analysis for the 2018 PMP data is provided in Appendix F.

The completed 2018 PMP analytical program for Areas 1 and 3 are summarized in Table 3.

Table 3 - Areas 1 and 3 PMP Analytical Program Summary

	Number of Monitoring Wells Sampled	
Parameter	**Wet Event**	**Dry Event**
LEPHw / HEPHw	13**	14
EPHw	30**	30*
BTEX/VPHw/Styrene	30**	30*
MTBE	3	1
PAHs	13**	14

Note:

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

*** - discrepancies in number of monitoring wells sampled are due to laboratory handling and reporting associated with the U07-10S sample during the wet event; see Appendix G for a copy of the laboratory (ALS) Corrective Action Report.*

Site-Specific Screening Levels (SSSLs) for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of AECOM, to evaluate potential risks from impacted Site groundwater to Burrard Inlet. Refer to Appendix D for additional information on the development of the SSSLs. The results of the PMP groundwater samples are compared to the SSSLs as well as the Contaminated Sites Regulation (CSR) standards for the protection of marine aquatic life (AW) (CSR standards). SSSLs represent concentrations which, if exceeded, indicate the need for further assessment/evaluation or remedial action. For those parameters where SSSLs are not available, the

CSR standards are used to evaluate the need for further assessment/evaluation or remedial action. A summary of the number of samples containing concentrations of the analyzed parameters above and below the established triggers for further assessment are summarized in Table 4.

Table 4 - Overview of Areas 1 and 3 Groundwater Results

Parameter	Wet Event			Dry Event		
	Result Below RDL	Detectable Result Below SSSLs	Result Above SSSLs	Result Below RDL	Detectable Result Below SSSLs	Result Above SSSLs
LEPHw	11	2	0	13	0	1
EPHw (C10-<C19)	28	2	0	28	1	1
VHw (C6-C10)	28	2	0	28	2	0
VPHw	28	2	0	28	2	0
BTEX	24	7	0	27	3	0
Styrene	30	1	0	29	1	0
MTBE	1	2	0	0	1	0
PAHs	4	9	0	4	8	2

Note:
RDL= Reported Detection Limit

Additional detail for samples with detectable results above the SSSLs, are summarized below.

- Reported concentrations for samples collected from 29 of the 31 monitoring wells sampled in Areas 1 and 3 were below the SSSLs.
- Reported concentrations above the SSSLs from samples collected from monitoring wells A3MW02-07 and U07-10S in Area 3.
- The acenaphthene concentration (69.8 µg/L) in the sample collected from monitoring well A3MW02-07, exceeded the SSSL (60 µg/L) during the September 25, 2018 sampling event. The reported acenaphthene concentration in this sample represents the highest acenaphthene concentration since this well was added to the PMP in 2005. An acenaphthene SSSL was not specifically developed, so the CSR AW standard is the trigger for additional evaluation. A time series graph of these parameters is provided as Graph A-1. To investigate the observed increase of acenaphthene and other PAH parameters in A3MW02-07, an additional sample was collected on October 15, 2018. The concentration of acenaphthene in this sample was 32.8 µg/L and below the SSSL. The trend line for acenaphthene indicates concentration historically fluctuated with the groundwater elevation at this location when the AS was operational. Prior to the AS operation, the acenaphthene concentrations were generally higher with less variability. Additional monitoring is required to confirm whether the reported acenaphthene concentration continues to oscillate (similarly to the post 2010 results) or whether elevated concentrations are sustained (similarly to the pre-air sparge operating period).
- Concentrations of LEPHw, $EPHw_{C10-C19}$, acenaphthene, benz(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene in a sample collected from U07-10S exceeded the SSSLs during the dry 2018 PMP sampling event. A sample from this well was collected during the wet sampling event but analytical data was not available due to a laboratory handling and reporting error (refer to Appendix G for a corrective action report provided by the project laboratory). A time series graph (Graph A-2) summarizing the above parameters illustrates that the analytical results were generally consistent with historical data.

- Well U07-10S is part of a multi- level nested well installation near the wharf approach in Area 3 of the Refinery. The two other monitoring wells in this cluster (U07-10I and U07-10D) are screened at deeper intervals. The concentrations of parameters exceeding the SSSLs in samples from U07-10S were below the SSSLs in samples collected from U07-10I and U07-10D, providing vertical delineation.
- Samples collected from shallow monitoring wells adjacent and downgradient from U07-10S all had concentrations below the SSSLs, providing cross gradient and down gradient delineation.

Concentrations in groundwater samples above the CSR standards, but below the SSSLs for at least one sampling event in 2018 are summarized, by monitoring well, in Table 5.

Table 5 - Summary of Samples below SSSLs, but above the CSR AW Standards

Monitoring Well ID	Parameter Greater Than the CSR AW Standards
A3MW02-06	Pyrene
A3MW02-07	Anthracene, fluoranthene, naphthalene, and pyrene
A3MW02-08	Pyrene
A3MW03-02	LEPHw
U07-10S	Acridine and anthracene

Time series graphs for each well and associated parameters are attached as Graph A-1 through A-6. For reference, the Area 3 AS system commissioning (October 2010) and system standby (August 2015) dates have been represented as vertical black lines. A discussion, by monitoring well, is provided in the bullets below.

- The time series Graph A-1 illustrates anthracene, fluoranthene, naphthalene, and pyrene concentrations for samples collected from A2MW02-07 alongside the acenaphthene concentration which exceeded the SSSL during the dry season sampling event. In 2018, the reported anthracene, fluoranthene, naphthalene, and pyrene concentrations from samples collected from A2MW02-07 were above the CSR AW standards, but below the SSSLs. Similar to acenaphthene, the September 2018 concentrations were the highest for anthracene, fluoranthene, and pyrene since the well was added to the PMP in 2005. The sample collected on October 15, 2018 from A3MW02-07 contained concentrations below the CSR AW standards for acenaphthene, anthracene, fluoranthene, and naphthalene parameters. The reported acenaphthene and pyrene concentrations remained above the CSR AW standards (but below the SSSLs). Additional monitoring is required to continue to monitor trends.
- The time series Graph A-3 illustrates pyrene concentrations for samples collected from A2MW02-06. In 2018, the observed pyrene concentrations were above the CSR AW standard but consistent with previous concentrations reported for this monitoring well.
- The time series Graph A-4 illustrates pyrene concentrations for samples collected from A2MW02-08. In 2018, the observed pyrene concentrations were above the CSR AW standard but within the historical range of concentrations reported for this monitoring well. The reported concentration was below the SSSL for pyrene in all samples. Based on the observed concentrations from 2017 to present the pyrene concentration in A3MW02-08 does not fluctuated with water level as observed prior to 2017. All reported concentrations were more than an order of magnitude below the SSSL for pyrene.
- The time series Graph A-5 illustrates LEPHw concentrations for samples collected from A3MW03-02. Based on the trend graph, the variation of LEPHw concentrations in samples from this well appear to correlate better with fluctuations in the groundwater, rather than the influence of the AS system. The LEPHw concentrations continue to remain below the SSSLs and within the historical range for this

monitoring well. The reported concentration of LEPHw in a sample collected in September 2018 was the lowest reported concentration of LEPHw since sampling was initiated in 2004. This sample was collected during one of the lower (but not lowest) groundwater elevations within the historical range associated with this monitoring well.

- The time series Graph A-6 illustrates acridine and anthracene concentrations for samples collected from U07-10S. Concentrations of acridine and anthracene in the sample collected from U07-10S on September 10, 2018 were above the CSR AW standards. A sample was collected during the wet sampling event but analytical data was not available due to a laboratory handling and reporting error (refer to Appendix G for a corrective action report provided by the project laboratory). Based on the isolated nature of the contamination in this well and that all parameters reported in 2018 were within historical ranges, the absence of the results from the wet sampling event are not anticipated to deviate from the trends historically observed on Graph A-6.

Based on the above evaluations, increasing concentration trends of evaluated PAH parameters in A3MW02-06 through A3MW02-08 may be attributed to rebound following the dormancy of the Area 3 AS system. The trends observed during the operation of the AS system differ from the trends observed from 2017 to present. Although concentrations of PAHs appear to be increasing, they remain orders of magnitude below the SSSL, except for the acenaphthene concentration observed in A3MW02-07.

The influence of the Area 3 AS system is less evident in the trend evaluation for U7-10S and A3MW03-02. At these locations the fluctuations in the concentrations appear correlate better with groundwater elevation.

4 AREA 3 AIR SPARGE SYSTEM

In October 2015, the AS system was temporarily turned off to assess the need for further remediation in the area. Based on the assessment provided in the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System Report (AECOM, 2017), the AS system remained on permanent standby throughout 2018 to facilitate ongoing monitoring of Area 3 without the influence of the AS system.

5 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To confirm the integrity and reliability of the data, AECOM field staff followed pre-existing QA/QC protocols during the 2018 PMP. These procedures have resulted in a high-quality dataset that is representative of the groundwater quality and achieves the project objectives for monitoring as described in Appendix G.

5.1 Travel Blanks

During the 2018 wet and dry season sampling events, 16 travel blank samples were submitted with groundwater samples and analyzed for BTEX/VPHw, VHw, and styrene. Concentrations for all samples were less than the RDLs and the CSR AW standards. The reported analytical results for the travel blanks are presented in the laboratory Certificates of Analysis (COA) provided in Appendix F and summarized in Table A-2.

5.2 Precision

Relative percent differences (RPDs) are presented for duplicate samples in Tables A-2 and A-3.

RPDs were calculated for BTEX/VPHw, styrene, VHwC6-C10, LEPHw/HEPHw, EPHwC10-C19/EPHwC19-C32, and PAHs in instances where the concentrations were five times the reported detection limit or greater. The average value was calculated using the absolute RPD numbers. It should be noted that the data set is small for statistical purposes as the majority of reported concentrations were less than the RDLs. During the 2018 wet and dry season sampling events, 10 duplicate samples were collected. Of the samples collected, a total of 12 parameters were suitable for RPD calculation. The average, maximum, and minimum RPDs of the field duplicates are presented in Table 6.

Table 6 - Summary of RPD (%) of Duplicate Analyses

Sample Type	Average RPD (%)	Maximum RPD (%)	Minimum RPD (%)
Groundwater Samples			
Organic Parameters (LEPHw/HEPHw, EPHw, VPHw, VHw, BTEX, Styrene, and PAHs)	7.4	23.9	0.0

The average RPD value of organic parameters (7.4%) indicates a sufficient correlation for duplicate pairings for the entire analytical program. The maximum RPD value of 23.9% was calculated using the reported acenaphthene concentrations from monitoring well A3MW02-07 and its duplicate sample (DUP-6); both concentrations were below the SSSL.

The BC Environmental Lab Manual (BCELM) provides data quality objectives for recommended laboratory duplicate RPDs[3]. The ENV has provided guidance indicating fields RPDs within 1.5 times the laboratory RPDs, as defined in the BCELM, are acceptable[4]. As a result, organic parameters in water therefore have an acceptable field RPD of 45%. Based on this guidance and the above results, the calculated RPDs for organic parameters in groundwater are within acceptable limits; therefore, they do not add uncertainty to the findings of the monitoring program.

5.3 Accuracy

Analytical accuracy was confirmed in a review of percent recoveries reported in the laboratory reports. Percent recoveries are obtained when the project laboratory analyzes samples with known concentrations and compares their analytical results to the known concentrations. The laboratory provided percent recoveries for the majority of the organic parameter analyses. All reported laboratory control spike (LCS) sample recoveries and matrix control spike (MS) sample recoveries were within laboratory quality control (QC) limits or were outside of laboratory QC limits, but associated results were not affected.

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

5.4 Completeness

No samples from either sampling events were invalidated by ALS Environmental, however, due to laboratory handling and reporting errors the wet season sample collected from U07-10S was not analysed for LEPHw, HEPHw, VPHw, or VHw parameters. A corrective action report was prepared by the laboratory and is included in Appendix G. All other samples were analysed as indicated on the COAs that accompanied the samples.

[3] British Columbia Environmental Laboratory Manual (2015)
http://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a.pdf
[4] Question #36 from the BC MoE Questions and Answers webpage accessed February 27, 2019.
http://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/contaminated-sites/cs_q-a.pdf

6 SUMMARY AND CONCLUSIONS

The semi-annual PMP was successfully completed in Areas 1 and 3 of the Parkland Burnaby Refinery. With the exception of select reported parameters for A3MW02-07 and U07-10S, all reported concentrations were below the SSSLs established for the Refinery.

The concentrations of acenaphthene, anthracene, fluoranthene, and pyrene in the September 2018 sample from A3MW02-07 were the highest concentrations reported in samples from this monitoring well since it was added to the PMP in 2005. In this sample acenaphthene also exceeded the SSSL. Unlike anthracene, fluoranthene, and pyrene, a SSSL was not developed for acenaphthene. As a result, the CSR AW standard is adopted as the compliance trigger for this parameter. An additional sample was collected from A3MW02-07 on October 15, 2018 to investigate the observed PAH increases. In all instances the PAH concentrations in the October sample were less than those reported in the September sample. In the October sample, the concentration of acenaphthene was below the standard and only the acenaphthene and pyrene concentrations remained above the CSR AW standards.

Based on the historical data for acenaphthene, the influence of the Area AS System has a noticeable effect on concentration trends. Prior to the AS system commissioning in 2010, the concentration of acenaphthene ranged from 13.9 µg/L to 51.1 µg/L. Once the system was in operation, the concentration ranged from less than the RDL (0.05 µg/L) to 20.5 µg/L with the fluctuation mimicking the rise and fall of the groundwater elevation. From 2017 to present, the acenaphthene concentration has been trending upwards, similar to the pre-commissioning concentrations. A similar trend is observed in other PAH parameters for samples collected from A3MW02-06, A3MW02-07, and A3MW02-08. This may be due to rebound following the extended dormancy of the Area 3 AS system. Except for the single acenaphthene concentration in A3MW02-07, the PAH concentrations have not historically exceeded the SSSLs. With the exception of pre-remediation concentrations of phenanthrene, pre-remediation concentrations also have not exceeded the SSSLs at these wells. Additional monitoring without the influence of the system will be continued to observe trends.

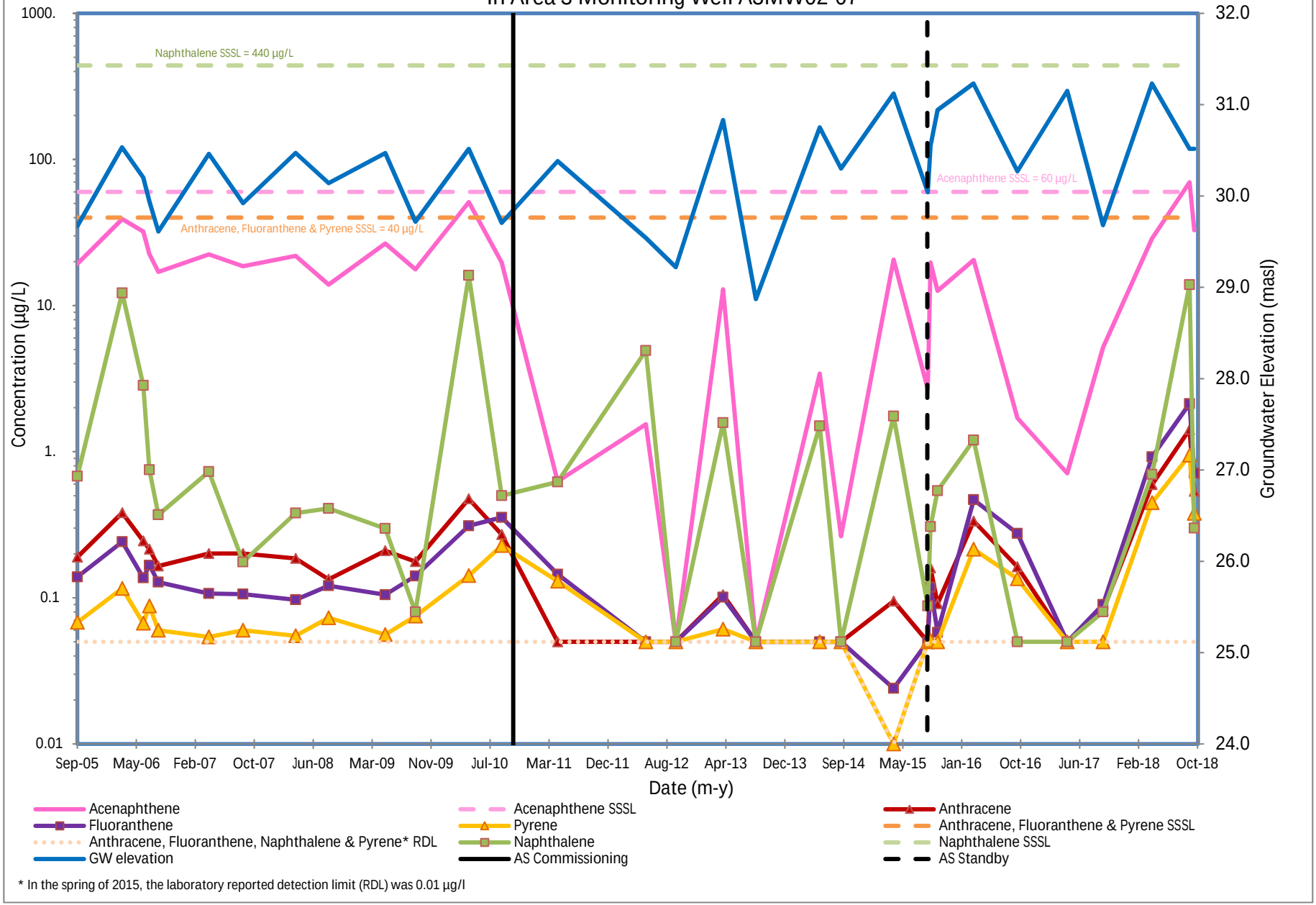
The concentrations of LEPHw, $EPHw_{C10-C19}$, and select PAHs reported in the groundwater sample collected from U07-10S in September 2018 exceeded the SSSLs, but concentrations were generally within historical ranges. Additionally, due to a laboratory sample handling and reporting error, the wet event sample concentrations of LEPHw, HEPHw, VPHw, and VHw, could not be reported. The missing data is not anticipated to affect the findings or recommendations of this report, due to the delineated status of the contamination in this well and that all parameters reported in 2018 were within historical ranges. Nearby monitoring wells which provide horizontal and vertical delineation indicate that the contamination is localized to the vicinity of U07-10S and is unlikely to represent a risk to Burrard Inlet at this time. Therefore, the SSSL exceedances do not indicate an immediate need for additional investigation, evaluation, or remediation.

Detectable concentrations of LEPHw and select PAHs above the applicable CSR AW standards were reported for samples collected from three additional monitoring wells (A3MW02-06, A3MW02-08, and A3MW03-02) located in Area 3. None of these concentrations exceeded the SSSLs.

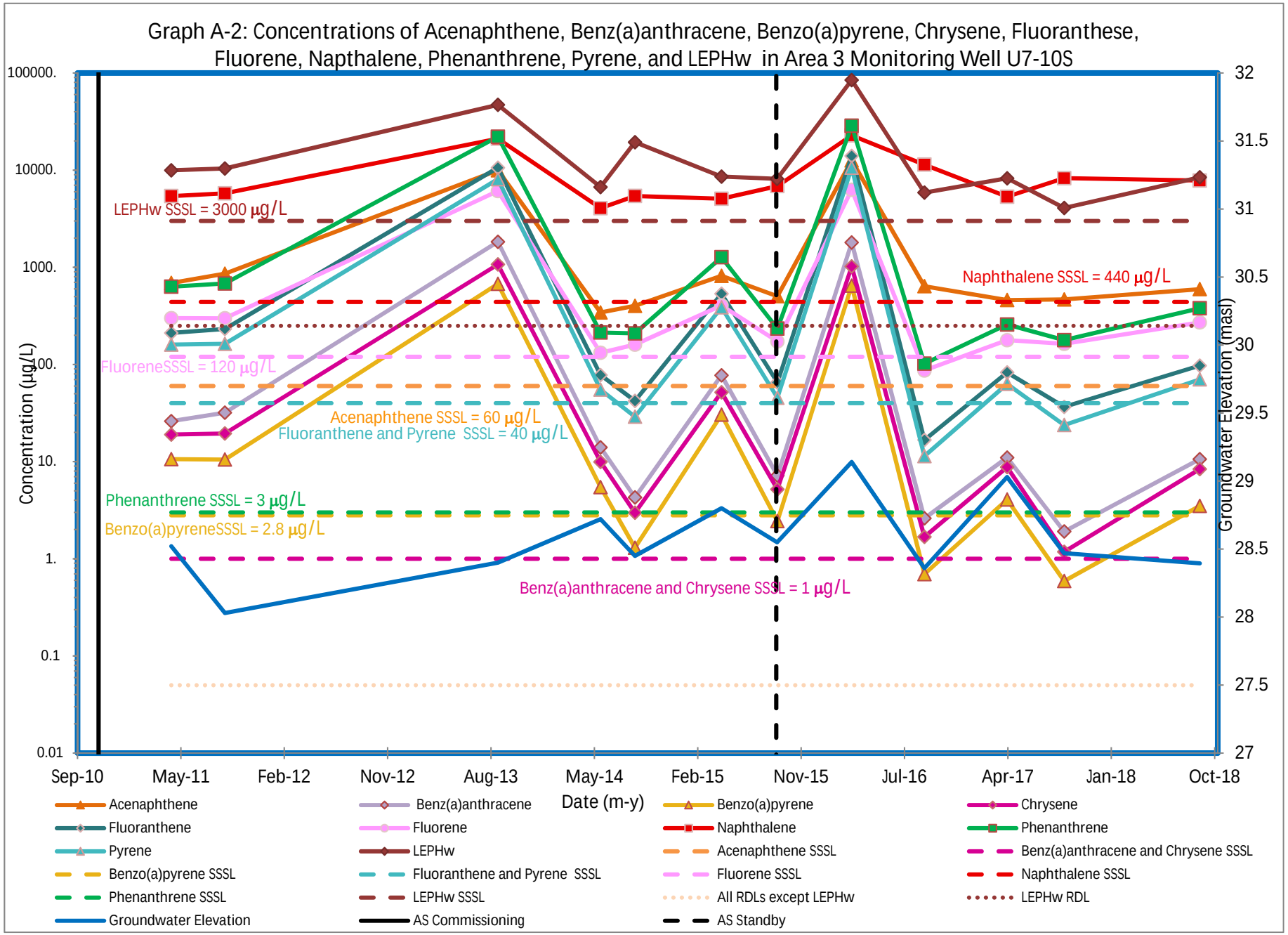
Based on the assessment provided in the Report on the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System (AECOM, 2017), the AS system has remained on permanent standby since 2017 to allow continued monitoring of Area 3 without the influence of the AS system.

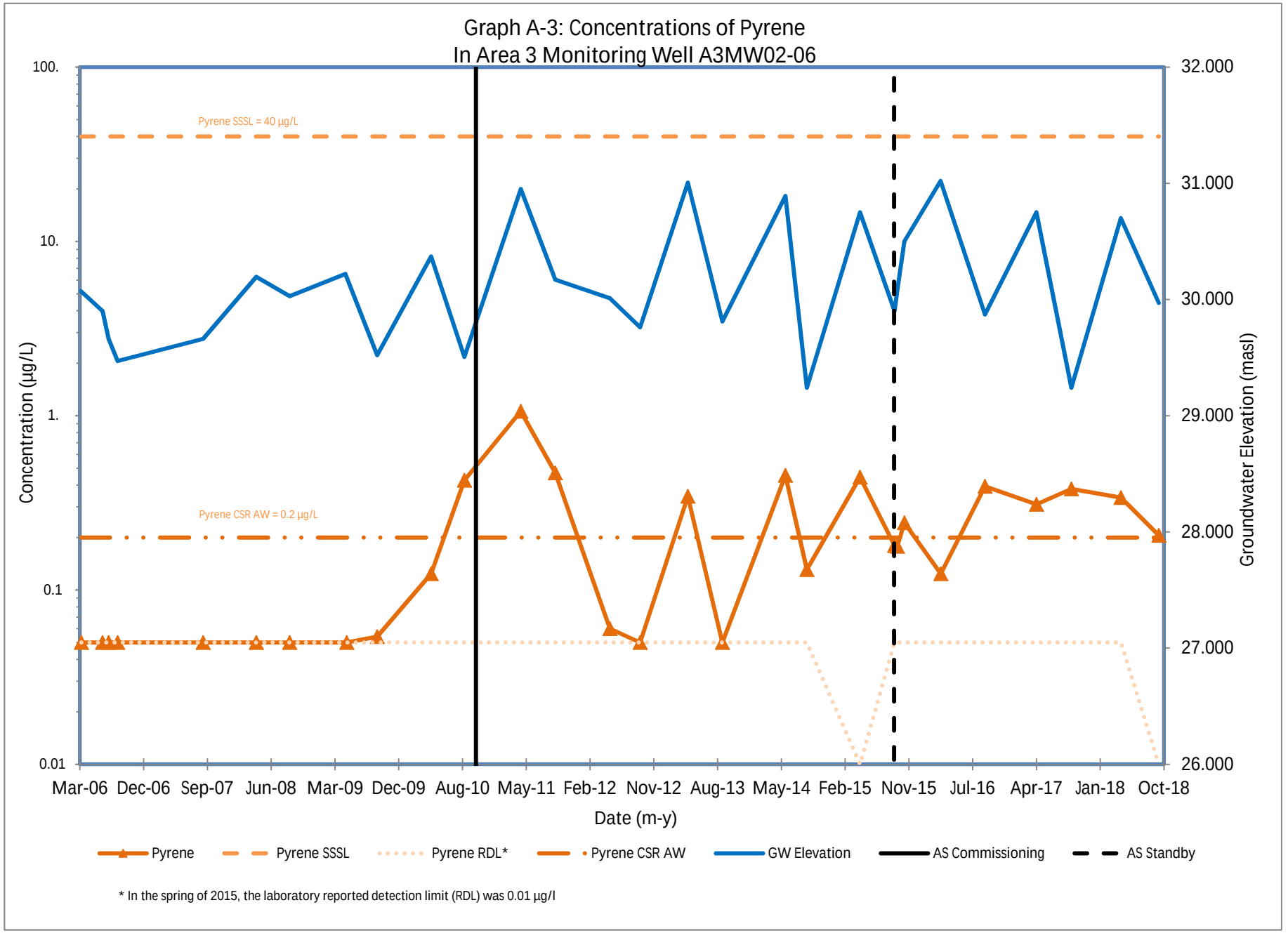
The results of the 2018 PMP for Areas 1 and 3 do not indicate an immediate need for additional investigation or remediation. Ongoing monitoring of Area 3 without the influence of the Area 3 AS system will be continued to monitor developing trends. AECOM recommends that the Area 1 and 3 PMP continue in 2019 with a similar scope of work as completed in 2018.

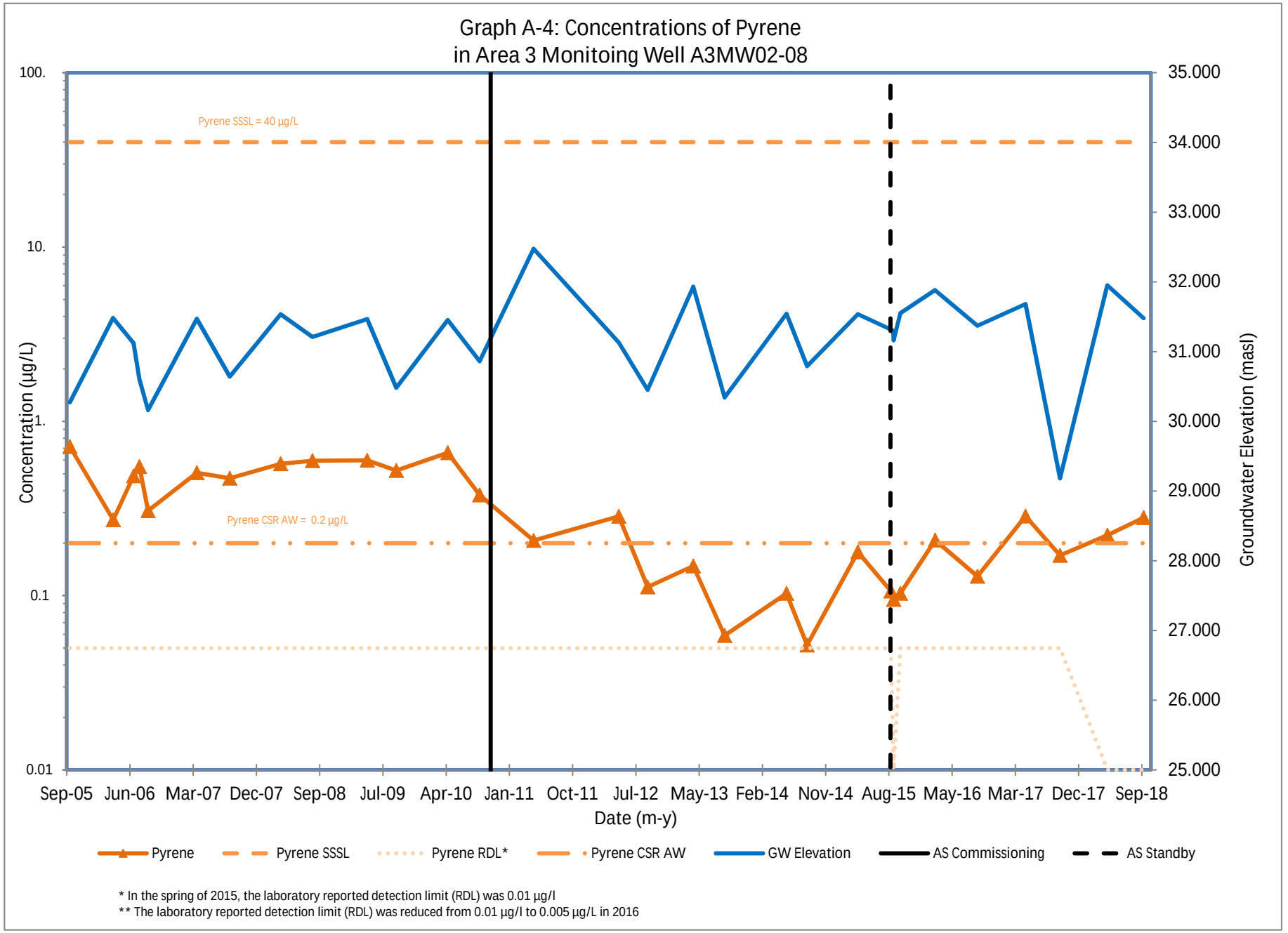
Graph A-1: Concentrations of Acenaphthene, Anthracene, Fluoranthene, Naphthalene, and Pyrene
In Area 3 Monitoring Well A3MW02-07



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

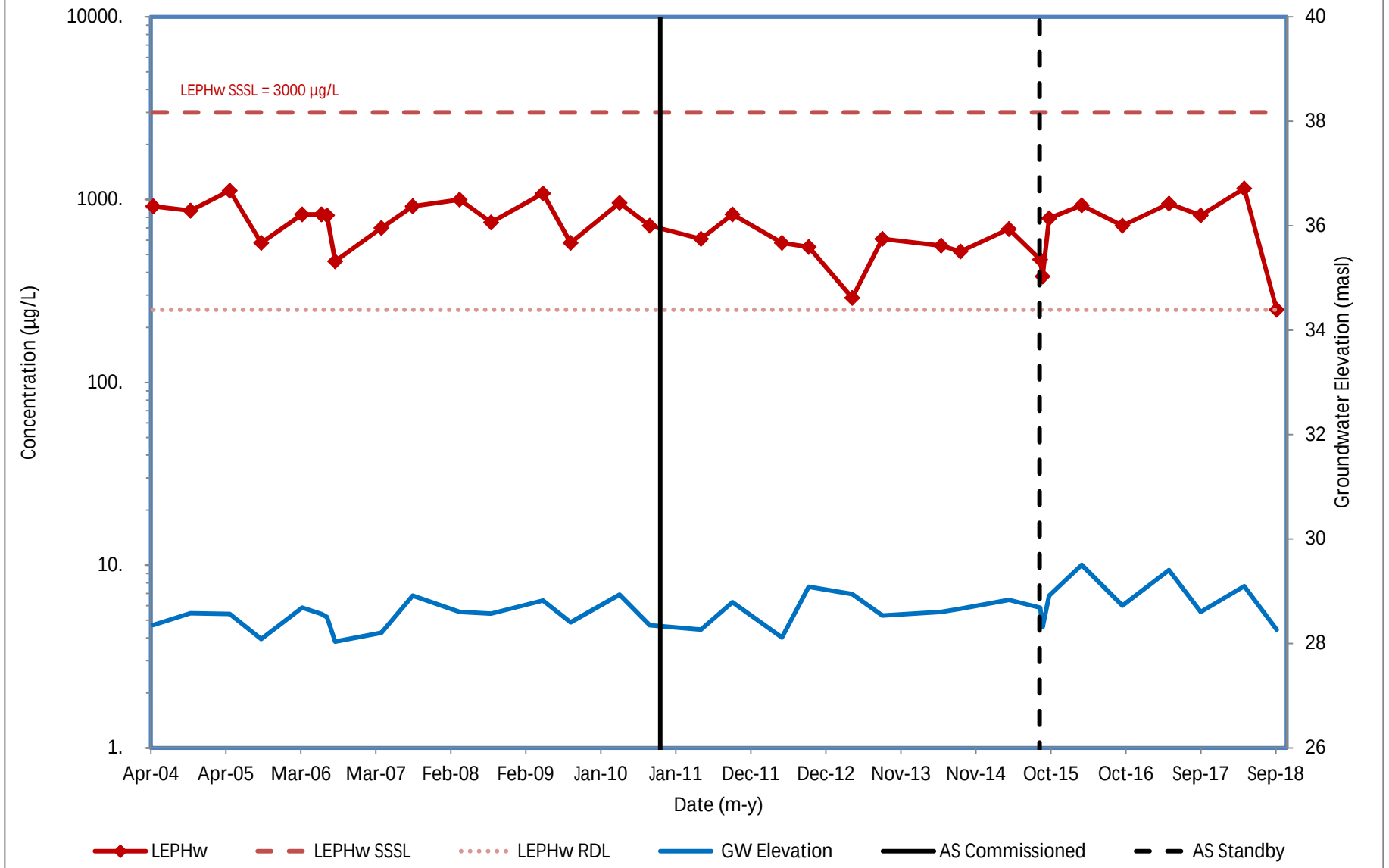

Graph A-2: Concentrations of Acenaphthene, Benz(a)anthracene, Benzo(a)pyrene, Chrysene, Fluoranthese, Fluorene, Napthalene, Phenanthrene, Pyrene, and LEPHw in Area 3 Monitoring Well U7-10S
Concentration (µg/L)
Groundwater Elevation (masl)
Date (m-y)
LEPHw SSSL = 3000 µg/L
Naphthalene SSSL = 440 µg/L
FluoreneSSSL = 120 µg/L
Acenaphthene SSSL = 60 µg/L
Fluoranthene and Pyrene SSSL = 40 µg/L
Phenanthrene SSSL = 3 µg/L
Benzo(a)pyreneSSSL = 2.8 µg/L
Benz(a)anthracene and Chrysene SSSL = 1 µg/L
100000.
10000.
1000.
100.
10.
1.
0.1
0.01
32
31.5
31
30.5
30
29.5
29
28.5
28
27.5
27
Sep-10
May-11
Feb-12
Nov-12
Aug-13
May-14
Feb-15
Nov-15
Jul-16
Apr-17
Jan-18
Oct-18
Acenaphthene
Benz(a)anthracene
Benzo(a)pyrene
Chrysene
Fluoranthene
Fluorene
Naphthalene
Phenanthrene
Pyrene
LEPHw
Acenaphthene SSSL
Benz(a)anthracene and Chrysene SSSL
Benzo(a)pyrene SSSL
Fluoranthene and Pyrene SSSL
Fluorene SSSL
Naphthalene SSSL
Phenanthrene SSSL
LEPHw SSSL
All RDLs except LEPHw
LEPHw RDL
Groundwater Elevation
AS Commissioning
AS Standby


Graph A-3: Concentrations of Pyrene
In Area 3 Monitoring Well A3MW02-06
Concentration (µg/L)
100.
10.
1.
0.1
0.01
Pyrene SSSL = 40 µg/L
Pyrene CSR AW = 0.2 µg/L
Groundwater Elevation (masl)
32.000
31.000
30.000
29.000
28.000
27.000
26.000
Mar-06 Dec-06 Sep-07 Jun-08 Mar-09 Dec-09 Aug-10 May-11 Feb-12 Nov-12 Aug-13 May-14 Feb-15 Nov-15 Jul-16 Apr-17 Jan-18 Oct-18
Date (m-y)
Pyrene
Pyrene SSSL
Pyrene RDL*
Pyrene CSR AW
GW Elevation
AS Commissioning
AS Standby
* In the spring of 2015, the laboratory reported detection limit (RDL) was 0.01 µg/l



* In the spring of 2015, the laboratory reported detection limit (RDL) was 0.01 µg/l
** The laboratory reported detection limit (RDL) was reduced from 0.01 µg/l to 0.005 µg/L in 2016

Graph A-5: Concentrations of LEPHw
in Area 3 Monitoring Well A3MW03-02



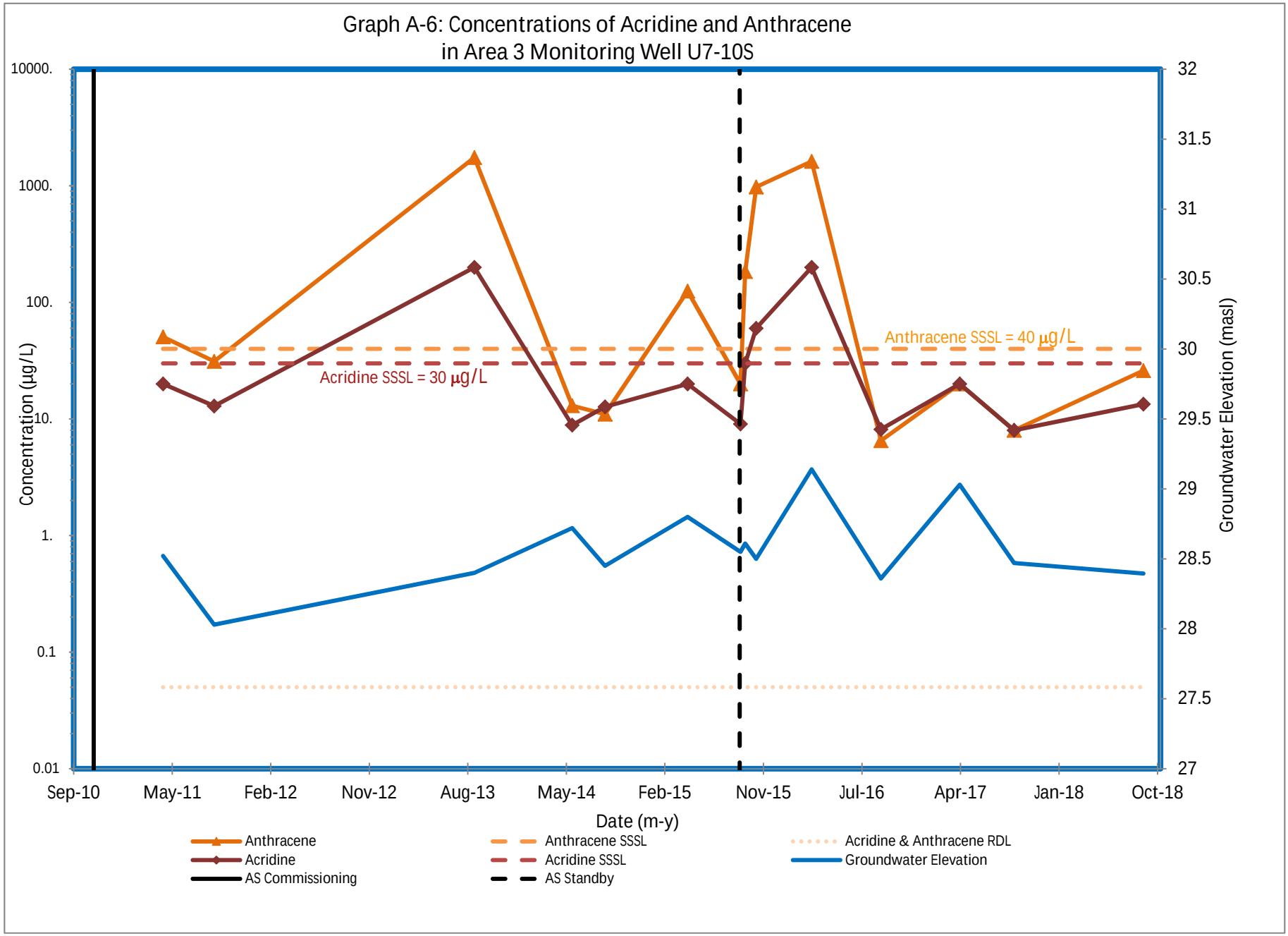

Graph A-6: Concentrations of Acridine and Anthracene
in Area 3 Monitoring Well U7-10S
Concentration (µg/L)
10000.
1000.
100.
10.
1.
0.1
0.01
Groundwater Elevation (masl)
32
31.5
31
30.5
30
29.5
29
28.5
28
27.5
27
Sep-10
May-11
Feb-12
Nov-12
Aug-13
May-14
Feb-15
Nov-15
Jul-16
Apr-17
Jan-18
Oct-18
Date (m-y)
Anthracene SSSL = 40 µg/L
Acridine SSSL = 30 µg/L
Anthracene
Acridine
AS Commissioning
Anthracene SSSL
Acridine SSSL
AS Standby
Acridine & Anthracene RDL
Groundwater Elevation

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
A1-12C	A1-12C	5.2-6.7	06-May-04	6.520	55.453	55.346	60	nd	na	3.46	51.886	nm	6.43	12.1	332.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	19-Oct-04	6.550	55.453	55.346	100	nd	na	3.387	51.959	nm	6.57	14.4	459.	nm	0.	nm	---
A1-12C	A1-12C	5.2-6.7	19-Apr-05	6.530	55.453	55.346	550	nd	na	3.29	52.056	nm	6.61	12.3	450.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	14-Sep-05	6.550	55.453	55.346	25	nd	na	3.68	51.666	nm	6.77	14.	454.	nm	nm	nm	Sampled on Sept.14
A1-12C	A1-12C	5.2-6.7	29-Mar-06	6.600	55.453	55.346	60	nd	na	3.31	52.036	1.57	6.35	12.2	51.6	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	05-Sep-06	6.600	55.453	55.346	40	nd	na	3.74	51.606	nm	6.67	19.7	48.	nm	nm	nm	DUP14
A1-12C	A1-12C	5.2-6.7	02-Apr-07	6.550	55.453	55.346	nm	nd	na	3.332	52.014	0.38	6.61	11.1	474.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	28-Aug-07	6.600	55.453	55.346	50	nd	na	3.62	51.726	0.2	6.53	15.9	481.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	8-Apr-08	6.570	55.453	55.346	15	nd	na	3.329	52.017	2.09	6.57	10.2	600.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	26-Aug-08	6.595	55.453	55.346	80	nd	na	3.453	51.893	0.4	6.71	13.9	568.	nm	nm	nm	---
A1-12C	A1-12C	5.2-6.7	21-Apr-09	6.592	55.453	55.346	60	nd	na	3.351	51.995	2.3	6.36	11.5	225.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	25-Aug-09	6.600	55.453	55.346	15	nd	na	3.62	51.726	0.2	6.31	13.6	695.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	6-Apr-10	6.600	55.453	55.346	nd	nd	na	3.32	52.026	1.29	6.66	10.7	860.	nm	nm	nm	Low turbid and low sediment
A1-12C	A1-12C	5.2-6.7	7-Sep-10	6.595	55.453	55.346	nd	nd	na	3.525	51.821	0.15	6.38	14.3	778.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	26-Apr-11	6.594	55.453	55.346	65	nd	na	3.445	51.901	0.22	6.15	10.9	723.	nm	nm	nm	Clear; on main road
A1-12C	A1-12C	5.2-6.7	20-Sep-11	6.590	55.453	55.346	10	nd	na	3.705	51.641	0.67	6.27	12.42	610.	nm	nm	nm	Clear; DUP-31
A1-12C	A1-12C	5.2-6.7	18-May-12	6.600	55.453	55.346	nd	nd	na	3.6	51.746	0.16	6.66	11.18	549.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	23-Aug-12	6.600	55.453	55.346	nd	nd	na	3.56	51.786	0.31	5.9	13.67	517.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	16-Apr-13	6.590	55.453	55.346	5	nd	na	3.41	51.936	1.72	6.41	10.72	480.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	3-Sep-13	6.595	55.453	55.346	nd	nd	na	3.63	51.716	0.99	5.77	13.98	448.	nm	nm	nm	Clear
A1-12C	A1-12C	5.2-6.7	23-May-14	6.590	55.453	55.346	nm	nd	na	3.505	51.841	0.26	6.01	11.6	625.	0.546	0.42	37.4	Well cap punctured on arrival
A1-12C	A1-12C	5.2-6.7	2-Sep-14	6.600	55.453	55.346	nm	nd	na	3.67	51.676	0.32	6.1	12.9	574.	0.485	0.37	-32.9	Clear
A1-12C	A1-12C	5.2-6.7	1-Apr-15	6.590	55.453	55.346	100	nd	na	3.3	52.046	0.92	6.08	11.81	545.	0.474	0.36	-5.8	Clear
A1-12C	A1-12C	5.2-6.7	1-Sep-15	6.585	55.453	55.346	nd	nd	na	3.48	51.866	0.27	6.32	15.14	511.	0.409	0.31	13.9	Clear
A1-12C	A1-12C	5.2-6.7	16-Mar-16	6.580	55.453	55.346	75	nd	na	3.34	52.006	1.09	6.43	11.96	437.	0.378	0.28	61.7	Clear; DUP-7
A1-12C	A1-12C	5.2-6.7	4-Oct-16	6.620	55.453	55.346	85	nd	na	3.63	51.716	0.5	6.41	14.43	418.	0.34	0.25	11.7	Clear
A1-12C	A1-12C	5.2-6.7	27-Apr-17	6.570	55.453	55.346	nd	nd	na	3.24	52.106	6.89	6.04	11.43	687.	0.602	0.46	142	J-plug missing
A1-12C	A1-12C	5.2-6.7	14-Sep-17	6.570	55.453	55.346	nd	nd	na	3.65	51.696	1.08	6.13	14.62	594.	0.481	0.36	0.5	Clear
A1-12C	A1-12C	5.2-6.7	9-Apr-18	3.952	55.453	55.346	110	nd	na	0.979	54.367	1.14	6.23	11.44	726.	0.637	0.49	87.4	Clear
A1-12C	A1-12C	5.2-6.7	30-Aug-18	6.543	55.453	55.346	5	nd	na	3.684	51.662	0.33	6.18	14.73	729.	0.589	0.45	-290.1	Clear; sampled
A1-12D	A1-12D	1.7-3.2	6-May-04	3.980	55.143	55.029	25	nd	na	1.6	53.429	nm	6.28	12.2	268.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	19-Oct-04	3.737	55.143	55.029	180	nd	na	0.946	54.083	nm	6.37	14.8	297.	nm	0.	nm	---
A1-12D	A1-12D	1.7-3.2	19-Apr-05	3.990	55.143	55.029	200	nd	na	0.995	54.034	nm	6.58	10.7	373.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	14-Sep-05	3.740	55.143	55.029	nm	nd	na	1.83	53.199	nm	6.51	16.3	381.	nm	nm	nm	Sampled on Sept.14
A1-12D	A1-12D	1.7-3.2	29-Mar-06	3.980	55.143	55.029	30	nd	na	1.11	53.919	1.27	6.34	11.2	39.5	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	05-Sep-06	3.990	55.143	55.029	60	nd	na	1.93	53.099	nm	6.5	19.	47.3	nm	nm	nm	DUP15
A1-12D	A1-12D	1.7-3.2	02-Apr-07	3.737	55.143	55.029	nm	nd	na	1.42	53.609	0.13	6.24	11.8	373.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	28-Aug-07	4.000	55.143	55.029	30	nd	na	1.64	53.389	0.52	6.42	17.9	425.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	8-Apr-08	3.974	55.143	55.029	30	nd	na	1.082	53.947	0.33	6.35	9.3	400.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	26-Aug-08	3.980	55.143	55.029	40	nd	na	1.277	53.752	0.5	6.19	15.8	475.	nm	nm	nm	---
A1-12D	A1-12D	1.7-3.2	21-Apr-09	3.972	55.143	55.029	75	nd	na	1.331	53.698	0.5	6.25	11.	205.	nm	nm	nm	Clear, orange suspended debris
A1-12D	A1-12D	1.7-3.2	25-Aug-09	3.950	55.143	55.029	nd	nd	na	1.6	53.429	0.2	6.22	17.5	770.	nm	nm	nm	Clear
A1-12D	A1-12D	1.7-3.2	6-Apr-10	3.950	55.143	55.029	nm	nd	na	1.06	53.969	0.06	6.23	9.4	680.	nm	nm	nm	Clear, minimal sediment
A1-12D	A1-12D	1.7-3.2	7-Sep-10	3.930	55.143	55.029	20	nd	na	1.41	53.619	0.09	6.35	17.3	732.	nm	nm	nm	Clear, QA/QC duplicate: DUP-5
A1-12D	A1-12D	1.7-3.2	26-Apr-11	3.940	55.143	55.029	30	nd	na	1.345	53.684	0.33	6.11	10.1	687.	nm	nm	nm	Clear, DUP-19; on main road
A1-12D	A1-12D	1.7-3.2	20-Sep-11	3.945	55.143	55.029	35	nd	na	1.485	53.544	0.27	6.44	14.58	606.	nm	nm	nm	Clear
A1-12D	A1-12D	1.7-3.2	18-May-12	3.950	55.143	55.029	nd	nd	na	1.4	53.629	0.16	6.66	11.64	516.	nm	nm	nm	Clear
A1-12D	A1-12D	1.7-3.2	23-Aug-12	3.930	55.143	55.029	50	nd	na	1.21	53.819	0.27	5.86	15.96	556.	nm	nm	nm	Clear; DUP-18
A1-12D	A1-12D	1.7-3.2	16-Apr-13	3.940	55.143	55.029	50	nd	na	1.14	53.889	0.77	6.3	9.92	464.	nm	nm	nm	Clear; DUP-24
A1-12D	A1-12D	1.7-3.2	3-Sep-13	3.950	55.143	55.029	40	nd	na	1.375	53.654	1.57	5.85	16.9	508.	nm	nm	nm	Clear; DUP-21
A1-12D	A1-12D	1.7-3.2	23-May-14	3.940	55.143	55.029	70	nd	na	1.3	53.729	0.49	5.9	12.72	680.	0.577	0.44	-101.3	Clear, DUP-24
A1-12D	A1-12D	1.7-3.2	2-Sep-14	3.950	55.143	55.029	60	nd	na	1.42	53.609	0.57	5.74	17.17	644.	0.492	0.37	-105.2	Clear, DUP-20
A1-12D	A1-12D	1.7-3.2	1-Apr-15	3.950	55.143	55.029	260	nd	na	1.	54.029	0.4	5.98	10.98	564.	0.501	0.38	-74.2	DUP-6
A1-12D	A1-12D	1.7-3.2	1-Sep-15	3.940	55.143	55.029	100	nd	na	1.15	53.879	0.11	6.26	18.17	516.	0.386	0.29	8.6	Silt on probe; DUP-10
A1-12D	A1-12D	1.7-3.2	16-Mar-16	3.960	55.143	55.029	35	nd	na	1.03	53.999	0.18	6.44	10.4	465.	0.42	0.32	32	Clear
A1-12D	A1-12D	1.7-3.2	4-Oct-16	3.960	55.143	55.029	45	nd	na	1.31	53.719	0.29	6.34	15.98	428.	0.336	0.25	5.9	Clear; DUP-10
A1-12D	A1-12D	1.7-3.2	27-Apr-17	3.950	55.143	55.029	130	nd	na	1.25	53.779	0.26	6.28	11.34	659.	0.596	0.45	13.6	Clear; DUP-15
A1-12D	A1-12D	1.7-3.2	14-Sep-17	3.970	55.143	55.029	45	nd	na	1.4	53.629	0.93	6.05	17.07	577.	0.436	0.33	-24.7	Clear
A1-12D	A1-12D	1.7-3.2	9-Apr-18	6.549	55.143	55.029	35	nd	na	3.243	51.786	1.38	4.6	9.94	582.	0.531	0.4	109.1	Clear; DUP-2
A1-12D	A1-12D	1.7-3.2	28-Aug-18	3.951	55.143	55.029	45	nd	na	1.485	53.544	0.18	6.11	19.27	1118.	0.816	0.63	-31.3	Clear; sampled
A1-12S	A1-12S	0.98-2.48	6-May-04	2.340	55.225	55.141	175	nd	na	1.57	53.571	nm	5.72	13.7	1071.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	19-Oct-04	1.250	55.225	55.141	225	nd	na	0.922	54.219	nm	6.4	14.4	239.	nm	0.	nm	---
A1-12S	A1-12S	0.98-2.48	20-Apr-05	1.660	55.225	55.141	475	nd	na	1.11	54.031	nm	6.14	10.6	1411.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	14-Sep-05	1.250	55.225	55.141	nm	nd	na	0.88	54.261	nm	5.88	17.5	1766.	nm	nm	nm	Sampled on Sept.14
A1-12S	A1-12S	0.98-2.48	29-Mar-06	2.330	55.225	55.141	75	nd	na	1.1	54.041	5.36	5.93	12.6	140.5	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	05-Sep-06	2.300	55.225	55.141	40	nd	na	2.02	53.121	nm	6.69	21.7	311.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	02-Apr-07	2.390	55.225	55.141	nm	nd	na	1.36	53.781	4.47	6.26	10.	600.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	28-Aug-07	2.350	55.225	55.141	100	nd	na	1.7	53.441	0.33	5.9	20.6	748.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	8-Apr-08	2.360	55.225	55.141	25	nd	na	1.033	54.108	4.42	5.63	8.9	2200.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	2-Sep-08	2.390	55.225	55.141	nm	nd	na	1.145	53.996	1.6	5.83	17.2	983.	nm	nm	nm	Had to break slip-cap to remove it
A1-12S	A1-12S	0.98-2.48	21-Apr-09	2.348	55.225	55.141	75	nd	na	1.288	53.853	5.7	5.24	11.9	11240.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	25-Aug-09	2.360	55.225	55.141	50	nd	na	1.688	53.453	0.8	5.23	19.6	6690.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	6-Apr-10	2.365	55.225	55.141	nd	nd	na	1.035	54.106	5.54	5.81	9.8	1075.	nm	nm	nm	---
A1-12S	A1-12S	0.98-2.48	7-Sep-10	2.350	55.225	55.141	100	nd	na	1.38	53.761	0.81	5.93	19.8	951.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	26-Apr-11	2.350	55.225	55.141	120	nd	na	1.291	53.85	5.74	5.73	10.2	1320.	nm	nm	nm	Clear; On main road
A1-12S	A1-12S	0.98-2.48	20-Sep-11	2.355	55.225	55.141	40	nd	na	1.545	53.596	1.27	5.56	16.93	1439.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	18-May-12	2.360	55.225	55.141	100	nd	na	1.45	53.691	6.56	6.21	13.38	675.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	23-Aug-12	2.360	55.225	55.141	170	nd	na	1.13	54.011	1.52	5.68	20.43	555.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	16-Apr-13	2.350	55.225	55.141	70	nd	na	1.08	54.061	6.37	5.79	10.4	735.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	3-Sep-13	2.360	55.225	55.141	130	nd	na	1.26	53.881	2.68	5.57	19.25	696.	nm	nm	nm	Clear
A1-12S	A1-12S	0.98-2.48	23-May-14	2.355	55.225	55.141	nd	nd	na	1.215	53.926	3.21	5.34	14.69	951.	0.774	0.6	165.3	Clear
A1-12S	A1-12S	0.98-2.48	2-Sep-14	2.355	55.225	55.141	150	nd	na	1.39	53.751	1.4	4.88	19.79	808.	0.554	0.44	29.8	Clear
A1-12S	A1-12S	0.98-2.48	1-Apr-15	2.370	55.225	55.141	220	nd	na	0.92	54.221	5.13	5.67	11.1	857.	0.758	0.58	170.3	Clear
A1-12S	A1-12S	0.98-2.48	1-Sep-15	2.355	55.225	55.141	220	nd	na	1.04	54.101	1.63	5.55	21.01	1485.	1.045	0.81	13.5	Clear
A1-12S	A1-12S	0.98-2.48	16-Mar-16	2.360	55.225	55.141	100	nd	na	1.04	54.101	5.8	5.77	9.68	556.	0.51	0.39	271.8	Clear
A1-12S	A1-12S	0.98-2.48	4-Oct-16	2.360	55.225	55.141	200	nd	na	1.16	53.981	2.23	5.97	16.49	313.	0.243	0.18	197.3	Clear
A1-12S	A1-12S	0.98-2.48	28-Apr-17	2.360	55.225	55.141	130	nd	na	1.1	54.041	8.18	6.01	11.03	821.	0.723	0.55	113.1	Clear
A1-12S	A1-12S	0.98-2.48	14-Sep-17	2.360	55.225	55.141	170	nd	na	1.29	53.851	3.78	5.43	20.45	644.	0.459	0.35	51.4	Clear
A1-12S	A1-12S	0.98-2.48	9-Apr-18	2.360	55.225	55.141	50	nd	na	0.91	54.231	5.77	5.65	10.77	1241.	1.107	0.87	2450.	Purged dry at 3.5 L; sampled on the following day; clear
A1-12S	A1-12S	0.98-2.48	28-Aug-18	2.360	55.225	55.141	170	nd	na	1.543	53.598	0.42	5.33	21.66	1668.	1.158	0.93	240.1	Clear; sampled; DUP-3
A1-3D	A1-3D	10.9-15.5	3-May-04	15.430	46.105	45.948	20	nd	na	8.92	37.028	nm	8.96	11.8	482.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	20-Oct-04	12.118	46.105	45.948	100	nd	na	8.523	37.425	nm	8.88	11.6	349.	nm	0.	nm	---
A1-3D	A1-3D	10.9-15.5	20-Apr-05	11.910	46.105	45.948	25	nd	na	8.01	37.938	nm	9.18	13.1	572.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	22-Sep-05	15.200	46.105	45.948	nm	nd	na	7.755	38.193	nm	8.64	12.8	349.	nm	nm	nm	Sampled on Sept.23
A1-3D	A1-3D	10.9-15.5	03-Apr-06	15.250	46.105	45.948	<5	nd	na	7.28	38.668	2.18	8.54	13.	99.9	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	30-Aug-06	14.650	46.105	45.948	5	nd	na	7.83	38.118	6.56	8.48	16.2	528.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	04-Apr-07	13.200	46.105	45.948	10	nd	na	7.04	38.908	0.28	9.13	12.6	674.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	27-Aug-07	14.950	46.105	45.948	50	nd	na	7.94	38.008	0.25	9.26	15.8	483.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	10-Apr-08	15.042	46.105	45.948	75	nd	na	7.584	38.364	0.11	8.98	12.	571.	nm	nm	nm	---
A1-3D	A1-3D	10.9-15.5	26-Aug-08	14.995	46.105	45.948	nm	nd	na	8.091	37.857	0.1	8.55	11.7	518.	nm	nm	nm	Silty
A1-3D	A1-3D	10.9-15.5	21-Apr-09	15.197	46.105	45.948	10	nd	na	7.742	38.206	0.5	9.17	11.6	948.	nm	nm	nm	Silty
A1-3D	A1-3D	10.9-15.5	24-Aug-09	13.418	46.105	45.948	nd	nd	na	8.25	37.698	0.6	9.04	14.2	473.	nm	nm	nm	Silty
A1-3D	A1-3D	10.9-15.5	22-Sep-10	15.120	46.105	45.948	nm	nd	na	8.15	37.798	nm	9.11	17.8	570.	nm	nm	nm	Purged dry, well damaged, cannot use bailer
A1-3D	A1-3D	10.9-15.5	03-May-11	15.121	46.105	45.948	45	nd	na	7.349	38.599	0.24	8.35	17.4	2280.	nm	nm	nm	Silty, 1 EPH only
A1-3D	A1-3D	10.9-15.5	19-Sep-11	15.190	46.105	45.948	nd	nd	na	8.945	37.003	7.5	4.01	11.56	436.	nm	nm	nm	Silty; Sample collected on Sept 20 because of silty; 2" bailer won't fit down well
A1-3D	A1-3D	10.9-15.5	15-May-12	15.210	46.105	45.948	nm	nd	na	7.91	38.038	8.6	9.2	15.	677.	nm	nm	nm	Slightly turbid
A1-3D	A1-3D	10.9-15.5	04-Sep-12	15.190	46.105	45.948	15	nd	na	8.41	37.538	5.24	8.7	13.59	511.	nm	nm	nm	Only had enough water for one set of parameters; located 1.4m east of A1-3S
A1-3D	A1-3D	10.9-15.5	03-Apr-13	15.180	46.105	45.948	15	nd	na	8.085	37.863	4.87	8.72	12.45	414.	nm	nm	nm	Clear; DO exposed to air bubbles in flow-through
A1-3D	A1-3D	10.9-15.5	27-Aug-13	15.190	46.105	45.948	nd	nd	na	8.61	37.338	4.39	8.41	12.37	420.	nm	nm	nm	Purged dry and silty at 50 L; parameters collected Aug.26; sampled Aug.27; clear; A1-3D slightly silty ambers
A1-3D	A1-3D	10.9-15.5	02-Jun-14	15.190	46.105	45.948	55	nd	na	8.35	37.598	8.2	7.92	12.8	434.	0.366	0.27	-28.7	Purged dry at 42 L; DUP-30
A1-3D	A1-3D	10.9-15.5	22-Sep-14	15.190	46.105	45.948	20	nd	na	8.425	37.523	7.84	8.71	13.12	400.	0.337	0.25	30.4	Purged dry at 25 L on Sept.23; Sampled on Sept.23

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
A1-3D	A1-3D	10.9-15.5	13-May-15	15.120	46.105	45.948	65	nd	na	8.36	37.588	1.37	9.45	11.87	428.	0.371	0.28	21.8	Slightly turbid
A1-3D	A1-3D	10.9-15.5	23-Sep-15	15.150	46.105	45.948	20	nd	na	7.075	38.873	7.97	10.4	15.18	322.	0.257	0.19	134.2	Silty; J-plug missing
A1-3D	A1-3D	10.9-15.5	04-Apr-16	15.130	46.105	45.948	10	nd	na	6.87	39.078	6.02	8.34	11.31	394.	0.347	0.25	83.4	Purged dry at 35L on Apr.4; Sample collected on Apr.5; Clear
A1-3D	A1-3D	10.9-15.5	22-Sep-16	15.170	46.105	45.948	10	nd	na	7.85	38.098	4.01	9.01	14.72	363.	0.294	0.22	84.4	Clear
A1-3D	A1-3D	10.9-15.5	15-Apr-17	15.100	46.105	45.948	15	nd	na	7.78	38.168	4.25	8.98	11.07	378.	0.333	0.25	62.5	Clear
A1-3D	A1-3D	10.9-15.5	30-Aug-17	15.120	46.105	45.948	5	nd	na	8.46	37.488	3.78	8.01	12.32	347.	0.297	0.22	210.1	Turbid
A1-3D	A1-3D	10.9-15.5	10-Apr-18	12.620	46.105	45.948	10	nd	na	6.002	39.946	10.39	9.22	11.14	696.	0.614	0.48	157.4	Cloudy grey; bailed & waterra
A1-3D	A1-3D	10.9-15.5	3-May-18	15.117	46.105	45.948	10	nd	na	7.327	38.621	6.74	7.64	14.52	590.	0.479	0.36	121.6	Purged dry; waterra; sampled
A1-3D	A1-3D	10.9-15.5	5-Sep-18	15.118	46.105	45.948	10	nd	na	8.75	37.198	6.83	8.78	19.03	554.	0.406	0.3	190.8	Sampled; DUP-5
A1-3S	ns	1.1-4.1	3-May-04	3.630	46.219	46.121	140	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	20-Oct-04	3.580	46.219	46.121	200	nd	na	3.16	42.961	nm	nm	nm	nm	nm	nm	nm	Dry at 10:10 and dry at 13:35; Not sampled
A1-3S	ns	1.1-4.1	20-Apr-05	3.530	46.219	46.121	100	nd	na	3.	43.121	nm	nm	nm	nm	nm	nm	nm	Too shallow to sample
A1-3S	ns	1.1-4.1	22-Sep-05	3.630	46.219	46.121	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	A1-3S	1.1-4.1	29-Mar-06	3.640	46.219	46.121	100	nd	na	3.13	42.991	1.68	6.21	10.5	158.9	nm	nm	nm	---
A1-3S	ns	1.1-4.1	30-Aug-06	3.640	46.219	46.121	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	04-Apr-07	3.630	46.219	46.121	110	nd	na	3.47	42.651	nm	nm	nm	nm	nm	nm	nm	Insufficient groundwater to sample.
A1-3S	ns	1.1-4.1	27-Aug-07	3.630	46.219	46.121	55	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	10-Apr-08	3.630	46.219	46.121	70	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	25-Aug-08	3.630	46.219	46.121	105	nd	na	3.598	42.523	2.	nm	nm	nm	nm	nm	nm	No sample Dry
A1-3S	A1-3S	1.1-4.1	20-Apr-09	3.621	46.219	46.121	125	nd	na	3.173	42.948	0.8	6.19	9.6	1822.	nm	nm	nm	---
A1-3S	ns	1.1-4.1	24-Aug-09	3.628	46.219	46.121	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	A1-3S	1.1-4.1	20-Sep-10	3.390	46.219	46.121	35	nd	na	2.73	43.391	7.93	7.01	16.3	318.	nm	nm	nm	Clear
A1-3S	A1-3S	1.1-4.1	03-May-11	3.372	46.219	46.121	140	nd	na	3.251	42.87	0.53	6.21	15.4	2503.	nm	nm	nm	Purged dry at ~240 mL, silty (1 EPH). Road box and well lid missing, PVC/J-plug OK. A1-3S well needs repair, put cone over hole.
A1-3S	A1-3S	1.1-4.1	19-Sep-11	3.380	46.219	46.121	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No well casing cover or road box
A1-3S	ns	1.1-4.1	15-May-12	3.380	46.219	46.121	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	04-Sep-12	3.380	46.219	46.121	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No sample; No road box; well is buried deeply next to road
A1-3S	ns	1.1-4.1	03-Apr-13	3.375	46.219	46.121	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	26-Aug-13	3.370	46.219	46.121	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	02-Jun-14	3.360	46.219	46.121	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	22-Sep-14	3.355	46.219	46.121	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Biofoul on probe.
A1-3S	ns	1.1-4.1	13-May-15	3.370	46.219	46.121	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
A1-3S	ns	1.1-4.1	23-Sep-15	3.360	46.219	46.121	90	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
A1-3S	ns	1.1-4.1	4-Apr-16	3.360	46.219	46.121	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	ns	1.1-4.1	22-Sep-16	3.360	46.219	46.121	60	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	A1-3S	1.1-4.1	15-Apr-17	3.260	46.219	46.121	35	nd	na	2.76	43.361	0.56	6.38	9.01	1140.	1.052	0.82	110	Clear
A1-3S	ns	1.1-4.1	30-Aug-17	3.380	46.219	46.121	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A1-3S	A1-3S	1.1-4.1	10-Apr-18	3.372	46.219	46.121	120	nd	na	2.515	43.606	5.9	6.53	9.15	2709.	2.524	2.06	198	Clear
A1-3S	ns	1.1-4.1	3-May-18	3.373	46.219	46.121	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry, sandy bottom, brown
A1-3S	ns	1.1-4.1	5-Sep-18	3.360	46.219	46.121	60	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A3MW02-05	MW02-05	2.4-6.1	05-May-04	6.000	33.145	33.042	10450	nd	na	3.88	29.162	nm	6.61	11.	266.	nm	nm	nm	---
A3MW02-05	MW02-05	2.4-6.1	25-Oct-04	5.995	33.145	33.042	1650	nd	na	3.253	29.789	nm	6.86	14.6	303.	nm	nm	nm	---
A3MW02-05	MW02-05	2.4-6.1	26-Apr-05	6.000	33.145	33.042	nm	nd	na	3.22	29.822	nm	6.86	11.9	248.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	15-Sep-05	6.000	33.145	33.042	nm	nd	na	4.42	28.622	nm	6.75	15.5	416.	nm	nm	nm	Sampled Sept.20
A3MW02-05	A3-MW02-05	2.4-6.1	29-Mar-06	6.050	33.145	33.042	550	nd	na	3.015	30.027	1.83	6.48	10.	512.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	31-Aug-06	6.040	33.145	33.042	2090	nd	na	4.48	28.562	0.43	6.04	14.4	485.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	02-Apr-07	6.100	33.145	33.042	11000	nd	na	3.27	29.772	0.28	6.54	9.3	223.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	28-Aug-07	6.000	33.145	33.042	6600	nd	na	4.4	28.642	0.43	6.53	13.8	332.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	9-Apr-08	6.050	33.145	33.042	11000	nd	na	2.798	30.244	0.39	nm	9.	232.	nm	nm	nm	pH collected at lab
A3MW02-05	A3-MW02-05	2.4-6.1	28-Aug-08	6.025	33.145	33.042	>11000	nd	na	5.322	27.72	0.4	6.31	14.	319.	nm	nm	nm	---
A3MW02-05	A3-MW02-05	2.4-6.1	27-Apr-09	6.025	33.145	33.042	>11000	nd	na	3.174	29.868	0.5	6.58	10.5	534.	nm	nm	nm	Clear
A3MW02-05	A3-MW02-05	2.4-6.1	3-Sep-09	6.050	33.145	33.042	20	nd	na	4.271	28.771	0.2	6.71	13.7	362.	nm	nm	nm	Clear
A3MW02-05	A3-MW02-05	2.4-6.1	19-Apr-10	6.050	33.145	33.042	200	nd	na	3.09	29.952	0.08	6.59	10.2	308.	nm	nm	nm	Clear low sediment
A3MW02-05	A3MW02-05	2.4-6.1	20-Sep-10	6.040	33.145	33.042	2200	nd	na	3.466	29.576	0.86	6.81	14.9	391.	nm	nm	nm	Clear; QA/QC duplicate: DUP-15
A3MW02-05	A3MW02-05	2.4-6.1	4-May-11	6.035	33.145	33.042	110	nd	na	2.868	30.174	0.22	5.84	13.5	318.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	27-Sep-11	6.020	33.145	33.042	130	nd	na	3.225	29.817	0.35	6.03	15.92	230.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	15-May-12	6.020	33.145	33.042	120	nd	na	2.84	30.202	0.75	6.58	12.03	213.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	20-Sep-12	6.000	33.145	33.042	85	nd	na	3.04	30.002	0.8	6.42	16.08	235.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	10-Apr-13	6.000	33.145	33.042	85	nd	na	2.39	30.652	0.4	6.39	10.46	1456.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	3-Sep-13	5.960	33.145	33.042	90	nd	na	3.36	29.682	0.34	6.07	15.81	1161.	nm	nm	nm	Clear
A3MW02-05	A3MW02-05	2.4-6.1	28-May-14	6.000	33.145	33.042	260	nd	na	2.75	30.292	0.21	6.02	11.21	664.	0.584	0.45	-8.7	Orange biofouling; DUP-29
A3MW02-05	A3MW02-05	2.4-6.1	27-Aug-14	6.010	33.145	33.042	65	nd	na	3.2	29.842	1.51	6.	14.97	444.	0.357	0.27	82.3	Slight biofoul; DUP-19
A3MW02-05	A3MW02-05	2.4-6.1	9-Apr-15	6.010	33.145	33.042	170	nd	na	2.755	30.287	0.59	6.3	12.53	350.	0.299	0.22	-61.2	Clear; DUP-8
A3MW02-05	A3MW02-05	2.4-6.1	2-Sep-15	5.990	33.145	33.042	310	nd	na	3.5	29.542	0.2	6.31	16.75	667.	0.514	0.39	-14.3	Clear
A3MW02-05	A3MW02-05	2.4-6.1	15-Mar-16	6.020	33.145	33.042	15	nd	na	2.69	30.352	1.23	6.59	12.71	299.	0.254	0.19	-41.6	Minor biofouling on probe
A3MW02-05	A3MW02-05	2.4-6.1	19-Sep-16	6.020	33.145	33.042	nd	nd	na	3.87	29.172	0.03	6.35	16.02	335.	0.263	0.19	-49.1	Clear
A3MW02-05	A3MW02-05	2.4-6.1	25-Apr-17	6.040	33.145	33.042	25	nd	na	1.81	31.232	0.25	6.54	11.47	415.	0.364	0.27	-73.9	Clear
A3MW02-05	A3MW02-05	2.4-6.1	21-Sep-17	6.030	33.145	33.042	400	nd	na	4.52	28.522	0.45	6.11	15.74	529.	0.417	0.4	-26.2	Clear
A3MW02-05	A3MW02-05	2.4-6.1	1-May-18	6.032	33.145	33.042	40	nd	na	1.893	31.149	0.59	6.33	10.09	537.	0.488	0.37	-47.1	Clear
A3MW02-05	A3MW02-05	2.4-6.1	13-Sep-18	6.020	33.145	33.042	250	nd	na	4.468	28.574	0.98	5.87	15.18	1290.	1.01	0.79	141.6	Clear
A3MW02-06	MW02-06	3.4-6.4	05-May-04	6.24	33.191	33.121	10450	nd	na	3.28	29.841	nm	6.76	11.3	471.	nm	nm	nm	---
A3MW02-06	MW02-06	3.4-6.4	25-Oct-04	6.214	33.191	33.121	>11000	nd	na	3.028	30.093	nm	6.84	14.9	509.	nm	nm	nm	---
A3MW02-06	MW02-06	3.4-6.4	26-Apr-05	6.200	33.191	33.121	>11000	nd	na	3.14	29.981	nm	6.88	11.7	482.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	19-Sep-05	6.260	33.191	33.121	nm	nd	na	3.62	29.501	nm	6.87	15.4	516.	nm	nm	nm	Sampled Sept.19
A3MW02-06	A3-MW02-06	3.4-6.4	29-Mar-06	6.220	33.191	33.121	>11000	nd	na	3.05	30.071	1.53	6.59	12.7	239.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	31-Aug-06	6.250	33.191	33.121	2060	nd	na	3.65	29.471	0.43	6.31	14.8	512.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	02-Apr-07	6.260	33.191	33.121	9900	nd	na	3.08	30.041	0.22	6.58	10.6	479.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	28-Aug-07	6.300	33.191	33.121	25	nd	na	3.46	29.661	0.19	6.85	14.9	458.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	9-Apr-08	6.270	33.191	33.121	>11000	nd	na	2.926	30.195	0.36	---	9.5	443.	nm	nm	nm	pH collected at lab, DUP
A3MW02-06	A3-MW02-06	3.4-6.4	28-Aug-08	6.269	33.191	33.121	>11000	nd	na	3.092	30.029	1.	6.19	13.5	555.	nm	nm	nm	---
A3MW02-06	A3-MW02-06	3.4-6.4	21-Apr-09	6.257	33.191	33.121	9350	nd	na	2.901	30.22	0.5	6.57	10.6	1243.	nm	nm	nm	Clear
A3MW02-06	A3-MW02-06	3.4-6.4	3-Sep-09	6.260	33.191	33.121	200	nd	na	3.6	29.521	0.3	6.66	15.9	627.	nm	nm	nm	Clear
A3MW02-06	A3-MW02-06	3.4-6.4	19-Apr-10	6.200	33.191	33.121	160	nd	na	2.75	30.371	0.07	6.66	10.9	618.	nm	nm	nm	Observed very turbid green sediment
A3MW02-06	A3MW02-06	3.4-6.4	7-Sep-10	6.080	33.191	33.121	15	nd	na	3.615	29.506	0.08	6.38	14.8	521.	nm	nm	nm	Light brown, slightly turbid
A3MW02-06	A3MW02-06	3.4-6.4	4-May-11	6.230	33.191	33.121	nd	nd	na	2.17	30.951	0.08	6.13	14.8	453.	nm	nm	nm	Slightly silty; DUP-25
A3MW02-06	A3MW02-06	3.4-6.4	27-Sep-11	6.230	33.191	33.121	5	nd	na	2.95	30.171	1.3	6.14	13.22	345.	nm	nm	nm	Slightly silty; DUP-36
A3MW02-06	A3MW02-06	3.4-6.4	15-May-12	6.110	33.191	33.121	nd	nd	na	3.11	30.011	1.28	5.88	12.71	283.	nm	nm	nm	Clear
A3MW02-06	A3MW02-06	3.4-6.4	20-Sep-12	6.110	33.191	33.121	nd	nd	na	3.36	29.761	3.89	5.97	14.98	350.	nm	nm	nm	Turbid
A3MW02-06	A3MW02-06	3.4-6.4	10-Apr-13	6.145	33.191	33.121	100	nd	na	2.115	31.006	0.43	6.54	10.48	425.	nm	nm	nm	Silty
A3MW02-06	A3MW02-06	3.4-6.4	3-Sep-13	6.170	33.191	33.121	45	nd	na	3.31	29.811	0.67	5.64	15.04	411.	nm	nm	nm	Well lid was ajar; Clear
A3MW02-06	A3MW02-06	3.4-6.4	28-May-14	6.130	33.191	33.121	10	nd	na	2.23	30.891	0.31	6.06	11.18	404.	0.357	0.27	-23.7	Slightly turbid
A3MW02-06	A3MW02-06	3.4-6.4	27-Aug-14	6.200	33.191	33.121	5	nd	na	3.88	29.241	0.73	6.17	4.66	528.	0.428	0.32	-40.6	---
A3MW02-06	A3MW02-06	3.4-6.4	9-Apr-15	6.165	33.191	33.121	70	nd	na	2.37	30.751	0.28	5.6	12.97	391.	0.33	0.25	-10.8	---
A3MW02-06	A3MW02-06	3.4-6.4	2-Sep-15	6.180	33.191	33.121	10	nd	na	3.22	29.901	1.03	6.51	16.06	288.	0.226	0.17	4.7	Clear
A3MW02-06	A3MW02-06	3.4-6.4	15-Mar-16	6.220	33.191	33.121	5	nd	na	2.1	31.021	1.08	6.51	13.56	333.	0.288	0.19	-32.8	Slightly turbid; Minor biofoul in flow cell
A3MW02-06	A3MW02-06	3.4-6.4	19-Sep-16	6.250	33.191	33.121	nd	nd	na	3.25	29.871	0.31	6.5	15.98	396.	0.31	0.23	-87.4	Slightly turbid
A3MW02-06	A3MW02-06	3.4-6.4	25-Apr-17	6.260	33.191	33.121	10	nd	na	2.37	30.751	0.73	6.73	10.65	228.	0.205	0.15	20.2	Clear
A3MW02-06	A3MW02-06	3.4-6.4	20-Sep-17	6.200	33.191	33.121	200	nd	na	3.88	29.241	0.11	6.54	16.17	391.	0.305	0.23	-68.9	Clear
A3MW02-06	A3MW02-06	3.4-6.4	17-Apr-18	6.260	33.191	33.121	15	nd	na	2.42	30.701	0.38	6.6	11.71	332.	0.289	0.22	-27.9	Clear
A3MW02-06	A3MW02-06	3.4-6.4	25-Sep-18	6.260	33.191	33.121	30	nd	na	3.15	29.971	0.58	6.67	16.34	451.	0.351	0.26	-289.5	Clear
A3MW02-07	MW02-07	3.1-6.2	05-May-04	6.340	33.453	33.371	8800	nd	na	3.22	30.151	nm	6.86	11.2	653.	nm	nm	nm	---
A3MW02-07	MW02-07	3.1-6.2	25-Oct-04	6.300	33.453	33.371	100	nd	na	2.848	30.523	nm	7.04	14.4	515.	nm	0.1	nm	---
A3MW02-07	MW02-07	3.1-6.2	26-Apr-05	6.300	33.453	33.371	>11000	nd	na	2.97	30.401	nm	6.81	11.7	636.	nm	nm	nm	---
A3MW02-07	A3-MW02-07	3.1-6.2	19-Sep-05	6.220	33.453	33.371	nm	nd	na	3.7	29.671	nm	7.03	14.3	746.	nm	nm	nm	Sampled on Sept.19
A3MW02-07	A3-MW02-07	3.1-6.2	29-Mar-06	6.200	33.453	33.371	5500	nd	na	2.838	30.533	1.49	6.56	11.8	333.	nm	nm	nm	---
A3MW02-07	A3-MW02-07	3.1-6.2	31-Aug-06	6.300	33.453	33.371	720	nd	na	3.76	29.611	0.6	6.31	13.79	774.	nm	nm	nm	Could not get vapours as sucked up water
A3MW02-07	A3-MW02-07	3.1-6.2	04-Apr-07	6.300	33.453	33.371	10450	nd	na	2.91	30.461	0.24	6.72	10.4	643.	nm	nm	nm	Could not get vapours as sucked up water
A3MW02-07	A3-MW02-07	3.1-6.2	28-Aug-07	6.300	33.453	33.371	6600	nd	na	3.45	29.921	0.26	6.81	13.2	697.	nm	nm	nm	---
A3MW02-07	A3-MW02-07	3.1-6.2	09-Apr-08	6.295	33.453	33.371	6050	nd	na	2.9	30.471	0.46	7.46	10.7	608.	nm	nm	nm	pH collected at lab
A3MW02-07	A3-MW02-07	3.1-6.2	28-Aug-08	6.288	33.453	33.371	>11000	nd	na	3.23	30.141	0.8	6.6	13.3	611.	nm	nm	nm	Clear
A3MW02-07	A3-MW02-07	3.1-6.2	27-Apr-09	6.295	33.453	33.371	7700	nd	na	2.901	30.47	0.5	6.52	10.9	1554.	nm	nm	nm	Clear
A3MW02-07	A3-MW02-07	3.1-6.2	03-Sep-09	6.310	33.453	33.371	75	nd	na	3.652	29.719	0.1	6.49	13.6	684.	nm	nm	nm	Clear

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
A3MW02-07	A3-MW02-07	3.1-6.2	19-Apr-10	6.298	33.453	33.371	610	nd	na	2.856	30.515	0.08	6.66	11.4	611.	nm	nm	nm	high turbid low sediment
A3MW02-07	A3MW02-07	3.1-6.2	07-Sep-10	6.300	33.453	33.371	130	nd	na	3.665	29.706	0.22	6.28	14.7	652.	nm	nm	nm	Clear
A3MW02-07	A3MW02-07	3.1-6.2	04-May-11	4.260	33.453	33.371	30	nd	na	2.99	30.381	13.53	7.31	13.	527.	nm	nm	nm	Silty
A3MW02-07	ns	3.1-6.2	27-Sep-11	4.460	33.453	33.371	45	nd	na	3.53	29.841	1.15	6.86	14.45	462.	nm	nm	nm	Purged Dry at 7 L - Silty; Still dry at end of day
A3MW02-07	A3MW02-07	3.1-6.2	15-May-12	5.960	33.453	33.371	nd	nd	na	3.83	29.541	4.34	6.57	12.01	436.	nm	nm	nm	Clear
A3MW02-07	A3MW02-07	3.1-6.2	20-Sep-12	5.930	33.453	33.371	130	nd	na	4.15	29.221	1.11	7.03	14.3	725.	nm	nm	nm	Turbid
A3MW02-07	A3MW02-07	3.1-6.2	10-Apr-13	5.710	33.453	33.371	55	nd	na	2.54	30.831	0.39	6.14	10.27	1277.	nm	nm	nm	Clear
A3MW02-07	A3MW02-07	3.1-6.2	28-Aug-13	5.420	33.453	33.371	15	nd	na	4.5	28.871	2.23	7.38	15.4	993.	nm	nm	nm	Clear; j-plug replaced
A3MW02-07	A3MW02-07	3.1-6.2	28-May-14	5.430	33.453	33.371	nd	nd	na	2.62	30.751	6.31	6.25	12.7	415.	0.322	0.18	-16.4	Clear
A3MW02-07	A3MW02-07	3.1-6.2	27-Aug-14	5.430	33.453	33.371	5	nd	na	3.07	30.301	4.16	6.39	16.67	982.	0.768	0.59	71.7	Clear
A3MW02-07	A3MW02-07	3.1-6.2	9-Apr-15	5.440	33.453	33.371	nd	nd	na	2.25	31.121	2.66	6.29	11.91	679.	0.588	0.45	46.7	Purged dry at 4 L; Clear
A3MW02-07	A3MW02-07	3.1-6.2	2-Sep-15	5.430	33.453	33.371	2090	nd	na	3.33	30.041	0.36	6.53	16.37	854.	0.664	0.51	13.5	Clear
A3MW02-07	A3MW02-07	3.1-6.2	15-Mar-16	5.440	33.453	33.371	100	nd	na	2.14	31.231	1.32	6.69	12.51	270.	0.231	0.17	60.7	Clear
A3MW02-07	A3MW02-07	3.1-6.2	19-Sep-16	5.450	33.453	33.371	nm	nd	na	3.1	30.271	1.21	6.38	15.55	1352.	1.072	0.84	-25.6	---
A3MW02-07	A3MW02-07	3.1-6.2	20-Apr-17	5.440	33.453	33.371	5	nd	na	2.22	31.151	5.48	6.31	11.23	123.	0.108	0.08	167.5	Clear
A3MW02-07	A3MW02-07	3.1-6.2	20-Sep-17	6.250	33.453	33.371	90	nd	na	3.69	29.681	0.77	6.5	15.95	431.	0.341	0.26	-21.3	Clear
A3MW02-07	A3MW02-07	3.1-6.2	17-Apr-18	5.460	33.453	33.371	210	nd	na	2.14	31.231	0.28	6.4	11.64	610.	0.532	0.4	-16	Clear; DUP-6
A3MW02-07	A3MW02-07	3.1-6.2	25-Sep-18	5.455	33.453	33.371	30.000	nd	na	2.855	30.516	1.21	6.55	16.05	683.	0.535	0.411	34.5	Clear
A3MW02-07	A3MW02-07	3.1-6.2	15-Oct-18	5.455	33.453	33.371	30	nd	na	2.855	30.516	1.21	6.55	16.05	683.	0.535	0.411	34.5	Clear; sampled
A3MW02-08	MW02-08	1.5-5.5	05-May-04	5.30	33.145	33.072	6050	nd	na	2.02	31.052	nm	6.32	10.8	413.	nm	nm	nm	---
A3MW02-08	MW02-08	1.5-5.5	25-Oct-04	5.370	33.145	33.072	>11000	nd	na	1.473	31.599	nm	7.17	12.6	285.	nm	0.	nm	---
A3MW02-08	MW02-08	1.5-5.5	26-Apr-05	5.440	33.145	33.072	>11000	nd	na	1.68	31.392	nm	6.36	11.3	445.	nm	nm	nm	---
A3MW02-08	A3-MW02-08	1.5-5.5	19-Sep-05	5.350	33.145	33.072	nm	nd	na	2.8	30.272	nm	6.52	13.1	501.	nm	nm	nm	Sampled on Sept.19
A3MW02-08	A3-MW02-08	1.5-5.5	29-Mar-06	5.370	33.145	33.072	>11000	nd	na	1.59	31.482	1.51	6.19	11.1	254.	nm	nm	nm	---
A3MW02-08	A3-MW02-08	1.5-5.5	31-Aug-06	5.440	33.145	33.072	660	nd	na	2.91	30.162	0.59	5.96	13.19	661.	nm	nm	nm	---
A3MW02-08	A3-MW02-08	1.5-5.5	04-Apr-07	5.360	33.145	33.072	9680	nd	na	1.6	31.472	0.5	6.36	10.	436.	nm	nm	nm	---
A3MW02-08	A3-MW02-08	1.5-5.5	28-Aug-07	5.430	33.145	33.072	8800	nd	na	2.43	30.642	0.12	6.31	12.7	460.	nm	nm	nm	---
A3MW02-08	A3-MW02-08	1.5-5.5	09-Apr-08	5.414	33.145	33.072	1100	nd	na	1.537	31.535	0.65	7.04	9.9	356.	nm	nm	nm	pH collected at lab
A3MW02-08	A3-MW02-08	1.5-5.5	28-Aug-08	5.429	33.145	33.072	8800	nd	na	1.862	31.21	0.7	6.13	12.3	345.	nm	nm	nm	Clear
A3MW02-08	A3-MW02-08	1.5-5.5	27-Apr-09	5.423	33.145	33.072	>11000	nd	na	1.605	31.467	0.5	6.29	10.7	840.	nm	nm	nm	Clear
A3MW02-08	A3-MW02-08	1.5-5.5	03-Sep-09	5.435	33.145	33.072	6600	nd	na	2.59	30.482	0.3	6.42	12.9	419.	nm	nm	nm	Clear
A3MW02-08	A3-MW02-08	1.5-5.5	19-Apr-10	5.436	33.145	33.072	1320	nd	na	1.618	31.454	0.12	6.32	10.8	410.	nm	nm	nm	Clear
A3MW02-08	A3MW02-08	1.5-5.5	07-Sep-10	5.425	33.145	33.072	420	nd	na	2.21	30.862	0.12	5.87	14.4	413.	nm	nm	nm	Clear
A3MW02-08	A3MW02-08	1.5-5.5	04-May-11	5.430	33.145	33.072	75	nd	na	0.597	32.475	1.17	5.92	12.1	370.	nm	nm	nm	Clear
A3MW02-08	A3MW02-08	1.5-5.5	22-Sep-11	5.450	33.145	33.072	35	nd	na	2.345	30.727	0.48	6.26	12.98	309.	nm	nm	nm	Clear
A3MW02-08	A3MW02-08	1.5-5.5	15-May-12	4.650	33.145	33.072	20	nd	na	1.94	31.132	1.6	6.05	11.17	320.	nm	nm	nm	Very silty
A3MW02-08	A3MW02-08	1.5-5.5	20-Sep-12	4.580	33.145	33.072	20	nd	na	2.62	30.452	0.85	6.15	13.47	302.	nm	nm	nm	Turbid
A3MW02-08	A3MW02-08	1.5-5.5	10-Apr-13	4.610	33.145	33.072	10	nd	na	1.14	31.932	0.36	6.06	10.71	974.	nm	nm	nm	Clear
A3MW02-08	A3MW02-08	1.5-5.5	27-Aug-13	4.380	33.145	33.072	25	nd	na	2.73	30.342	0.81	5.7	16.65	1037.	nm	nm	nm	Pumped a lot of sand out of well; Silty
A3MW02-08	A3MW02-08	1.5-5.5	28-May-14	4.540	33.145	33.072	85	nd	na	1.53	31.542	0.18	6.1	13.6	693.	0.574	0.44	-48.3	Clear
A3MW02-08	A3MW02-08	1.5-5.5	27-Aug-14	4.590	33.145	33.072	25	nd	na	2.28	30.792	0.33	6.37	20.08	808.	0.583	0.44	-36.1	Clear
A3MW02-08	A3MW02-08	1.5-5.5	9-Apr-15	4.620	33.145	33.072	410	nd	na	1.535	31.537	0.39	6.57	14.19	447.	0.368	0.27	-42	Clear
A3MW02-08	A3MW02-08	1.5-5.5	12-Sep-15	4.610	33.145	33.072	>11000	nd	na	1.77	31.302	0.14	6.21	18.08	602.	0.45	0.34	-94.9	Slightly turbid
A3MW02-08	A3MW02-08	1.5-5.5	15-Mar-16	4.780	33.145	33.072	35	nd	na	1.19	31.882	0.13	6.31	13.46	500.	0.416	0.31	-39.2	Turbid
A3MW02-08	A3MW02-08	1.5-5.5	19-Sep-16	4.830	33.145	33.072	nm	nd	na	1.7	31.372	0.53	6.11	16.67	559.	0.431	0.32	-88.7	Clear
A3MW02-08	A3MW02-08	1.5-5.5	20-Apr-17	4.880	33.145	33.072	5	nd	na	1.39	31.682	0.38	5.97	13.92	401.	0.33	0.25	-57.0	Clear
A3MW02-08	A3MW02-08	1.5-5.5	20-Sep-17	5.400	33.145	33.072	530	nd	na	3.89	29.182	0.39	6.19	18.49	469.	0.348	0.26	-33.9	Slightly turbid; DUP-9
A3MW02-08	A3MW02-08	1.5-5.5	17-Apr-18	4.930	33.145	33.072	120	nd	na	1.12	31.952	0.46	6.46	14.83	492.	0.398	0.3	16.2	Turbid; sampled
A3MW02-08	A3MW02-08	1.5-5.5	25-Sep-18	4.965	33.145	33.072	90	nd	na	1.592	31.48	0.27	6.28	18.91	643.	0.473	0.36	-351.6	Clear; sampled
A3MW03-01	MW03-01	1.5-6.1	05-May-04	6.050	32.024	31.896	nm	nd	na	3.92	27.976	nm	7.24	10.7	39.1	nm	nm	nm	---
A3MW03-01	MW03-01	1.5-6.1	25-Oct-04	6.059	32.024	31.896	200	nd	na	3.916	27.98	nm	6.67	13.2	17700.	nm	13.7	nm	---
A3MW03-01	MW03-01	1.5-6.1	26-Apr-05	6.000	32.024	31.896	130	nd	na	3.9	27.996	nm	6.83	12.1	2990.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	20-Sep-05	6.060	32.024	31.896	nm	nd	na	3.97	27.926	nm	6.79	14.6	43400.	nm	nm	nm	Sampled Sept.20
A3MW03-01	A3-MW03-01	1.5-6.1	29-Mar-06	6.030	32.024	31.896	50	nd	na	3.91	27.986	5.18	6.51	11.	2140.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	31-Aug-06	6.000	32.024	31.896	60	nd	na	4.3	27.596	0.35	6.29	15.19	40146.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	04-Apr-07	6.060	32.024	31.896	150	nd	na	4.05	27.846	0.13	6.82	9.7	33400.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	28-Aug-07	6.050	32.024	31.896	130	nd	na	3.9	27.996	2.05	6.78	15.9	36300.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	3-Apr-08	6.060	32.024	31.896	50	nd	na	3.805	28.091	0.65	6.06	8.4	12920.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	28-Aug-08	6.048	32.024	31.896	125	nd	na	3.927	27.969	4.8	6.72	14.2	1531.	nm	nm	nm	---
A3MW03-01	A3-MW03-01	1.5-6.1	27-Apr-09	6.050	32.024	31.896	75	nd	na	3.402	28.494	3.4	6.54	10.	90800.	nm	nm	nm	Clear
A3MW03-01	A3-MW03-01	1.5-6.1	3-Sep-09	6.050	32.024	31.896	225	nd	na	3.84	28.056	6.	6.55	15.1	42600.	nm	nm	nm	Clear
A3MW03-01	A3-MW03-01	1.5-6.1	19-Apr-10	6.055	32.024	31.896	nd	nd	na	2.86	29.036	3.	6.74	9.3	39.3	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	7-Sep-10	6.050	32.024	31.896	nd	nd	na	3.86	28.036	0.5	6.17	14.9	1630.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	4-May-11	6.050	32.024	31.896	60	nd	na	4.044	27.852	0.53	6.45	12.4	11520.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	28-Sep-11	6.045	32.024	31.896	160	nd	na	3.785	28.111	4.22	6.53	13.1	30287.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	16-May-12	6.060	32.024	31.896	90	nd	na	3.97	27.926	7.95	6.93	12.09	25199.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	18-Sep-12	6.030	32.024	31.896	100	nd	na	2.95	28.946	4.32	6.63	13.65	33275.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	9-Apr-13	5.490	32.024	31.896	25	nd	na	3.82	28.076	1.4	6.43	9.46	21647.	nm	nm	nm	Clear; Well was re-drilled and installed in March
A3MW03-01	A3MW03-01	1.5-6.1	28-Aug-13	5.490	32.024	31.896	170	nd	na	3.44	28.456	4.41	6.84	16.57	34368.	nm	nm	nm	Clear
A3MW03-01	A3MW03-01	1.5-6.1	29-May-14	5.490	32.024	31.896	60	nd	na	3.89	28.006	4.33	6.94	12.35	28500.	24.41	23.8	-68.5	Clear; Heavy biofoul
A3MW03-01	A3MW03-01	1.5-6.1	27-Aug-14	5.500	32.024	31.896	105	nd	na	3.36	28.536	4.99	7.03	16.23	34465.	26.91	26.58	26.7	Clear; DUP-18
A3MW03-01	A3MW03-01	1.5-6.1	10-Apr-15	5.500	32.024	31.896	20	nd	na	3.745	28.151	0.12	6.57	11.34	13240.	11.64	10.04	129.2	Clear
A3MW03-01	A3MW03-01	1.5-6.1	3-Sep-15	5.490	32.024	31.896	170	nd	na	3.03	28.866	3.99	6.94	16.08	33929.	26.59	26.23	26.5	Clear; Brackish
A3MW03-01	A3MW03-01	1.5-6.1	15-Mar-16	5.490	32.024	31.896	10	nd	na	2.72	29.176	0.4	7.64	9.87	8955.	8.2	7.42	76.8	Clear
A3MW03-01	A3MW03-01	1.5-6.1	21-Sep-16	5.480	32.024	31.896	nd	nd	na	2.92	28.976	5.59	7.14	15.31	34071.	27.18	26.87	149.6	Clear
A3MW03-01	A3MW03-01	1.5-6.1	26-Apr-17	5.500	32.024	31.896	5	nd	na	3.41	28.486	0.36	6.87	10.01	20095.	18.29	17.79	-46.7	Clear
A3MW03-01	A3MW03-01	1.5-6.1	21-Sep-17	5.500	32.024	31.896	130	nd	na	3.5	28.396	5.16	7.07	14.62	28298.	22.94	22.27	-35.9	Clear
A3MW03-01	A3MW03-01	1.5-6.1	16-Apr-18	5.500	32.024	31.896	nd	nd	na	4.78	27.116	2.95	6.85	9.74	19805.	18.16	17.13	113.4	Clear
A3MW03-01	A3MW03-01	1.5-6.1	10-Sep-18	5.493	32.024	31.896	15	nd	na	3.521	28.375	1.76	6.98	15.5	22123.	17.44	16.56	-321	Sampled
A3MW03-02	MW03-02	2.3-8.3	05-May-04	8.20	33.292	33.185	nm	nd	na	4.83	28.355	nm	7.34	10.1	2430.	nm	nm	nm	---
A3MW03-02	MW03-02	2.3-8.3	25-Oct-04	8.312	33.292	33.185	250	nd	na	4.605	28.58	nm	7.11	12.5	768.	nm	0.1	nm	---
A3MW03-02	MW03-02	2.3-8.3	26-Apr-05	8.250	33.292	33.185	75	nd	na	4.62	28.565	nm	7.14	12.	540.	nm	nm	nm	---
A3MW03-02	A3-MW03-02	2.3-8.3	20-Sep-05	8.200	33.292	33.185	nm	nd	na	5.1	28.085	nm	6.72	14.7	23800.	nm	nm	nm	Sampled Sept.20
A3MW03-02	A3-MW03-02	2.3-8.3	29-Mar-06	8.250	33.292	33.185	50	nd	na	4.5	28.685	7.71	6.69	11.8	345.	nm	nm	nm	---
A3MW03-02	A3-MW03-02	2.3-8.3	31-Aug-06	8.250	33.292	33.185	55	nd	na	5.15	28.035	0.47	6.33	15.2	25720.	nm	nm	nm	DUP 11
A3MW03-02	A3-MW03-02	2.3-8.3	04-Apr-07	8.250	33.292	33.185	40	nd	na	4.98	28.205	0.42	7.17	9.6	566.	nm	nm	nm	---
A3MW03-02	A3-MW03-02	2.3-8.3	28-Aug-07	8.250	33.292	33.185	60	nd	na	4.27	28.915	0.52	7.	13.1	3720.	nm	nm	nm	---
A3MW03-02	A3-MW03-02	2.3-8.3	3-Apr-08	8.250	33.292	33.185	40	nd	na	4.58	28.605	1.61	6.72	9.4	694.	nm	nm	nm	DUP
A3MW03-02	A3-MW03-02	2.3-8.3	28-Aug-08	8.239	33.292	33.185	75	nd	na	4.612	28.573	0.7	6.7	12.9	2490.	nm	nm	nm	---
A3MW03-02	A3-MW03-02	2.3-8.3	27-Apr-09	8.212	33.292	33.185	50	nd	na	4.362	28.823	0.6	6.97	11.3	1873.	nm	nm	nm	Clear with orange suspended debris
A3MW03-02	A3-MW03-02	2.3-8.3	3-Sep-09	8.210	33.292	33.185	125	nd	na	4.78	28.405	0.3	6.68	13.6	2250.	nm	nm	nm	Clear
A3MW03-02	A3-MW03-02	2.3-8.3	19-Apr-10	8.250	33.292	33.185	nd	nd	na	4.25	28.935	0.18	7.03	10.	882.	nm	nm	nm	---
A3MW03-02	A3MW03-02	2.3-8.3	7-Sep-10	8.120	33.292	33.185	nd	nd	na	4.835	28.35	0.18	6.73	13.5	5800.	nm	nm	nm	Clear; QA/QC duplicate: DUP-4
A3MW03-02	A3MW03-02	2.3-8.3	4-May-11	8.110	33.292	33.185	nd	nd	na	4.92	28.265	0.96	6.67	13.	571.	nm	nm	nm	Clear; DUP-26
A3MW03-02	A3MW03-02	2.3-8.3	28-Sep-11	8.115	33.292	33.185	nd	nd	na	4.395	28.79	0.77	6.69	15.35	833.	nm	nm	nm	Clear
A3MW03-02	A3MW03-02	2.3-8.3	16-May-12	8.120	33.292	33.185	5	nd	na	5.07	28.115	0.38	7.27	11.14	765.	nm	nm	nm	Clear
A3MW03-02	A3MW03-02	2.3-8.3	18-Sep-12	8.700	33.292	33.185	10	nd	na	4.1	29.085	1.15	7.37	13.99	1023.	nm	nm	nm	Clear; DUP-24
A3MW03-02	A3MW03-02	2.3-8.3	9-Apr-13	7.910	33.292	33.185	20	nd	na	4.24	28.945	0.28	7.	10.13	1422.	nm	nm	nm	Clear; DUP-18; this well was repaired in March
A3MW03-02	A3MW03-02	2.3-8.3	28-Aug-13	7.910	33.292	33.185	35	nd	na	4.65	28.535	0.61	7.01	14.61	1070.	nm	nm	nm	Clear; DUP-19
A3MW03-02	A3MW03-02	2.3-8.3	29-May-14	7.900	33.292	33.185	5	nd	na	4.58	28.605	0.36	6.57	11.22	695.	0.613	0.47	-70.7	NAPL stained tubing (bottom), Hydrocarbon odour
A3MW03-02	A3MW03-02	2.3-8.3	27-Aug-14	7.930	33.292	33.185	5	nd	na	4.52	28.665	0.2	6.55	13.59	708.	0.588	0.45	-93.2	Clear
A3MW03-02	A3MW03-02	2.3-8.3	10-Apr-15	7.920	33.292	33.185	15	nd	na	4.35	28.835	0.98	6.65	11.51	663.	0.51	0.44	-96.9	Clear; DUP-9
A3MW03-02	A3MW03-02	2.3-8.3	3-Sep-15	7.910	33.292	33.185	15	nd	na	4.5	28.685	0.21	6.86	15.35	3184.	2.537	2.08	-8	Clear
A3MW03-02	A3MW03-02	2.3-8.3	15-Mar-16	7.920	33.292	33.185	20	nd	na	3.68	29.505	0.41	7.02	11.51	635.	0.556	0.42	-73.4	Clear; Minor biofoul
A3MW03-02	A3MW03-02	2.3-8.3	21-Sep-16	7.920	33.292	33.185	nd	nd	na	4.46	28.725	0.02	6.78	14.93	1231.	0.99	0.77	-70	DUP-7
A3MW03-02	A3MW03-02	2.3-8.3	26-Apr-17	7.930	33.292	33.185	30	nd	na	3.78	29.405	0.1	6.98	10.97	654.	0.58	0.44	-121.3	Clear
A3MW03-02	A3MW03-02	2.3-8.3	21-Sep-17	7.930	33.292	33.185	35	nd	na	4.58	28.605	1.33	6.89	14.85	695.	0.56	0.43	-98.1	Clear
A3MW03-02	A3MW03-02	2.3-8.3	12-Apr-18	7.927	33.292	33.185	15	nd	na	4.089	29.096	0.05	7.03	10.77	454.	0.406	0.31	-82.4	Clear
A3MW03-02	A3MW03-02	2.3-8.3	10-Sep-18	7.920	33.292	33.185	60	nd	na	4.918	28.267	0.61	6.18	15.61	3906.	3.112	2.59	-60	Clear
A3MW03-02	A3MW03-02	2.3-8.3	12-Apr-18	7.927	33.292	33.185	15	nd	na	4.089	29.096	0.05	7.03	10.77	454.	0.406	0.31	-82.4	Clear; DUP-5
A3MW03-02	A3MW03-02	2.3-8.3	10-Sep-18	7.920	33.292	33.185	60	nd	na	4.918	28.267	0.61	6.18	15.61	3906.	3.112	2.59	-60	Clear; sampled
A3MW03-03	MW03-03	0.8-6.9	5-May-04	6.450	32.972	32.868	nm	nd	na	4.63	28.238	nm	7.19	10.8	685.	nm	nm	nm	---
A3MW03-03	MW03-03	0.8-6.9	25-Oct-04	6.440	32.972	32.868	50	nd	na	5.55	27.318	nm	6.71	14.3	643.	nm	0.1	nm	---
A3MW03-03	MW03-03	0.8-6.9	26-Apr-05	6.530	32.972	32.868	>11000	nd	na	4.36	28.508	nm	7.08	12.3	827.	nm	nm	nm	PMP sampling event
A3MW03-03	A3-MW03-03	0.8-6.9	20-Sep-05	6.500	32.972	32.868	nm	nd	na	4.79	28.078	nm	6.95	15.3	1096.	nm	nm	nm	Sampled Sept.20
A3MW03-03	A3-MW03-03	0.8-6.9	12-Apr-06	6.600	32.972	32.868	4840	nd	na	4.42	28.448	---	6.54	10.8	964.	nm	nm	nm	---

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
A3MW03-03	A3-MW03-03	0.8-6.9	31-Aug-06	6.550	32.972	32.868	500	nd	na	4.96	27.908	0.65	6.2	13.5	737.	nm	nm	nm	---
A3MW03-03	A3-MW03-03	0.8-6.9	4-Apr-07	6.550	32.972	32.868	nm	nd	na	4.74	28.128	0.33	6.84	10.3	981.	nm	nm	nm	---
A3MW03-03	A3-MW03-03	0.8-6.9	29-Aug-07	6.500	32.972	32.868	4950	nd	na	4.6	28.268	0.45	6.84	13.6	776.	nm	nm	nm	BC: Clear.
A3MW03-03	A3-MW03-03	0.8-6.9	9-Apr-08	6.550	32.972	32.868	75	nd	na	3.936	28.932	1.12	7.37	10.2	886.	nm	nm	nm	pH collected at lab
A3MW03-03	A3-MW03-03	0.8-6.9	28-Aug-08	6.538	32.972	32.868	100	nd	na	4.554	28.314	0.7	6.48	12.1	845.	nm	nm	nm	BC: Clear
A3MW03-03	A3-MW03-03	0.8-6.9	27-Apr-09	6.535	32.972	32.868	>11000	nd	na	4.41	28.458	1.	6.64	9.7	461.	nm	nm	nm	BC: Clear; Clear sample with orange suspended debris
A3MW03-03	A3-MW03-03	0.8-6.9	3-Sep-09	6.538	32.972	32.868	>11000	nd	na	4.618	28.25	0.2	6.41	12.	875.	nm	nm	nm	Clear
A3MW03-03	A3-MW03-03	0.8-6.9	19-Apr-10	6.470	32.972	32.868	1100	nd	na	3.68	29.188	0.12	6.53	10.6	909.	nm	nm	nm	Slightly turbid with organic smell; Peristaltic pump purged water from the bottom of the well, sheen not observed, no product
A3MW03-03	A3MW03-03	0.8-6.9	20-Sep-10	6.460	32.972	32.868	>11000	nd	na	4.518	28.35	0.87	6.57	13.4	1088.	nm	nm	nm	Very slightly turbid
A3MW03-03	A3MW03-03	0.8-6.9	4-May-11	6.470	32.972	32.868	45	nd	na	4.517	28.351	3.86	6.72	14.6	604.	nm	nm	nm	Clear
A3MW03-03	A3MW03-03	0.8-6.9	21-Sep-11	6.480	32.972	32.868	60	nd	na	5.	27.868	0.1	6.96	12.35	628.	nm	nm	nm	Clear
A3MW03-03	A3MW03-03	0.8-6.9	15-May-12	6.445	32.972	32.868	nd	nd	na	5.14	27.728	1.03	6.98	14.56	598.	nm	nm	nm	Clear
A3MW03-03	A3MW03-03	0.8-6.9	20-Sep-12	6.460	32.972	32.868	35	nd	na	4.72	28.148	5.22	7.	17.15	531.	nm	nm	nm	Clear; slightly turbid; DUP-25; BC: Clear
A3MW03-03	A3MW03-03	0.8-6.9	9-Apr-13	6.530	32.972	32.868	nd	nd	na	4.63	28.238	7.64	6.82	10.5	313.	nm	nm	nm	Clear; DUP-19
A3MW03-03	A3MW03-03	0.8-6.9	3-Sep-13	6.540	32.972	32.868	15	nd	na	4.76	28.108	1.54	6.55	15.47	556.	nm	nm	nm	Clear; DUP-20
A3MW03-03	A3MW03-03	0.8-6.9	28-May-14	6.460	32.972	32.868	nd	nd	na	4.56	28.308	0.75	6.38	11.8	444.	0.385	0.29	-21.9	Turbid
A3MW03-03	A3MW03-03	0.8-6.9	27-Aug-14	6.560	32.972	32.868	nd	nd	na	4.65	28.218	0.23	6.33	16.25	776.	0.605	0.46	-28.5	Clear
A3MW03-03	A3MW03-03	0.8-6.9	8-Jul-15	6.670	32.972	32.868	45	nd	na	4.61	28.258	0.5	6.51	16.37	1712.	1.333	1.05	5.6	Clear; Well redeveloped successfully by Mac and Mac
A3MW03-03	A3MW03-03	0.8-6.9	2-Sep-15	6.630	32.972	32.868	120	nd	na	4.4	28.468	0.29	6.75	16.98	445.	0.341	0.26	11.5	Clear
A3MW03-03	A3MW03-03	0.8-6.9	15-Mar-16	6.650	32.972	32.868	85	nd	na	3.95	28.918	4.82	6.68	12.46	445.	0.381	0.29	75.6	Clear
A3MW03-03	A3MW03-03	0.8-6.9	12-Oct-16	6.640	32.972	32.868	15	nd	na	4.83	28.038	0.23	6.25	14.32	390.	0.31	0.23	-52.1	Clear
A3MW03-03	A3MW03-03	0.8-6.9	25-Apr-17	6.660	32.972	32.868	20	nd	na	4.34	28.528	0.96	6.77	10.78	402.	0.359	0.27	41.2	Clear
A3MW03-03	A3MW03-03	0.8-6.9	20-Sep-17	6.400	32.972	32.868	90	nd	na	4.1	28.768	0.16	6.41	14.51	859.	0.699	0.54	-72	Clear
A3MW03-03	A3MW03-03	0.8-6.9	1-May-18	6.650	32.972	32.868	70	nd	na	4.255	28.613	0.9	6.04	11.32	411.	0.362	0.27	132.4	Clear
A3MW03-03	A3MW03-03	0.8-6.9	25-Sep-18	6.663	32.972	32.868	nd	nd	na	4.7	28.168	0.68	6.1	14.53	359.	0.291	0.22	151	Clear; sampled
A3MW03-04	MW03-04	1.5-6.7	05-May-04	6.500	33.42	33.316	50	nd	na	5.17	28.146	nm	6.77	12.	801.	nm	nm	nm	---
A3MW03-04	MW03-04	1.5-6.7	25-Oct-04	6.550	33.42	33.316	75	nd	na	5.072	28.244	nm	7.04	13.7	702.	nm	0.1	nm	---
A3MW03-04	MW03-04	1.5-6.7	26-Apr-05	6.600	33.42	33.316	>11000	nd	na	2.96	30.356	nm	6.68	13.4	848.	nm	nm	nm	---
A3MW03-04	A3-MW03-04	1.5-6.7	19-Sep-05	6.590	33.42	33.316	nm	nd	na	nm	na	nm	6.65	14.3	871.	nm	nm	nm	Sampled Sept.19
A3MW03-04	MW03-04	1.5-6.7	12-Apr-06	6.600	33.42	33.316	4400	nd	na	4.81	28.506	nm	6.46	11.5	782.	nm	nm	nm	---
A3MW03-04	MW03-04	1.5-6.7	31-Aug-06	6.610	33.42	33.316	500	nd	na	5.32	27.996	0.7	6.28	13.28	1070.	nm	nm	nm	---
A3MW03-04	MW03-04	1.5-6.7	04-Apr-07	6.600	33.42	33.316	3080	nd	na	4.88	28.436	0.3	6.57	11.1	791.	nm	nm	nm	---
A3MW03-04	MW03-04	1.5-6.7	28-Aug-07	6.600	33.42	33.316	1210	nd	na	5.05	28.266	0.19	6.67	14.7	949.	nm	nm	nm	---
A3MW03-04	MW03-04	1.5-6.7	09-Apr-08	6.620	33.42	33.316	>11000	nd	na	4.345	28.971	1.21	7.23	11.2	543.	nm	nm	nm	pH collected at lab
A3MW03-04	MW03-04	1.5-6.7	28-Aug-08	6.625	33.42	33.316	1100	nd	na	4.853	28.463	0.3	6.5	12.1	761.	nm	nm	nm	Strong hydrocarbon odour
A3MW03-04	MW03-04	1.5-6.7	27-Apr-09	6.618	33.42	33.316	>11000	nd	na	4.89	28.426	0.6	6.52	10.8	1554.	nm	nm	nm	Clear with orange suspended debris
A3MW03-04	MW03-04	1.5-6.7	09-Sep-09	6.630	33.42	33.316	8800	nd	na	5.17	28.146	0.2	6.8	11.9	852.	nm	nm	nm	Clear
A3MW03-04	MW03-04	1.5-6.7	19-Apr-10	6.620	33.42	33.316	>11000	nd	na	4.75	28.566	0.13	6.58	11.8	796.	nm	nm	nm	Slightly turbid with organic smell
A3MW03-04	MW03-04	1.5-6.7	7-Sep-10	6.600	33.42	33.316	>11000	nd	na	5.11	28.206	0.12	6.38	13.4	867.	nm	nm	nm	Purged dry; clear with fine black particles
A3MW03-04	MW03-04	1.5-6.7	4-May-11	6.610	33.42	33.316	80	nd	na	4.7	28.616	0.62	6.08	13.5	561.	nm	nm	nm	Clear with trace orange-brown flocculant, probe and tape covered in mud
A3MW03-04	ns	1.5-6.7	27-Sep-11	6.605	33.42	33.316	70	nd	na	4.88	28.436	0.78	6.23	14.38	491.	nm	nm	nm	Purged dry at 6 L - Silty;, Still dry at end of day
A3MW03-04	MW03-04	1.5-6.7	15-May-12	6.510	33.42	33.316	5	nd	na	5.84	27.476	3.41	6.31	13.13	564.	nm	nm	nm	Ran dry; silty; 1/2 amber collected
A3MW03-04	MW03-04	1.5-6.7	20-Sep-12	6.600	33.42	33.316	55	nd	na	5.38	27.936	1.23	8.04	14.89	888.	nm	nm	nm	Turbid
A3MW03-04	MW03-04	1.5-6.7	9-Apr-13	6.620	33.42	33.316	160	nd	na	4.99	28.326	0.23	6.12	10.8	370.	nm	nm	nm	Clear
A3MW03-04	MW03-04	1.5-6.7	28-Aug-13	6.620	33.42	33.316	30	nd	na	5.25	28.066	6.2	6.44	14.4	944.	nm	nm	nm	Clear
A3MW03-04	MW03-04	1.5-6.7	28-May-14	6.630	33.42	33.316	180	nd	na	4.97	28.346	2.52	6.18	11.91	415.	0.36	0.27	-47.3	Clear; DUP-28
A3MW03-04	MW03-04	1.5-6.7	27-Aug-14	6.635	33.42	33.316	35	nd	na	5.16	28.156	1.12	6.16	14.41	508.	0.414	0.31	53.5	Clear
A3MW03-04	MW03-04	1.5-6.7	09-Apr-15	6.630	33.42	33.316	75	nd	na	4.885	28.431	0.16	6.08	13.64	375.	0.311	0.23	21.8	Clear
A3MW03-04	MW03-04	1.5-6.7	2-Sep-15	6.630	33.42	33.316	290	nd	na	4.93	28.386	0.21	6.67	14.95	534.	0.43	0.32	-20.3	Clear; DUP-12
A3MW03-04	MW03-04	1.5-6.7	15-Mar-16	6.640	33.42	33.316	120	nd	na	4.41	28.906	0.27	6.39	12.43	414.	0.354	0.27	61	Clear
A3MW03-04	MW03-04	1.5-6.7	19-Sep-16	6.650	33.42	33.316	nm	nd	na	5.06	28.256	0.33	6.22	14.57	575.	0.467	0.35	13.1	---
A3MW03-04	A3MW03-04	1.5-6.7	25-Apr-17	6.640	33.42	33.316	210	nd	na	4.67	28.646	0.5	6.24	11.26	385.	0.339	0.25	29	Clear; DUP-13
A3MW03-04	A3MW03-04	1.5-6.7	20-Sep-17	6.600	33.42	33.316	20	nd	na	3.88	29.436	1.46	6.01	14.48	610.	0.496	0.38	51.4	Clear; DUP-10
A3MW03-04	MW03-04	1.5-6.7	18-Apr-18	6.530	33.42	33.316	230	nd	na	4.57	28.746	2.63	6.13	11.19	426.	0.373	0.28	87.6	Clear; sampled
A3MW03-04	MW03-04	1.5-6.7	25-Sep-18	6.675	33.42	33.316	45	nd	na	5.046	28.27	0.81	6.	14.15	743.	0.609	0.46	152.9	Clear; sampled
MW03-07	MW03-07	0.6-2.2	03-May-04	1.940	34.965	34.874	115	nd	na	1.36	33.514	nm	7.11	14.1	731.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	21-Oct-04	1.966	34.965	34.874	50	nd	na	1.317	33.557	nm	7.33	13.4	479.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	21-Apr-05	1.940	34.965	34.874	10	nd	na	1.28	33.594	nm	7.42	12.8	1916.	nm	nm	nm	---
MW03-07	ns	0.6-2.2	21-Sep-05	1.960	34.965	34.874	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-07	MW03-07	0.6-2.2	03-Apr-06	2.100	34.965	34.874	10	nd	na	1.28	33.594	5.75	6.83	11.	22.6	nm	nm	nm	---
MW03-07	ns	0.6-2.2	31-Aug-06	2.100	34.965	34.874	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-07	MW03-07	0.6-2.2	05-Apr-07	2.100	34.965	34.874	10	nd	na	1.28	33.594	2.7	7.23	10.8	2220.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	27-Aug-07	2.120	34.965	34.874	25	nd	na	1.53	33.344	0.32	6.89	20.	2320.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	03-Apr-08	2.100	34.965	34.874	15	nd	na	1.252	33.622	7.73	7.	9.	2410.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	26-Aug-08	2.290	34.965	34.874	75	nd	na	1.31	33.564	2.6	6.74	18.1	1112.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	20-Apr-09	2.124	34.965	34.874	nd	nd	na	1.285	33.589	4.5	7.01	10.1	3550.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	24-Aug-09	2.080	34.965	34.874	nd	nd	na	1.37	33.504	2.1	6.9	20.2	2880.	nm	nm	nm	Cloudy
MW03-07	MW03-07	0.6-2.2	6-Apr-10	2.150	34.965	34.874	nd	nd	na	1.29	33.584	10.77	7.3	8.4	1560.	nm	nm	nm	---
MW03-07	MW03-07	0.6-2.2	2-Sep-10	2.110	34.965	34.874	nd	nd	na	1.21	33.664	0.56	6.11	19.8	389.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	28-Apr-11	2.115	34.965	34.874	10	nd	na	1.27	33.604	0.11	7.02	9.1	3760.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	15-Sep-11	2.120	34.965	34.874	15	nd	na	1.53	33.344	4.01	6.86	18.28	1992.	nm	nm	nm	Purged Dry (Sept.14); Silty (Sept.15)
MW03-07	MW03-07	0.6-2.2	14-May-12	2.110	34.965	34.874	15	nd	na	1.28	33.594	7.35	6.61	13.4	3278.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	9-Aug-12	2.130	34.965	34.874	nd	nd	na	1.29	33.584	4.41	6.81	19.98	2694.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	10-Apr-13	2.110	34.965	34.874	nd	nd	na	1.27	33.604	8.3	7.16	9.64	2500.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	28-Aug-13	2.130	34.965	34.874	5	nd	na	1.39	33.484	1.62	6.88	18.89	5672.	nm	nm	nm	Clear
MW03-07	MW03-07	0.6-2.2	04-Jun-14	2.120	34.965	34.874	15	nd	na	1.27	33.604	1.56	6.5	14.87	4706.	3.794	3.18	19.7	Clear
MW03-07	MW03-07	0.6-2.2	04-Sep-14	2.110	34.965	34.874	5	nd	na	1.28	33.594	1.33	6.64	19.44	3489.	2.616	2.13	62.2	Clear
MW03-07	MW03-07	0.6-2.2	22-Apr-15	2.110	34.965	34.874	5	nd	na	1.27	33.604	0.84	6.74	12.15	2360.	2.031	1.64	114.9	Clear
MW03-07	MW03-07	0.6-2.2	15-Sep-15	2.110	34.965	34.874	nd	nd	na	1.28	33.594	1.05	6.99	18.31	2753.	2.037	1.64	8.7	Clear
MW03-07	MW03-07	0.6-2.2	17-Mar-16	2.110	34.965	34.874	15	nd	na	1.27	33.604	4.9	7.02	9.3	1908.	1.769	1.41	62.2	Clear; DUP-8
MW03-07	MW03-07	0.6-2.2	23-Sep-16	2.100	34.965	34.874	nm	nd	na	1.29	33.584	1.79	6.76	16.36	3230.	2.513	2.05	-40.7	---
MW03-07	MW03-07	0.6-2.2	13-Apr-17	2.120	34.965	34.874	nd	nd	na	1.29	33.584	2.45	7.8	8.99	8123.	7.52	6.65	-109.5	Clear
MW03-07	MW03-07	0.6-2.2	30-Aug-17	2.120	34.965	34.874	20	nd	na	1.31	33.564	4.66	6.85	20.66	5177.	3.681	3.08	-36.5	Silty, brown
MW03-07	MW03-07	0.6-2.2	12-Apr-18	2.130	34.965	34.874	nd	nd	na	1.306	33.568	1.68	6.86	9.24	7630.	7.099	6.2	11	Clear; sampled
MW03-07	MW03-07	0.6-2.2	4-Sep-18	2.120	34.965	34.874	5	nd	na	1.299	33.575	0.69	7.09	19.44	5059.	3.68	3.08	-279.8	Silty; sampled
G1-1A	G1-1A	3.1-6.1	03-May-04	5.940	39.921	39.765	>11000	nd	na	4.85	34.915	nm	5.91	11.8	398.	nm	nm	nm	---
G1-1A	G1-1A	3.1-6.1	20-Oct-04	5.930	39.921	39.765	8800	nd	na	4.441	35.324	nm	6.04	14.7	487.	nm	0.	nm	---
G1-1A	G1-1A	3.1-6.1	20-Apr-05	6.000	39.921	39.765	25	nd	na	3.86	35.905	nm	5.39	12.9	593.	nm	nm	nm	---
G1-1A	G1-1A	3.1-6.1	21-Sep-05	5.930	39.921	39.765	nm	nd	na	5.21	34.555	nm	6.12	15.3	569.	nm	nm	nm	Sampled on Sept.22
G1-1A	G1-1A	3.1-6.1	29-Mar-06	5.930	39.921	39.765	80	nd	na	4.06	35.705	1.58	6.	12.2	50.2	nm	nm	nm	---
G1-1A	ns	3.1-6.1	30-Aug-06	5.900	39.921	39.765	100	nd	na	5.34	34.425	nm	nm	nm	nm	nm	nm	nm	Dry after purging.
G1-1A	G1-1A	3.1-6.1	05-Apr-07	5.430	39.921	39.765	100	nd	na	3.91	35.855	0.8	6.02	11.4	620.	nm	nm	nm	---
G1-1A	G1-1A	3.1-6.1	30-Aug-07	6.000	39.921	39.765	280	nd	na	5.21	34.555	0.5	6.12	16.9	592.	nm	nm	nm	---
G1-1A	G1-1A	3.1-6.1	03-Apr-08	5.978	39.921	39.765	75	nd	na	4.144	35.621	0.78	5.95	10.4	1940.	nm	nm	nm	---
G1-1A	G1-1A	3.1-6.1	26-Aug-08	6.002	39.921	39.765	nm	nd	na	5.047	34.718	0.3	6.25	12.3	412.	nm	nm	nm	Cap not in place; Silty
G1-1A	G1-1A	3.1-6.1	21-Apr-09	5.988	39.921	39.765	500	nd	na	3.81	35.955	1.	6.42	11.5	1100.	nm	nm	nm	Clear, minimal sediment (well re-sampled May.5)
G1-1A	G1-1A	3.1-6.1	24-Aug-09	6.003	39.921	39.765	4950	nd	na	5.13	34.635	0.7	5.81	14.7	904.	nm	nm	nm	Turbid
G1-1A	G1-1A	3.1-6.1	2-Sep-10	6.000	39.921	39.765	nd	nd	na	5.12	34.645	0.2	5.95	14.5	666.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	28-Apr-11	6.005	39.921	39.765	70	nd	na	3.801	35.964	nm	6.48	10.3	650.	nm	nm	nm	Clear, DO meter malfunctioning
G1-1A	G1-1A	3.1-6.1	19-Sep-11	6.000	39.921	39.765	>11000	nd	na	5.045	34.72	0.33	5.76	12.72	574.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	14-May-12	6.010	39.921	39.765	750	nd	na	4.335	35.43	0.6	5.45	12.29	527.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	4-Sep-12	6.000	39.921	39.765	>11000	nd	na	5.14	34.625	0.83	6.31	14.04	585.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	3-Apr-13	6.000	39.921	39.765	155	nd	na	4.145	35.62	1.	5.63	11.19	420.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	26-Aug-13	6.000	39.921	39.765	55	nd	na	5.22	34.545	1.24	5.27	15.11	591.	nm	nm	nm	Clear
G1-1A	G1-1A	3.1-6.1	02-Jun-14	6.000	39.921	39.765	160	nd	na	4.27	35.495	0.57	5.59	11.73	594.	0.517	0.39	25.3	Clear
G1-1A	G1-1A	3.1-6.1	23-Sep-14	6.000	39.921	39.765	75	nd	na	5.15	34.615	1.07	5.75	15.81	801.	0.629	0.48	-37.6	Clear
G1-1A	G1-1A	3.1-6.1	04-May-15	6.000	39.921	39.765	140	nd	na	4.38	35.385	0.21	6.02	12.05	549.	0.474	0.36	44.4	Clear
G1-1A	G1-1A	3.1-6.1	03-Sep-15	6.000	39.921	39.765	>11000	nd	na	4.82	34.945	0.28	5.96	15.23	731.	0.584	0.44	-26.2	Clear
G1-1A	G1-1A	3.1-6.1	04-Apr-16	6.020	39.921	39.765	70	nd	na	3.64	36.125	0.38	6.22	11.79	351.	0.305	0.23	-18.8	Clear
G1-1A	G1-1A	3.1-6.1	22-Sep-16	6.000	39.921	39.765	nd	nd	na	4.91	34.855	7.42	8.28	12.92	273.	0.231	0.17	-23.4	---
G1-1A	G1-1A	3.1-6.1	15-Apr-17	6.000	39.921	39.765	240	nd	na	3.1	36.665	0.93	5.83	10.25	520.	0.471	0.36	-20.5	Clear; DUP-7
G1-1A	G1-1A	3.1-6.1	30-Aug-17	6.020	39.921	39.765	330	nd	na	5.07	34.695	0.35	5.91	15.53	495.	0.393	0.3	24.6	Clear; DUP-3

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
G1-1A	G1-1A	3.1-6.1	10-Apr-18	6.010	39.921	39.765	100	nd	na	3.11	36.655	0.26	6.24	11.31	637.	0.561	0.43	0.2	Clear
G1-1A	G1-1A	3.1-6.1	7-May-18	6.012	39.921	39.765	170	nd	na	3.803	35.962	0.74	5.82	11.21	545.	0.48	0.36	21.2	Clear; sampled
G1-1A	G1-1A	3.1-6.1	5-Sep-18	6.015	39.921	39.765	150	nd	na	4.956	34.809	0.46	5.9	15.81	527.	0.415	0.31	69.7	Sampled
G1-1B	G1-1B	10.8-12.3	03-May-04	12.420	39.634	39.512	85	nd	na	8.57	30.942	nm	7.87	11.9	342.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	20-Oct-04	12.446	39.634	39.512	125	nd	na	8.539	30.973	nm	8.7	12.	251.	nm	0.	nm	---
G1-1B	G1-1B	10.8-12.3	20-Apr-05	12.420	39.634	39.512	50	nd	na	8.4	31.112	nm	9.03	13.3	344.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	21-Sep-05	12.440	39.634	39.512	nm	nd	na	8.04	31.472	nm	9.1	14.	370.	nm	nm	nm	Sampled on Sept.22
G1-1B	G1-1B	10.8-12.3	29-Mar-06	12.500	39.634	39.512	10	nd	na	8.38	31.132	3.5	8.44	11.6	244.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	05-Nov-06	12.460	39.634	39.512	100	nd	na	8.64	30.872	nm	7.8	12.8	360.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	05-Apr-07	12.450	39.634	39.512	10	nd	na	8.73	30.782	0.12	9.41	13.2	341.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	30-Aug-07	12.450	39.634	39.512	50	nd	na	8.56	30.952	0.18	8.3	15.3	423.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	03-Apr-08	12.380	39.634	39.512	20	nd	na	8.375	31.137	0.27	9.24	13.6	436.	nm	nm	nm	---
G1-1B	G1-1B	10.8-12.3	26-Aug-08	12.470	39.634	39.512	15	nd	na	8.567	30.945	0.1	6.01	13.	740.	nm	nm	nm	Silty
G1-1B	G1-1B	10.8-12.3	21-Apr-09	12.491	39.634	39.512	25	nd	na	8.768	30.744	0.6	8.89	12.9	342.	nm	nm	nm	Silty, some sediment
G1-1B	G1-1B	10.8-12.3	24-Aug-09	12.512	39.634	39.512	nd	nd	na	8.58	30.932	1.7	9.29	12.1	338.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	2-Sep-10	12.495	39.634	39.512	nd	nd	na	8.685	30.827	0.2	8.64	13.3	541.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	3-May-11	12.440	39.634	39.512	30	nd	na	8.28	31.232	1.1	8.55	12.1	687.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	19-Sep-11	12.490	39.634	39.512	15	nd	na	8.435	31.077	4.77	8.94	13.83	424.	nm	nm	nm	Clear; DUP-28
G1-1B	G1-1B	10.8-12.3	14-May-12	12.490	39.634	39.512	nd	nd	na	8.33	31.182	1.09	7.58	14.8	1786.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	04-Sep-12	12.500	39.634	39.512	nd	nd	na	8.51	31.002	0.97	8.6	14.27	409.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	03-Apr-13	12.480	39.634	39.512	nd	nd	na	8.29	31.222	0.29	7.77	12.95	2336.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	26-Aug-13	12.490	39.634	39.512	nd	nd	na	8.5	31.012	0.88	6.96	14.53	641.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	02-Jun-14	12.490	39.634	39.512	nd	nd	na	8.3	31.212	3.33	6.82	15.67	381.	nm	nm	nm	Clear
G1-1B	G1-1B	10.8-12.3	23-Sep-14	12.490	39.634	39.512	nd	nd	na	8.46	31.052	1.5	6.92	12.51	376.	0.322	0.29	0.58	Clear
G1-1B	G1-1B	10.8-12.3	04-May-15	12.480	39.634	39.512	nd	nd	na	3.35	36.162	5.93	6.98	12.98	172.	0.246	0.11	77.3	Clear; Roadbox needs replacement
G1-1B	G1-1B	10.8-12.3	03-Sep-15	12.490	39.634	39.512	nd	nd	na	8.44	31.072	1.32	6.97	13.88	109.	0.09	0.07	5.7	Clear
G1-1B	G1-1B	10.8-12.3	04-Apr-16	12.500	39.634	39.512	5	nd	na	8.27	31.242	3.7	6.83	12.82	60.	0.051	0.04	119	Clear; Roadbox needs replacement
G1-1B	G1-1B	10.8-12.3	22-Sep-16	12.500	39.634	39.512	nd	nd	na	8.44	31.072	nm	nm	nm	nm	nm	nm	nm	Purged dry; collected sample on recharge
G1-1B	G1-1B	10.8-12.3	15-Apr-17	12.490	39.634	39.512	15	nd	na	8.26	31.252	5.28	7.83	12.	271.	0.234	0.17	-66.3	Clear
G1-1B	G1-1B	10.8-12.3	30-Aug-17	10.870	39.634	39.512	10	nd	na	8.72	30.792	3.	7.95	12.34	422.	0.362	0.27	102.5	---
G1-1B	G1-1B	10.8-12.3	10-Apr-18	12.400	39.634	39.512	15	nd	na	8.274	31.238	4.36	8.05	13.06	11531.	9.68	8.66	-38.3	Purged dry at 5 L; cloudy (yellow/orange); sampled on recharge
G1-1B	G1-1B	10.8-12.3	7-May-18	12.440	39.634	39.512	5	nd	na	8.418	31.094	0.62	7.87	14.24	2675.	2.189	1.78	128.7	Silty; sampled on recharge
G1-1B	G1-1B	10.8-12.3	5-Sep-18	12.440	39.634	39.512	nd	nd	na	8.825	30.687	7.89	7.32	12.84	4437.	3.757	3.15	207.4	Sampled
G1-1C	G1-1C	19.8-21.3	03-May-04	21.510	40.506	40.405	25	nd	na	9.71	30.695	nm	9.14	11.8	546.	nm	nm	nm	---
G1-1C	G1-1C	19.8-21.3	20-Oct-04	21.310	40.506	40.405	75	nd	na	10.127	30.278	nm	9.33	11.5	401.	nm	0.	nm	---
G1-1C	G1-1C	19.8-21.3	20-Apr-05	21.180	40.506	40.405	25	nd	na	10.06	30.345	nm	9.44	12.7	559.	nm	nm	nm	---
G1-1C	G1-1C	19.8-21.3	21-Sep-05	21.310	40.506	40.405	nm	nd	na	10.17	30.235	nm	9.33	12.9	480.	nm	nm	nm	Sampled on Sept.22
G1-1C	G1-1C	19.8-21.3	29-Mar-06	21.200	40.506	40.405	10	nd	na	10.28	30.125	3.44	9.34	11.2	364.	nm	nm	nm	---
G1-1C	G1-1C	19.8-21.3	30-Aug-06	21.200	40.506	40.405	70	nd	na	10.83	29.575	2.1	7.1	11.2	540.	nm	nm	nm	---
G1-1C	G1-1C	19.8-21.3	05-Apr-07	21.000	40.506	40.405	nd	nd	na	9.82	30.585	0.16	9.69	14.1	558.	nm	nm	nm	---
G1-1C	G1-1C	19.8-21.3	30-Aug-07	21.400	40.506	40.405	50	nd	na	10.47	29.935	0.24	8.5	16.2	568.	nm	nm	nm	A1-Sentry-Dup3
G1-1C	G1-1C	19.8-21.3	03-Apr-08	20.980	40.506	40.405	10	nd	na	9.99	30.415	0.22	9.45	12.7	584.	nm	nm	nm	DUP
G1-1C	G1-1C	19.8-21.3	26-Aug-08	21.110	40.506	40.405	25	nd	na	10.31	30.095	1.1	8.83	11.9	638.	nm	nm	nm	Silty
G1-1C	G1-1C	19.8-21.3	21-Apr-09	21.097	40.506	40.405	5	nd	na	9.958	30.447	0.4	9.56	12.7	609.	nm	nm	nm	Transparent, sample a little murky
G1-1C	G1-1C	19.8-21.3	24-Aug-09	21.420	40.506	40.405	25	nd	na	10.385	30.02	0.3	9.32	12.9	15.	nm	nm	nm	Cloudy
G1-1C	G1-1C	19.8-21.3	2-Sep-10	21.227	40.506	40.405	15	nd	na	10.18	30.225	0.2	8.28	17.3	678.	nm	nm	nm	Clear
G1-1C	G1-1C	19.8-21.3	4-May-11	21.240	40.506	40.405	15	nd	na	9.855	30.55	0.07	9.12	13.4	613.	nm	nm	nm	Clear; DUP-23
G1-1C	G1-1C	19.8-21.3	19-Sep-11	21.210	40.506	40.405	15	nd	na	9.975	30.43	4.74	9.22	12.08	390.	nm	nm	nm	Silty; sample collected on Sept.20
G1-1C	G1-1C	19.8-21.3	14-May-12	21.210	40.506	40.405	20	nd	na	9.85	30.555	2.95	9.46	12.79	482.	nm	nm	nm	Clear; Purged dry at 70 L on May.14; Clear
G1-1C	G1-1C	19.8-21.3	4-Sep-12	21.190	40.506	40.405	25	nd	na	9.96	30.445	4.16	9.5	12.09	454.	nm	nm	nm	Silty; BTEX only; DUP-21; EPH collected Sept.5
G1-1C	G1-1C	19.8-21.3	03-Apr-13	21.160	40.506	40.405	nd	nd	na	9.79	30.615	2.41	8.9	11.3	443.	nm	nm	nm	Purged 70 L; Parameters and sample collected Apr.4
G1-1C	G1-1C	19.8-21.3	26-Aug-13	21.140	40.506	40.405	10	nd	na	9.91	30.495	5.44	8.75	12.07	460.	nm	nm	nm	Odour and brown tinge; purged very silty; silty BTEX; amber collected Aug.27 AM, too silty on Aug.26
G1-1C	G1-1C	19.8-21.3	02-Jun-14	21.170	40.506	40.405	100	nd	na	9.82	30.585	2.41	8.39	13.62	490.	0.405	0.31	65.3	Clear
G1-1C	G1-1C	19.8-21.3	23-Sep-14	21.170	40.506	40.405	40	nd	na	9.89	30.515	3.31	8.98	11.49	463.	0.405	0.3	-72.8	Clear
G1-1C	G1-1C	19.8-21.3	4-May-15	21.185	40.506	40.405	80	nd	na	9.865	30.54	4.08	9.17	11.84	473.	0.411	0.31	59	Turbid; DUP-11
G1-1C	G1-1C	19.8-21.3	03-Sep-15	21.150	40.506	40.405	5	nd	na	9.9	30.505	1.5	9.07	11.56	449.	0.393	0.3	-55.6	Clear
G1-1C	G1-1C	19.8-21.3	04-Apr-16	21.120	40.506	40.405	nd	nd	na	9.76	30.645	6.4	8.5	11.79	248.	0.216	0.16	109.7	Purged dry at 40 L on Apr.4; Parameters and sample collected on Apr.5; Clear
G1-1C	G1-1C	19.8-21.3	22-Sep-16	21.210	40.506	40.405	5	nd	na	9.93	30.475	4.91	9.27	12.04	427.	0.369	0.28	-37	Turbid; DUP-8
G1-1C	G1-1C	19.8-21.3	15-Apr-17	21.340	40.506	40.405	nd	nd	na	9.76	30.645	2.22	9.55	11.99	406.	0.351	0.26	-39.2	Clear
G1-1C	G1-1C	19.8-21.3	30-Aug-17	21.220	40.506	40.405	5	nd	na	10.06	30.345	4.63	9.31	13.14	439.	0.369	0.28	37.3	Turbid
G1-1C	G1-1C	19.8-21.3	10-Apr-18	21.383	40.506	40.405	15	nd	na	9.847	30.558	3.84	9.35	12.48	472.	0.404	0.3	82.8	Cloudy/grey; bailed; sampled
G1-1C	G1-1C	19.8-21.3	3-May-18	21.357	40.506	40.405	nd	nd	na	9.917	30.488	7.29	8.99	13.19	599.	0.503	0.38	41.9	Cloudy/grey; bailed; sampled
G1-1C	G1-1C	19.8-21.3	5-Sep-18	21.330	40.506	40.405	5	nd	na	10.193	30.212	7.4	9.42	12.94	579.	0.488	0.37	-331.9	Sampled
G1-2A	G1-2A	1.8-3.4	04-May-04	3.150	34.462	34.352	75	nd	na	1.09	33.262	nm	8.65	13.7	4910.	nm	nm	nm	---
G1-2A	G1-2A	1.8-3.4	21-Oct-04	3.200	34.462	34.352	75	nd	na	1.544	32.808	nm	7.16	17.2	1601.	nm	0.8	nm	---
G1-2A	G1-2A	1.8-3.4	12-Apr-05	3.150	34.462	34.352	1100	nd	na	1.55	32.802	nm	7.5	13.9	1139.	nm	nm	nm	---
G1-2A	G1-2A	1.8-3.4	21-Sep-05	3.176	34.462	34.352	nm	nd	na	1.49	32.862	nm	7.47	19.8	2310.	nm	nm	nm	Sampled on Sept.22
G1-2A	G1-2A	1.8-3.4	03-Apr-06	3.170	34.462	34.352	25	nd	na	1.285	33.067	3.17	7.8	11.6	29.8	nm	nm	nm	---
G1-2A	G1-2A	1.8-3.4	05-Sep-06	3.170	34.462	34.352	nm	nd	na	1.35	33.002	nm	6.71	21.5	471.	nm	nm	nm	DUP16
G1-2A	G1-2A	1.8-3.4	13-Apr-07	3.200	34.462	34.352	75	nd	na	1.43	32.922	0.78	nm	9.6	6260.	nm	nm	nm	---
G1-2A	G1-2A	1.8-3.4	30-Aug-07	3.200	34.462	34.352	100	nd	na	1.66	32.692	0.09	7.38	19.4	5220.	nm	nm	nm	A1 Sentry DUP1
G1-2A	G1-2A	1.8-3.4	9-Apr-08	3.177	34.462	34.352	50	nd	na	1.447	32.905	1.42	7.33	10.5	2380.	nm	nm	nm	EPH; DUP
G1-2A	G1-2A	1.8-3.4	26-Aug-08	3.179	34.462	34.352	50	nd	na	1.557	32.795	0.3	6.76	19.5	2630.	nm	nm	nm	---
G1-2A	G1-2A	1.8-3.4	21-Apr-09	3.154	34.462	34.352	30	nd	na	1.506	32.846	2.5	6.92	11.9	888.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	24-Aug-09	3.155	34.462	34.352	nd	nd	na	1.428	32.924	0.2	7.05	20.4	2390.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	2-Sep-10	3.125	34.462	34.352	nd	nd	na	1.135	33.217	0.03	7.8	19.8	977.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	27-Apr-11	3.140	34.462	34.352	20	nd	na	0.996	33.356	2.4	9.66	9.6	2460.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	14-Sep-11	3.145	34.462	34.352	nd	nd	na	1.45	32.902	7.43	9.48	19.2	1570.	nm	nm	nm	Sheen and silty
G1-2A	G1-2A	1.8-3.4	14-May-12	3.150	34.462	34.352	nd	nd	na	1.07	33.282	6.83	9.61	13.5	977.	nm	nm	nm	Clear; purged dry during parameters at 4 L
G1-2A	G1-2A	1.8-3.4	09-Aug-12	3.160	34.462	34.352	10	nd	na	1.435	32.917	1.69	8.23	19.19	2386.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	10-Apr-13	3.150	34.462	34.352	15	nd	na	1.41	32.942	3.29	7.9	10.34	1541.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	26-Aug-13	3.160	34.462	34.352	nd	nd	na	1.71	32.642	0.97	8.02	20.14	2173.	nm	nm	nm	Clear
G1-2A	G1-2A	1.8-3.4	05-Jun-14	3.150	34.462	34.352	60	nd	na	1.035	33.317	1.28	7.31	15.41	846.	0.673	0.51	-149.7	---
G1-2A	G1-2A	1.8-3.4	03-Sep-14	3.145	34.462	34.352	nd	nd	na	1.63	32.722	0.61	7.5	19.81	1783.	1.286	1.01	-27	Clear
G1-2A	G1-2A	1.8-3.4	21-Apr-15	3.180	34.462	34.352	25	nd	na	1.075	33.277	2.39	7.17	12.46	2117.	1.809	1.45	2.33	Clear
G1-2A	G1-2A	1.8-3.4	01-Sep-15	3.145	34.462	34.352	15	nd	na	1.58	32.772	1.24	7.51	19.52	2069.	1.502	1.19	-52.9	Clear
G1-2A	G1-2A	1.8-3.4	15-Mar-16	3.190	34.462	34.352	nd	nd	na	0.99	33.362	3.2	7.97	9.51	1161.	1.071	0.84	179.6	Clear
G1-2A	G1-2A	1.8-3.4	21-Sep-16	3.180	34.462	34.352	5	nd	na	1.18	33.172	4.66	7.46	15.93	1012.	0.795	0.61	150.6	---
G1-2A	G1-2A	1.8-3.4	19-Apr-17	3.200	34.462	34.352	15	nd	na	1.9	33.172	0.9	7.52	9.43	819.	0.756	0.58	47.8	Clear
G1-2A	G1-2A	1.8-3.4	31-Aug-17	3.200	34.462	34.352	15	nd	na	1.72	33.172	207.	7.15	20.15	2463.	1.766	1.41	40.9	Silty, grey/brown
G1-2A	G1-2A	1.8-3.4	16-Apr-18	3.200	34.462	34.352	30	nd	na	1.12	33.172	3.38	7.66	10.23	2941.	2.665	2.19	170.8	Clear
G1-2A	G1-2A	1.8-3.4	6-Sep-18	3.235	34.462	34.352	15	nd	na	1.712	33.172	0.57	7.09	20.23	3047.	2.179	1.76	240.6	Silty; sampled
G1-2B	G1-2B	4.6-6.1	04-May-04	6.020	34.398	34.255	450	nd	na	2.22	32.035	nm	8.18	11.7	2250.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	21-Oct-04	6.164	34.398	34.255	100	nd	na	3.295	30.96	nm	7.73	15.6	1490.	nm	0.8	nm	---
G1-2B	G1-2B	4.6-6.1	27-Apr-05	6.200	34.398	34.255	10	nd	na	1.5	32.755	nm	7.98	12.9	2590.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	21-Sep-05	6.225	34.398	34.255	nm	nd	na	1.05	33.205	nm	7.83	18.	607.	nm	nm	nm	Sampled on Sept.22
G1-2B	G1-2B	4.6-6.1	03-Apr-06	6.240	34.398	34.255	<5	nd	na	1.615	32.64	1.75	7.79	12.7	45.7	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	05-Sep-06	6.250	34.398	34.255	nm	nd	na	1.56	32.695	nm	7.76	19.6	394.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	13-Apr-07	6.330	34.398	34.255	50	nd	na	1.44	32.815	0.14	nm	9.4	6320.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	30-Aug-07	6.260	34.398	34.255	75	nd	na	1.57	32.685	0.19	7.94	16.4	2290.	nm	nm	nm	A1 Sentry DUP2
G1-2B	G1-2B	4.6-6.1	9-Apr-08	6.258	34.398	34.255	25	nd	na	1.612	32.643	0.97	8.06	10.5	1961.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	26-Aug-08	6.261	34.398	34.255	nd	nd	na	1.171	33.084	0.1	9.09	16.7	991.	nm	nm	nm	---
G1-2B	G1-2B	4.6-6.1	21-Apr-09	6.241	34.398	34.255	50	nd	na	1.307	32.948	0.5	8.37	11.9	1084.	nm	nm	nm	Clear
G1-2B	G1-2B	4.6-6.1	24-Aug-09	6.265	34.398	34.255	nd	nd	na	1.402	32.853	0.1	8.1	16.4	6810.	nm	nm	nm	Cloudy
G1-2B	G1-2B	4.6-6.1	02-Sep-10	6.260	34.398	34.255	nd	nd	na	1.25	33.005	0.03	9.56	17.1	1761.	nm	nm	nm	Low sediment, low turbid
G1-2B	G1-2B	4.6-6.1	27-Apr-11	6.260	34.398	34.255	60	nd	na	1.113	33.142	0.02	8.48	9.4	5930.	nm	nm	nm	Clear
G1-2B	G1-2B	4.6-6.1	14-Sep-11	6.260	34.398	34.255	nd	nd	na	1.45	32.805	2.23	7.72	15.77	2879.	nm	nm	nm	Clear
G1-2B	G1-2B	4.6-6.1	14-May-12	6.270	34.398	34.255	50	nd	na	1.38	32.875	0.36	7.93	13.09	5558.	nm	nm	nm	Clear; DUP-9
G1-2B	G1-2B	4.6-6.1	09-Aug-12	6.265	34.398	34.255	15	nd	na	1.205	33.05	4.75	9.58	17.92	1679.	nm	nm	nm	Clear; Purged dry at 10 L - sampled on same day recharge
G1-2B	G1-2B	4.6-6.1	10-Apr-13	6.260	34.398	34.255	45	nd	na	1.35	32.905	1.45	8.2	10.96	3420.	nm	nm	nm	Clear
G1-2B	G1-2B	4.6-6.1	26-Aug-13	6.260	34.398	34.255	10	nd	na	1.385	32.87	1.98	7.45	16.56	2315.	nm	nm	nm	Clear

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
G1-2B	G1-2B	4.6-6.1	05-Jun-14	6.260	34.398	34.255	80	nd	na	1.365	32.89	0.28	7.43	12.28	3772.	3.242	2.69	148.1	Clear; DUP-34
G1-2B	G1-2B	4.6-6.1	03-Sep-14	6.260	34.398	34.255	nd	nd	na	1.3	32.955	2.43	8.42	15.71	2439.	1.927	1.55	-18.6	Clear
G1-2B	G1-2B	4.6-6.1	21-Apr-15	6.260	34.398	34.255	25	nd	na	1.27	32.985	0.33	7.89	13.08	2338.	1.966	1.59	282.9	Clear
G1-2B	G1-2B	4.6-6.1	01-Sep-15	6.260	34.398	34.255	25	nd	na	1.32	32.935	1.18	7.9	16.63	2150.	1.658	1.32	3.4	Clear
G1-2B	G1-2B	4.6-6.1	15-Mar-16	6.240	34.398	34.255	25	nd	na	1.16	33.095	2.35	7.78	10.86	2190.	1.943	1.56	193.6	Clear
G1-2B	G1-2B	4.6-6.1	26-Sep-16	6.190	34.398	34.255	nd	nd	na	1.23	33.025	1.	8.38	16.67	890.	0.597	0.45	-71.2	Clear
G1-2B	G1-2B	4.6-6.1	19-Apr-17	6.260	34.398	34.255	15	nd	na	1.28	32.975	2.3	7.8	10.24	2710.	2.452	2.	62.9	Clear
G1-2B	G1-2B	4.6-6.1	31-Aug-17	6.270	34.398	34.255	nd	nd	na	1.29	32.965	1.72	7.66	15.77	2183.	1.721	1.38	6.8	Clear
G1-2B	G1-2B	4.6-6.1	16-Apr-18	6.260	34.398	34.255	35	nd	na	1.32	32.935	4.39	7.5	9.25	1879.	1.746	0.4	154.8	Clear
G1-2B	G1-2B	4.6-6.1	6-Sep-18	6.270	34.398	34.255	20	nd	na	1.235	33.02	2.79	7.6	17.39	2708.	2.063	1.67	2.71	Clear; sampled; DUP-6
G1-5	G1-5	9.1-12.2	03-May-04	12.550	51.856	51.740	60	nd	na	7.68	44.06	nm	7.75	15.3	1112.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	20-Oct-04	12.530	51.856	51.740	100	nd	na	7.872	43.868	nm	7.81	11.5	928.	nm	0.2	nm	---
G1-5	G1-5	9.1-12.2	20-Apr-05	12.610	51.856	51.740	30	nd	na	7.6	44.14	nm	6.97	12.8	1048.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	22-Sep-05	12.600	51.856	51.740	nm	nd	na	8.2	43.54	nm	8.7	12.9	964.	nm	nm	nm	Sampled on Sept-23-05
G1-5	G1-5	9.1-12.2	29-Mar-06	12.620	51.856	51.740	25	nd	na	6.6	45.14	5.95	6.92	11.	449.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	30-Aug-06	12.610	51.856	51.740	85	nd	na	8.18	43.56	0.8	7.26	15.8	580.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	04-Apr-07	12.630	51.856	51.740	nm	nd	na	6.48	45.26	0.12	7.45	11.8	957.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	27-Aug-07	12.700	51.856	51.740	100	nd	na	7.95	43.79	1.12	7.22	13.8	1026.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	03-Apr-08	12.640	51.856	51.740	20	nd	na	6.84	44.9	0.26	7.86	13.4	1013.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	26-Aug-08	12.618	51.856	51.740	160	nd	na	7.473	44.267	0.4	6.78	12.2	1108.	nm	nm	nm	---
G1-5	G1-5	9.1-12.2	21-Apr-09	12.625	51.856	51.740	nd	nd	na	6.662	45.078	0.6	6.85	12.9	940.	nm	nm	nm	Clear, minimal sediment
G1-5	G1-5	9.1-12.2	24-Aug-09	12.628	51.856	51.740	nd	nd	na	7.575	44.165	0.6	6.88	12.7	1050.	nm	nm	nm	Clear
G1-5	G1-5	9.1-12.2	06-Apr-10	12.600	51.856	51.740	5	nd	na	6.56	45.18	0.16	6.86	9.2	919.	nm	nm	nm	Clear Duplicate
G1-5	G1-5	9.1-12.2	02-Sep-10	12.615	51.856	51.740	nd	nd	na	7.24	44.5	0.09	6.68	13.5	990.	nm	nm	nm	Clear, QA/QC duplicate: DUP-1
G1-5	G1-5	9.1-12.2	04-May-11	12.625	51.856	51.740	65	nd	na	6.691	45.049	0.21	6.68	13.6	901.	nm	nm	nm	Clear, purged dry at 20L; DUP 24
G1-5	G1-5	9.1-12.2	19-Sep-11	12.610	51.856	51.740	30	nd	na	7.35	44.39	9.75	3.92	12.29	148.	nm	nm	nm	Collected BTEX Sept 19 b/c ran dry; AM - Collected EPH Sept.20
G1-5	G1-5	9.1-12.2	14-May-12	12.500	51.856	51.740	nd	nd	na	6.85	44.89	0.61	6.27	13.97	688.	nm	nm	nm	Slightly turbid
G1-5	G1-5	9.1-12.2	04-Sep-12	12.620	51.856	51.740	nd	nd	na	7.225	44.515	9.2	7.68	12.58	620.	nm	nm	nm	Bailed dry at 16 L; EPH samples taken Sept.5 b/c too silty
G1-5	G1-5	9.1-12.2	03-Apr-13	12.605	51.856	51.740	35	nd	na	6.715	45.025	0.54	6.59	11.29	396.	nm	nm	nm	Clear; Dup-12
G1-5	G1-5	9.1-12.2	26-Aug-13	12.610	51.856	51.740	40	nd	na	7.24	44.5	0.92	6.17	15.4	268.	nm	nm	nm	Clear; Dup-15
G1-5	G1-5	9.1-12.2	02-Jun-14	12.610	51.856	51.740	15	nd	na	6.62	45.12	4.69	6.3	14.1	367.	0.298	0.2	-138.3	Clear
G1-5	G1-5	9.1-12.2	02-Sep-14	12.630	51.856	51.740	5	nd	na	7.39	44.35	3.75	6.95	15.01	520.	0.417	0.31	124	Turbid; DUP-21
G1-5	G1-5	9.1-12.2	13-May-15	12.640	51.856	51.740	5	nd	na	6.65	45.09	3.76	6.42	12.96	317.	0.268	0.2	146.8	Clear; DUP-14
G1-5	G1-5	9.1-12.2	23-Sep-15	12.655	51.856	51.740	30	nd	na	7.18	44.56	0.67	6.67	15.2	535.	0.426	0.32	92.6	Slightly turbid; medium biofoul
G1-5	G1-5	9.1-12.2	04-Apr-16	12.530	51.856	51.740	15	nd	na	6.39	45.35	0.73	6.78	12.66	500.	0.423	0.32	19.2	Clear
G1-5	G1-5	9.1-12.2	22-Sep-16	12.530	51.856	51.740	15	nd	na	7.06	44.68	2.95	6.75	14.89	269.	0.216	0.16	46.9	Clear
G1-5	G1-5	9.1-12.2	15-Apr-17	12.610	51.856	51.740	5	nd	na	6.11	45.63	0.65	6.92	12.16	595.	0.515	0.39	42.0	Clear
G1-5	G1-5	9.1-12.2	30-Aug-17	12.640	51.856	51.740	20	nd	na	7.2	44.54	0.43	7.19	14.28	577.	0.471	0.36	10.3	Clear
G1-5	G1-5	9.1-12.2	10-Apr-18	15.140	51.856	51.740	20	nd	na	7.503	44.237	4.93	7.3	11.74	385.	0.335	0.25	49.2	Well purged dry after 12.5L; clear; sampled on recharge
G1-5	G1-5	9.1-12.2	3-May-18	12.623	51.856	51.740	15	nd	na	6.58	45.16	0.21	6.71	13.97	623.	0.513	0.39	24.6	Clear; sampled
G1-5	G1-5	9.1-12.2	5-Sep-18	12.612	51.856	51.740	nd	nd	na	7.358	44.382	7.14	6.21	14.74	766.	0.619	0.47	257.2	Well purged dry after 17L; clear; sampled on recharge
G1-6	G1-6	7.9-11	03-May-04	10.740	42.28	42.179	40	nd	na	6.13	36.049	nm	8.45	11.7	383.	nm	nm	nm	---
G1-6	G1-6	7.9-11	20-Oct-04	10.820	42.28	42.179	150	nd	na	5.771	36.408	nm	8.02	11.9	423.	nm	0.	nm	---
G1-6	G1-6	7.9-11	20-Apr-05	10.810	42.28	42.179	50	nd	na	5.37	36.809	nm	7.63	12.5	466.	nm	nm	nm	---
G1-6	G1-6	7.9-11	21-Sep-05	10.735	42.28	42.179	nm	nd	na	6.28	35.899	nm	8.12	13.8	433.	nm	nm	nm	Sampled on Sept-22-05
G1-6	G1-6	7.9-11	29-Mar-06	10.900	42.28	42.179	55	nd	na	5.59	36.589	4.37	7.12	12.6	71.	nm	nm	nm	---
G1-6	G1-6	7.9-11	30-Aug-06	10.800	42.28	42.179	10	nd	na	6.66	35.519	2.52	7.23	16.2	526.	nm	nm	nm	---
G1-6	G1-6	7.9-11	4-Apr-07	10.800	42.28	42.179	20	nd	na	5.585	36.594	0.14	7.31	11.5	583.	nm	nm	nm	---
G1-6	G1-6	7.9-11	27-Aug-07	10.850	42.28	42.179	40	nd	na	6.3	35.879	0.54	7.9	15.	517.	nm	nm	nm	---
G1-6	G1-6	7.9-11	3-Apr-08	10.800	42.28	42.179	40	nd	na	5.635	36.544	0.16	7.51	12.1	719.	nm	nm	nm	---
G1-6	G1-6	7.9-11	26-Aug-08	10.804	42.28	42.179	65	nd	na	6.022	36.157	0.3	7.4	11.1	642.	nm	nm	nm	---
G1-6	G1-6	7.9-11	21-Apr-09	10.800	42.28	42.179	10	nd	na	5.342	36.837	0.8	7.18	11.9	682.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	24-Aug-09	10.805	42.28	42.179	75	nd	na	6.18	35.999	0.5	7.56	11.6	646.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	6-Apr-10	10.820	42.28	42.179	nd	nd	na	5.22	36.959	0.16	7.11	8.9	635.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	02-Sep-10	10.800	42.28	42.179	nd	nd	na	6.08	36.099	0.09	7.45	12.7	612.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	28-Apr-11	10.803	42.28	42.179	60	nd	na	5.381	36.798	nm	6.76	10.9	624.	nm	nm	nm	Clear, DO meter malfunctioning
G1-6	ns	7.9-11	19-Sep-11	nm	42.28	42.179	nm	nm	na	nm	na	nm	nm	nm	nm	nm	nm	nm	Well was covered
G1-6	ns	7.9-11	14-May-12	nm	42.28	42.179	nm	nm	na	nm	na	nm	nm	nm	nm	nm	nm	nm	Well was covered by steel plate
G1-6	G1-6	7.9-11	04-Sep-12	10.800	42.28	42.179	5	nd	na	6.11	36.069	0.29	7.54	12.17	428.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	03-Apr-13	10.790	42.28	42.179	nd	nd	na	5.575	36.604	0.71	7.38	11.28	408.	nm	nm	nm	Dup-14
G1-6	G1-6	7.9-11	26-Aug-13	10.780	42.28	42.179	35	nd	na	6.14	36.039	1.02	6.61	12.06	418.	nm	nm	nm	Clear
G1-6	G1-6	7.9-11	02-Jun-14	10.795	42.28	42.179	15	nd	na	5.585	36.594	0.28	6.64	10.87	468.	0.417	0.31	8.6	Clear
G1-6	G1-6	7.9-11	22-Sep-14	10.795	42.28	42.179	10	nd	na	6.04	36.139	1.06	7.11	10.99	464.	0.412	0.31	-11.1	Clear
G1-6	G1-6	7.9-11	13-May-15	10.810	42.28	42.179	70	nd	na	5.84	36.339	0.6	7.22	11.56	434.	0.379	0.29	-9.9	Clear
G1-6	G1-6	7.9-11	23-Sep-15	10.840	42.28	42.179	nd	nd	na	5.79	36.389	0.1	7.13	11.89	525.	0.455	0.34	8.6	Clear
G1-6	G1-6	7.9-11	04-Apr-16	10.730	42.28	42.179	nd	nd	na	5.25	36.929	1.56	7.23	11.66	485.	0.423	0.32	18.6	Clear
G1-6	G1-6	7.9-11	22-Sep-16	10.750	42.28	42.179	95	nd	na	5.81	36.369	0.01	7.28	13.11	478.	0.402	0.3	-10	---
G1-6	G1-6	7.9-11	15-Apr-17	10.800	42.280	42.179	15	nd	na	4.67	37.509	0.53	7.4	11.06	443.	0.393	0.3	-27.4	Clear
G1-6	G1-6	7.9-11	30-Aug-17	10.800	42.280	42.179	5	nd	na	6.02	36.159	0.22	7.01	12.25	477.	0.409	0.31	245.0	Clear
G1-6	G1-6	7.9-11	10-Apr-18	10.790	42.28	42.179	15	nd	na	4.59	37.589	0.28	7.35	11.74	472.	0.411	0.31	-13	Clear
G1-6	G1-6	7.9-11	3-May-18	10.790	42.28	42.179	5	nd	na	5.188	36.991	0.59	6.33	12.65	574.	0.488	0.37	105	Clear; sampled
G1-6	G1-6	7.9-11	5-Sep-18	10.805	42.28	42.179	10	nd	na	5.45	36.729	0.3	6.89	12.35	550.	0.471	0.36	136.3	Sampled
G1-7A	G1-7A	0.9-2.4	04-May-04	2.320	35.038	34.913	70	nd	na	0.92	33.993	nm	8.16	11.6	882.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	20-Oct-04	1.519	35.038	34.913	125	nd	na	0.982	33.931	nm	7.81	14.2	705.	nm	0.1	nm	---
G1-7A	G1-7A	0.9-2.4	21-Apr-05	2.330	35.038	34.913	20	nd	na	0.94	33.973	nm	7.64	9.9	866.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	22-Sep-05	2.200	35.038	34.913	nm	nd	na	1.18	33.733	nm	7.79	15.2	971.	nm	nm	nm	Sampled on Sept-20-05
G1-7A	G1-7A	0.9-2.4	29-Mar-06	2.300	35.038	34.913	30	nd	na	0.93	33.983	2.02	8.49	11.2	120.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	30-Aug-06	2.350	35.038	34.913	45	nd	na	1.56	33.353	nm	7.43	17.9	51.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	5-Apr-07	2.350	35.038	34.913	125	nd	na	0.91	34.003	0.43	7.36	8.6	1340.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	27-Aug-07	2.350	35.038	34.913	75	nd	na	1.07	33.843	0.95	7.26	16.5	1386.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	9-Apr-08	2.328	35.038	34.913	75	nd	na	0.906	34.007	0.84	7.44	10.5	1329.	nm	nm	nm	---
G1-7A	G1-7A	0.9-2.4	26-Aug-08	2.338	35.038	34.913	75	nd	na	0.96	33.953	4.3	7.04	16.1	1299.	nm	nm	nm	Clear
G1-7A	G1-7A	0.9-2.4	20-Apr-09	2.319	35.038	34.913	40	nd	na	0.906	34.007	2.2	7.33	8.8	1734.	nm	nm	nm	Transparent, sample slightly murky
G1-7A	G1-7A	0.9-2.4	24-Aug-09	2.338	35.038	34.913	20	nd	na	0.998	33.915	4.6	7.03	17.	2140.	nm	nm	nm	Transparent, sample slightly murky
G1-7A	G1-7A	0.9-2.4	02-Sep-10	2.650	35.038	34.913	nd	nd	na	1.71	33.203	0.05	7.71	16.2	1605.	nm	nm	nm	Clear
G1-7A	G1-7A	0.9-2.4	28-Apr-11	2.703	35.038	34.913	140	nd	na	1.421	33.492	nm	7.01	10.2	7870.	nm	nm	nm	pm-Slightly silty, DO meter malfunctioning
G1-7A	G1-7A	0.9-2.4	19-Sep-11	2.705	35.038	34.913	110	nd	na	1.7	33.213	0.27	7.42	14.59	1893.	nm	nm	nm	AM - collected BTEX only b/c silty; PM - collected one EPH jar - silty
G1-7A	G1-7A	0.9-2.4	14-May-12	2.715	35.038	34.913	40	nd	na	1.555	33.358	4.39	7.	10.66	3797.	nm	nm	nm	Silty
G1-7A	G1-7A	0.9-2.4	09-Aug-12	2.710	35.038	34.913	nd	nd	na	1.64	33.273	0.98	7.23	16.03	1684.	nm	nm	nm	Sunny; slight turbid
G1-7A	G1-7A	0.9-2.4	03-Apr-13	2.710	35.038	34.913	nd	nd	na	1.58	33.333	5.61	7.03	8.32	6395.	nm	nm	nm	turbid
G1-7A	G1-7A	0.9-2.4	26-Aug-13	2.710	35.038	34.913	50	nd	na	1.97	32.943	0.89	7.	16.52	1831.	nm	nm	nm	Slightly silty ambers
G1-7A	G1-7A	0.9-2.4	02-Jun-14	2.710	35.038	34.913	35	nd	na	1.5	33.413	2.27	6.95	13.	6123.	5.188	4.42	-154.1	Clear
G1-7A	G1-7A	0.9-2.4	22-Sep-14	2.710	35.038	34.913	65	nd	na	1.8	33.113	1.03	7.33	16.58	2711.	2.099	1.7	66.7	Clear
G1-7A	G1-7A	0.9-2.4	04-May-15	2.700	35.038	34.913	130	nd	na	1.55	33.363	0.27	7.23	11.05	3824.	3.391	2.83	-3	Clear
G1-7A	G1-7A	0.9-2.4	23-Sep-15	2.700	35.038	34.913	170	nd	na	1.63	33.283	1.6	7.49	16.41	2284.	1.776	1.42	327.6	Clear; Purged dry at 2 L; Parameters and sample collected on recharge
G1-7A	G1-7A	0.9-2.4	17-Mar-16	2.710	35.038	34.913	25	nd	na	1.51	33.403	4.16	7.28	9.41	5275.	4.884	4.16	87.9	Clear; Purged dry at 5 L; Parameters and sample collected on recharge
G1-7A	G1-7A	0.9-2.4	22-Sep-16	2.710	35.038	34.913	100	nd	na	1.65	33.263	0.51	7.41	16.06	1742.	1.383	1.09	11.2	Clear
G1-7A	G1-7A	0.9-2.4	15-Apr-17	2.710	35.038	34.913	70	nd	na	1.47	33.443	4.37	6.81	8.52	8330.	7.889	6.9	33.5	Clear
G1-7A	G1-7A	0.9-2.4	30-Aug-17	2.730	35.038	34.913	80	nd	na	2.11	32.803	0.66	7.12	16.78	3623.	2.78	2.3	19.8	Clear; EPH collected Aug 31 at 9:30am
G1-7A	G1-7A	0.9-2.4	11-Apr-18	2.703	35.038	34.913	80	nd	na	1.5	33.413	3.41	7.4	8.47	4411.	3.48	3.52	149.5	Slightly cloudy (grey); sampled
G1-7A	G1-7A	0.9-2.4	7-May-18	2.704	35.038	34.913	45	nd	na	1.575	33.338	3.59	6.9	10.59	12033.	10.79	9.76	10.4	Slightly cloudy (grey); sampled
G1-7A	G1-7A	0.9-2.4	4-Sep-18	2.620	35.038	34.913	55	nd	na	2.142	32.771	4.4	7.47	17.25	4726.	3.58	2.99	234.3	Clear; sampled, no metals collected due to minimum water
G1-7B	G1-7B	6.1-9.1	04-May-04	8.950	35.047	34.910	550	nd	na	1.22	33.69	nm	9.17	13.2	6570.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	20-Oct-04	8.980	35.047	34.910	150	nd	na	1.848	33.062	nm	8.77	14.1	557.	nm	0.	nm	---
G1-7B	G1-7B	6.1-9.1	21-Apr-05	8.980	35.047	34.910	50	nd	na	1.58	33.33	nm	8.88	11.5	784.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	22-Sep-05	8.980	35.047	34.910	nm	nd	na	2.02	32.89	nm	8.45	13.	767.	nm	nm	nm	Sampled on Sept-20-05
G1-7B	G1-7B	6.1-9.1	29-Mar-06	9.000	35.047	34.910	30	nd	na	1.59	33.32	1.4	7.27	9.7	135.1	nm	nm	nm	---

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
G1-7B	G1-7B	6.1-9.1	30-Aug-06	8.980	35.047	34.910	10	nd	na	1.69	33.22	nm	8.7	14.5	50.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	5-Apr-07	9.000	35.047	34.910	50	nd	na	1.225	33.685	0.15	8.67	11.2	1007.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	27-Aug-07	8.820	35.047	34.910	50	nd	na	1.725	33.185	0.26	8.75	12.7	936.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	9-Apr-08	8.967	35.047	34.910	25	nd	na	1.367	33.543	0.12	8.67	10.9	894.	nm	nm	nm	---
G1-7B	G1-7B	6.1-9.1	26-Aug-08	8.989	35.047	34.910	50	nd	na	1.727	33.183	0.2	8.51	13.1	705.	nm	nm	nm	Duplicate taken
G1-7B	G1-7B	6.1-9.1	20-Apr-09	8.972	35.047	34.910	nd	nd	na	1.241	33.669	1.1	8.38	11.1	810.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	24-Aug-09	8.990	35.047	34.910	nd	nd	na	2.12	32.79	0.6	8.2	12.5	740.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	02-Sep-10	14.090	35.047	34.910	2200	nd	na	2.758	32.152	0.06	8.49	14.6	466.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	03-May-11	15.145	35.047	34.910	80	nd	na	2.943	31.967	0.1	8.32	12.1	477.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	19-Sep-11	15.175	35.047	34.910	10	nd	na	3.215	31.695	0.43	8.76	11.25	380.	nm	nm	nm	Clear; DUP-27
G1-7B	G1-7B	6.1-9.1	14-May-12	15.170	35.047	34.910	20	nd	na	3.16	31.75	0.11	8.55	11.68	391.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	09-Aug-12	15.130	35.047	34.910	nd	nd	na	2.97	31.94	0.41	8.81	12.58	380.	nm	nm	nm	Clear, sunny
G1-7B	G1-7B	6.1-9.1	03-Apr-13	15.150	35.047	34.910	nd	nd	na	2.97	31.94	0.52	8.78	10.95	357.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	26-Aug-13	15.160	35.047	34.910	nd	nd	na	3.15	31.76	1.08	7.99	12.7	394.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	02-Jun-14	15.150	35.047	34.910	5	nd	na	3.18	31.73	1.38	7.8	11.62	385.	nm	nm	nm	Clear
G1-7B	G1-7B	6.1-9.1	23-Sep-14	15.160	35.047	34.910	nd	nd	na	3.22	31.69	0.94	8.36	11.89	386.	0.334	0.25	-115	Clear
G1-7B	G1-7B	6.1-9.1	04-May-15	15.150	35.047	34.910	20	nd	na	3.06	31.85	3.98	8.1	12.53	371.	0.316	0.24	-192.7	Clear
G1-7B	G1-7B	6.1-9.1	23-Sep-15	15.190	35.047	34.910	110	nd	na	3.16	31.75	0.08	8.75	12.94	389.	0.328	0.25	32.2	Clear; DUP-16
G1-7B	G1-7B	6.1-9.1	17-Mar-16	15.170	35.047	34.910	15	nd	na	2.87	32.04	0.63	8.82	11.35	343.	0.301	0.22	6.4	Clear
G1-7B	G1-7B	6.1-9.1	22-Sep-16	15.170	35.047	34.910	5	nd	na	2.93	31.98	0.92	8.56	12.68	380.	0.323	0.24	66.4	---
G1-7B	G1-7B	6.1-9.1	15-Apr-17	15.230	35.047	34.910	10	nd	na	3.1	31.81	0.22	8.51	11.6	358.	0.313	0.23	-126.2	Clear
G1-7B	G1-7B	6.1-9.1	31-Aug-17	15.270	35.047	34.910	15	nd	na	3.67	31.24	2.87	8.28	13.67	374.	0.31	0.23	-47.4	Clear
G1-7B	G1-7B	6.1-9.1	11-Apr-18	15.418	35.047	34.910	15	nd	na	4.76	30.15	1.69	8.77	11.06	348.	0.309	0.23	-32.5	Slightly cloudy (grey); sampled; DUP-3
G1-7B	G1-7B	6.1-9.1	7-May-18	15.450	35.047	34.910	10	nd	na	2.898	32.012	0.06	8.67	12.18	378.	0.325	0.24	-117.4	Slightly cloudy (grey); sampled; DUP-3
G1-7B	G1-7B	6.1-9.1	4-Sep-18	15.430	35.047	34.910	nd	nd	na	3.535	31.375	0.35	8.46	13.43	455.	0.379	0.28	234	Clear; sampled;
G1-8	G1-8	7.0-13.1	4-May-04	13.710	34.791	34.663	770	nd	na	4.15	30.513	nm	7.85	12.	948.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	25-Oct-04	13.850	34.791	34.663	550	nd	na	3.826	30.837	nm	8.08	12.	681.	nm	0.2	nm	---
G1-8	G1-8	7.0-13.1	27-Apr-05	13.710	34.791	34.663	25	nd	na	3.86	30.803	nm	8.18	13.8	1042.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	21-Sep-05	13.558	34.791	34.663	nm	nd	na	4.224	30.439	nm	8.01	12.5	789.	nm	nm	nm	Sampled on Sept-22-05
G1-8	G1-8	7.0-13.1	3-Apr-06	14.000	34.791	34.663	25	nd	na	3.785	30.878	136.	7.69	11.8	11.03	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	30-Aug-06	13.740	34.791	34.663	45	nd	na	4.46	30.203	1.32	7.66	13.51	765.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	13-Apr-07	13.750	34.791	34.663	140	nd	na	3.28	31.383	3.28	nm	10.2	1692.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	28-Aug-07	13.750	34.791	34.663	80	nd	na	3.782	30.881	0.16	7.28	13.7	693.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	3-Apr-08	13.750	34.791	34.663	70	nd	na	3.465	31.198	0.2	7.92	11.9	1626.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	26-Aug-08	13.051	34.791	34.663	50	nd	na	3.898	30.765	0.4	7.23	12.6	1386.	nm	nm	nm	---
G1-8	G1-8	7.0-13.1	21-Apr-09	13.743	34.791	34.663	25	nd	na	3.316	31.347	0.6	6.23	12.5	1066.	nm	nm	nm	Clear
G1-8	G1-8	7.0-13.1	24-Aug-09	13.763	34.791	34.663	75	nd	na	3.75	30.913	0.3	7.98	12.1	659.	nm	nm	nm	Clear
G1-8	G1-8	7.0-13.1	6-Apr-10	13.760	34.791	34.663	nd	nd	na	3.26	31.403	0.12	8.06	10.2	800.	nm	nm	nm	Low turbidity, minimal sediment
G1-8	G1-8	7.0-13.1	2-Sep-10	12.750	34.791	34.663	nd	nd	na	3.775	30.888	0.05	7.11	13.3	661.	nm	nm	nm	Clear
G1-8	G1-8	7.0-13.1	28-Apr-11	13.740	34.791	34.663	50	nd	na	3.171	31.492	0.06	7.48	10.6	2230.	nm	nm	nm	Clear; purged dry 28 L
G1-8	G1-8	7.0-13.1	14-Sep-11	13.750	34.791	34.663	40	nd	na	3.615	31.048	2.63	7.4	13.2	874.	nm	nm	nm	Clear; Sampled Sept.15
G1-8	G1-8	7.0-13.1	14-May-12	13.750	34.791	34.663	nd	nd	na	3.205	31.458	0.34	7.65	14.5	1517.	nm	nm	nm	Clear
G1-8	G1-8	7.0-13.1	4-Sep-12	13.740	34.791	34.663	nd	nd	na	3.54	31.123	0.48	8.1	12.92	713.	nm	nm	nm	Clear; Limited EPH - ran dry
G1-8	G1-8	7.0-13.1	3-Apr-13	nm	34.791	34.663	nd	nm	na	nm	na	nm	nm	nm	nm	nm	nm	nm	Covered by Brymark Seacan container
G1-8	G1-8	7.0-13.1	26-Aug-13	13.705	34.791	34.663	15	nd	na	3.87	30.793	0.78	7.37	13.88	589.	nm	nm	nm	Clear; Dup-14; Slight sheen in ambers
G1-8	G1-8	7.0-13.1	4-Jun-14	13.745	34.791	34.663	50	nd	na	3.205	31.458	5.92	7.04	14.25	801.	0.655	0.5	70.5	Purged dry at 30 L; quick recharge
G1-8	G1-8	7.0-13.1	23-Sep-14	13.730	34.791	34.663	10	nd	na	3.57	31.093	2.46	7.78	13.64	692.	0.574	0.44	-89.7	Clear; DUP-27
G1-8	G1-8	7.0-13.1	13-May-15	13.750	34.791	34.663	25	nd	na	3.37	31.293	1.43	7.3	12.8	545.	0.462	0.35	96.2	Clear
G1-8	G1-8	7.0-13.1	23-Sep-15	13.790	34.791	34.663	45	nd	na	3.41	31.253	0.29	8.34	14.2	1155.	0.999	0.58	-182.9	Clear; DUP-17
G1-8	G1-8	7.0-13.1	21-Mar-16	13.700	34.791	34.663	15	nd	na	2.45	32.213	4.28	6.71	11.59	438.	0.383	0.29	-26.5	Clear
G1-8	G1-8	7.0-13.1	26-Sep-16	13.720	34.791	34.663	25	nd	na	2.63	32.033	0.56	8.15	14.74	470.	0.38	0.28	-83.5	---
G1-8	G1-8	7.0-13.1	19-Apr-17	13.750	34.791	34.663	100	nd	na	2.1	32.563	2.12	7.58	11.49	376.	0.33	0.25	-199.8	Clear; DUP-12
G1-8	G1-8	7.0-13.1	31-Aug-17	13.770	34.791	34.663	15	nd	na	2.33	32.333	1.28	7.47	14.47	403.	0.328	0.25	-24.7	Clear; DUP-5
G1-8	G1-8	7.0-13.1	12-Apr-18	13.735	34.791	34.663	25	nd	na	2.05	32.613	0.1	8.18	11.44	2298.	2.015	1.63	-62.3	Clear; sampled
G1-8	G1-8	7.0-13.1	4-Sep-18	13.718	34.791	34.663	5	nd	na	2.247	32.416	0.22	8.7	13.78	594.	0.492	0.37	189.8	sampled
NDM97-2	NDM97-2	2.3-5.1	03-May-04	4.980	34.825	34.701	75	nd	na	1.55	33.151	nm	6.74	10.7	325.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	21-Oct-04	5.000	34.825	34.701	75	nd	na	1.462	33.239	nm	7.32	14.7	284.	nm	0.	nm	---
NDM97-2	NDM97-2	2.3-5.1	27-Apr-05	4.980	34.825	34.701	110	nd	na	1.25	33.451	nm	7.42	11.4	458.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	21-Sep-05	4.977	34.825	34.701	nm	nd	na	1.85	32.851	nm	7.4	15.4	421.	nm	nm	nm	Sampled Sept-21-05
NDM97-2	NDM97-2	2.3-5.1	03-Apr-06	4.950	34.825	34.701	80	nd	na	1.28	33.421	2.45	7.11	10.1	495.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	30-Aug-06	4.960	34.825	34.701	10	nd	na	2.12	32.581	0.65	7.31	15.27	658.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	13-Apr-07	4.650	34.825	34.701	40	nd	na	1.27	33.431	1.72	nm	9.4	591.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	27-Aug-07	4.880	34.825	34.701	30	nd	na	1.69	33.011	0.24	7.12	16.	4.23	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	3-Apr-08	4.800	34.825	34.701	50	nd	na	1.395	33.306	2.52	6.69	9.2	428.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	26-Aug-08	4.169	34.825	34.701	25	nd	na	1.668	33.033	0.2	6.79	15.2	352.	nm	nm	nm	---
NDM97-2	NDM97-2	2.3-5.1	21-Apr-09	4.961	34.825	34.701	85	nd	na	1.556	33.145	2.9	7.26	10.2	88.	nm	nm	nm	Clear
NDM97-2	NDM97-2	2.3-5.1	24-Aug-09	4.972	34.825	34.701	nd	nd	na	1.943	32.758	0.5	6.88	16.	563.	nm	nm	nm	Clear
NDM97-2	NDM97-2	2.3-5.1	6-Apr-10	4.980	34.825	34.701	25	nd	na	0.955	33.746	0.1	6.87	9.9	450.	nm	nm	nm	Clear, low sediment
NDM97-2	NDM97-2	2.3-5.1	2-Sep-10	4.960	34.825	34.701	nd	nd	na	1.04	33.661	0.07	6.67	15.7	588.	nm	nm	nm	Clear; Well comprised by unknown? of road water due to rainstorm during purging. Re-purged well.
NDM97-2	NDM97-2	2.3-5.1	27-Apr-11	4.953	34.825	34.701	30	nd	na	1.044	33.657	0.08	7.05	8.9	585.	nm	nm	nm	Clear; Well comprised by unknown amount of road water due to rainstorm during purging. Re-purged well.
NDM97-2	NDM97-2	2.3-5.1	14-Sep-11	4.980	34.825	34.701	5	nd	na	1.655	33.046	1.94	6.76	14.08	587.	nm	nm	nm	Clear
NDM97-2	NDM97-2	2.3-5.1	14-May-12	4.980	34.825	34.701	5	nd	na	1.185	33.516	2.11	7.01	10.54	468.	nm	nm	nm	Clear
NDM97-2	NDM97-2	2.3-5.1	9-Aug-12	4.970	34.825	34.701	35	nd	na	1.335	33.366	1.72	6.84	14.42	423.	nm	nm	nm	Clear
NDM97-2	NDM97-2	2.3-5.1	3-Apr-13	nm	34.825	34.701	nd	nm	na	nm	na	nm	nm	nm	nm	nm	nm	nm	Covered by Brymark Seaman container
NDM97-2	NDM97-2	2.3-5.1	26-Aug-13	4.980	34.825	34.701	nd	nd	na	0.86	33.841	1.55	6.39	15.13	513.	nm	nm	nm	Clear with some light sheen in ambers
NDM97-2	NDM97-2	2.3-5.1	4-Jun-14	4.980	34.825	34.701	nm	nd	na	0.	34.701	9.74	6.75	10.94	404.	0.359	0.27	64.7	J-plug off; redevelop with waterra 5 times volume
NDM97-2	NDM97-2	2.3-5.1	23-Sep-14	5.030	34.825	34.701	15	nd	na	1.1	33.601	2.1	6.75	14.47	472.	0.384	0.29	60.5	Clear
NDM97-2	NDM97-2	2.3-5.1	13-May-15	5.040	34.825	34.701	40	nd	na	1.17	33.531	1.32	6.68	11.56	472.	0.412	0.31	5.7	Clear
NDM97-2	NDM97-2	2.3-5.1	23-Sep-15	5.040	34.825	34.701	55	nd	na	0.58	34.121	2.37	6.67	15.11	532.	0.426	0.32	110.6	Clear
NDM97-2	NDM97-2	2.3-5.1	21-Mar-16	5.050	34.825	34.701	25	nd	na	0.42	34.281	1.01	6.65	10.14	335.	0.303	0.23	214.7	Clear; DUP-10
NDM97-2	NDM97-2	2.3-5.1	26-Sep-16	5.050	34.825	34.701	5	nd	na	0.53	34.171	2.74	7.08	15.45	401.	0.319	0.24	66.4	---
NDM97-2	NDM97-2	2.3-5.1	19-Apr-17	5.050	34.825	34.701	100	nd	na	0.7	34.001	1.3	6.76	9.34	361.	0.335	0.25	-161.8	---
NDM97-2	NDM97-2	2.3-5.1	31-Aug-17	5.060	34.825	34.701	nd	nd	na	0.96	33.741	0.86	6.77	15.5	449.	0.356	0.27	80.7	Clear
NDM97-2	NDM97-2	2.3-5.1	12-Apr-18	5.062	34.825	34.701	25	nd	na	0.427	34.274	0.73	6.89	9.33	679.	0.629	0.48	103.3	Silty; clear
NDM97-2	NDM97-2	2.3-5.1	4-Sep-18	5.060	34.825	34.701	70	nd	na	0.837	33.864	4.12	7.07	16.14	660.	0.516	0.4	-332.6	Clear; sampled
NDM97-3	NDM97-3	6.1-9.1	03-May-04	6.000	35.003	34.873	nm	nd	na	2.85	32.023	nm	7.41	11.9	463.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	20-Oct-04	8.035	35.003	34.873	175	nd	na	2.601	32.272	nm	7.74	13.1	425.	nm	0.	nm	---
NDM97-3	NDM97-3	6.1-9.1	27-Apr-05	8.035	35.003	34.873	4400	nd	na	2.73	32.143	nm	7.66	13.6	510.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	21-Sep-05	8.035	35.003	34.873	nm	nd	na	3.1	31.773	nm	7.76	13.	393.	nm	nm	nm	Sampled Sept-21-05
NDM97-3	NDM97-3	6.1-9.1	29-Mar-06	8.200	35.003	34.873	1980	nd	na	2.71	32.163	1.55	7.2	11.3	156.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	30-Aug-06	8.020	35.003	34.873	180	nd	na	3.74	31.133	nm	7.78	14.7	76.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	5-Apr-07	9.050	35.003	34.873	11000	nd	na	2.8	32.073	0.38	7.83	11.2	596.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	27-Aug-07	9.035	35.003	34.873	25	nd	na	3.22	31.653	0.26	7.86	12.9	390.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	3-Apr-08	9.050	35.003	34.873	20	nd	na	2.84	32.033	0.37	7.49	10.8	507.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	26-Aug-08	9.058	35.003	34.873	150	nd	na	2.82	32.053	0.2	7.1	12.8	356.	nm	nm	nm	---
NDM97-3	NDM97-3	6.1-9.1	20-Apr-09	9.031	35.003	34.873	nd	nd	na	2.798	32.075	0.9	8.13	11.5	413.	nm	nm	nm	Clear
NDM97-3	NDM97-3	6.1-9.1	24-Aug-09	9.030	35.003	34.873	100	nd	na	3.19	31.683	0.2	7.25	12.6	400.	nm	nm	nm	Clear
NDM97-3	NDM97-3	6.1-9.1	6-Apr-10	9.050	35.003	34.873	220	nd	na	2.7	32.173	0.14	7.65	10.9	490.	nm	nm	nm	clear
NDM97-3	NDM97-3	6.1-9.1	2-Sep-10	9.020	35.003	34.873	nd	nd	na	3.2	31.673	0.05	7.25	13.2	386.	nm	nm	nm	Clear
NDM97-3	NDM97-3	6.1-9.1	28-Apr-11	9.030	35.003	34.873	480	nd	na	2.758	32.115	0.12	7.12	9.8	941.	nm	nm	nm	Clear, DUP-21
NDM97-3	NDM97-3	6.1-9.1	14-Sep-11	9.035	35.003	34.873	nd	nd	na	3.445	31.428	0.89	7.44	12.5	330.	nm	nm	nm	Clear; DUP-26
NDM97-3	NDM97-3	6.1-9.1	14-May-12	9.055	35.003	34.873	45	nd	na	2.975	31.898	1.09	7.36	11.2	353.	nm	nm	nm	Clear
NDM97-3	NDM97-3	6.1-9.1	9-Aug-12	9.020	35.003	34.873	95	nd	na	3.12	31.753	0.25	7.58	12.45	290.	nm	nm	nm	Clear
NDM97-3	NDM97-3	6.1-9.1	4-Apr-13	9.020	35.003	34.873	nd	nd	na	2.92	31.953	0.26	7.24	10.32	519.	nm	nm	nm	Clear; Dup-15
NDM97-3	NDM97-3	6.1-9.1	28-Aug-13	9.030	35.003	34.873	470	nd	na	3.705	31.168	0.68	7.41	12.34	329.	nm	nm	nm	Clear; DUP-17
NDM97-3	NDM97-3	6.1-9.1	3-Jun-14	9.020	35.003	34.873	85	nd	na	2.86	32.013	0.52	6.91	10.91	496.	0.441	0.33	-122.8	Sheen on probe; DUP-32

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
NDM97-3	NDM97-3	6.1-9.1	4-Sep-14	9.040	35.003	34.873	100	nd	na	3.05	31.823	0.21	6.98	12.54	331.	0.288	0.21	-132.9	Clear; DUP-24
NDM97-3	NDM97-3	6.1-9.1	21-Apr-15	9.020	35.003	34.873	880	nd	na	2.91	31.963	0.23	7.34	12.2	361.	0.311	0.23	-99.9	Clear
NDM97-3	NDM97-3	6.1-9.1	15-Sep-15	9.070	35.003	34.873	20	nd	na	2.97	31.903	1.52	7.45	13.19	318.	0.266	0.2	11.6	Clear; DUP-15
NDM97-3	NDM97-3	6.1-9.1	17-Mar-16	9.030	35.003	34.873	230	nd	na	2.62	32.253	0.18	7.39	11.17	415.	0.365	0.27	-103.3	Clear
NDM97-3	NDM97-3	6.1-9.1	22-Sep-16	9.030	35.003	34.873	50	nd	na	2.97	31.903	0.07	7.19	12.73	279.	0.217	0.18	-85.3	---
NDM97-3	NDM97-3	6.1-9.1	13-Apr-17	9.020	35.003	34.873	650	nd	na	2.34	32.533	0.49	7.18	11.08	335.	0.297	0.22	-134.0	Clear; DUP-10
NDM97-3	NDM97-3	6.1-9.1	30-Aug-17	9.080	35.003	34.873	nd	nd	na	3.87	31.003	1.02	7.39	13.82	299.	0.247	0.18	29.2	Clear
NDM97-3	NDM97-3	6.1-9.1	11-Apr-18	9.018	35.003	34.873	400	nd	na	2.8	32.073	0.11	7.52	10.92	556.	0.494	0.37	-91.9	Clear; sampled; DUP-4
NDM97-3	NDM97-3	6.1-9.1	6-Sep-18	9.072	35.003	34.873	400	nd	na	3.773	31.1	0.07	6.72	13.64	398.	0.331	0.25	-34.2	Clear; Sampled
U07-10D	U07-10D	8.5-10.65	4-Jul-07	10.470	33.164	33.069	880	nd	na	4.25	28.819	nm	7.49	13.2	300.	nm	nm	nm	BC: no NAPL
U07-10D	U07-10D	8.5-10.65	28-Aug-07	10.470	33.164	33.069	50	nd	na	4.36	28.709	0.26	7.57	12.4	718.	nm	nm	nm	---
U07-10D	U07-10D	8.5-10.65	9-Apr-08	10.463	33.164	33.069	20	nd	na	2.784	30.285	0.54	6.96	9.2	289.	nm	nm	nm	---
U07-10D	U07-10D	8.5-10.65	28-Aug-08	10.503	33.164	33.069	25	nd	na	3.645	29.424	0.5	6.93	12.4	403.	nm	nm	nm	---
U07-10D	U07-10D	8.5-10.65	27-Apr-09	10.512	33.164	33.069	50	nd	na	3.885	29.184	0.7	7.14	10.5	780.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	3-Sep-09	10.420	33.164	33.069	30	nd	na	4.532	28.537	0.2	7.47	12.	1105.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	19-Apr-10	10.500	33.164	33.069	nd	nd	na	3.672	29.397	5.13	7.16	9.8	391.	nm	nm	nm	Clear low sediment
U07-10D	U07-10D	8.5-10.65	7-Sep-10	10.450	33.164	33.069	nd	nd	na	4.585	28.484	0.09	7.15	12.9	704.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	4-May-11	10.340	33.164	33.069	10	nd	na	4.16	28.909	6.42	6.67	12.2	333.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	27-Sep-11	10.275	33.164	33.069	nd	nd	na	3.84	29.229	5.21	6.78	16.79	215.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	16-May-12	10.100	33.164	33.069	nd	nd	na	4.43	28.639	3.28	7.7	12.62	399.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	18-Sep-12	10.000	33.164	33.069	nd	nd	na	4.61	28.459	5.59	7.78	15.92	761.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	9-Apr-13	10.060	33.164	33.069	10	nd	na	2.76	30.309	5.43	6.77	9.21	432.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	3-Sep-13	9.930	33.164	33.069	300	nd	na	4.65	28.419	0.79	6.85	13.14	830.	nm	nm	nm	Clear
U07-10D	U07-10D	8.5-10.65	28-May-14	9.930	33.164	33.069	30	nd	na	3.7	29.369	5.81	6.72	12.97	408.	0.344	0.26	-77.2	Clear
U07-10D	U07-10D	8.5-10.65	27-Aug-14	9.950	33.164	33.069	nd	nd	na	4.26	28.809	0.59	7.03	18.84	317.	0.233	0.17	105.2	Clear
U07-10D	U07-10D	8.5-10.65	10-Apr-15	9.940	33.164	33.069	nd	nd	na	3.45	29.619	0.47	6.9	11.62	344.	0.3	0.22	60.7	Clear
U07-10D	U07-10D	8.5-10.65	2-Sep-15	9.950	33.164	33.069	5	nd	na	4.18	28.889	0.13	7.37	13.69	442.	0.366	0.27	-11.8	Clear
U07-10D	U07-10D	8.5-10.65	15-Mar-16	9.970	33.164	33.069	10	nd	na	2.56	30.509	3.86	7.29	11.57	176.	0.154	0.11	229	Clear
U07-10D	U07-10D	8.5-10.65	21-Sep-16	9.950	33.164	33.069	20	nd	na	4.37	28.699	0.7	7.17	11.71	366.	0.296	0.22	477.6	Clear
U07-10D	U07-10D	8.5-10.65	26-Apr-17	10.000	33.164	33.069	40	nd	na	2.62	30.449	2.05	6.99	12.07	261.	0.225	0.17	-81.4	Clear; DUP-14
U07-10D	U07-10D	8.5-10.65	21-Sep-17	10.000	33.164	33.069	60	nd	na	4.2	28.869	0.12	7.21	13.96	582.	0.479	0.36	-72.8	Clear
U07-10D	U07-10D	8.5-10.65	16-Apr-18	10.000	33.164	33.069	20	nd	na	2.73	30.339	4.99	7.12	10.75	321.	0.287	0.21	100.7	Clear
U07-10D	U07-10D	8.5-10.65	10-Sep-18	10.009	33.164	33.069	55	nd	na	4.074	28.995	0.95	7.08	15.24	560.	0.447	0.34	-271.7	Clear; DUP-9
U07-10I	U07-10I	6.65-8.15	4-Jul-07	8.120	33.164	32.993	5	nd	na	4.4	28.593	nm	7.44	13.	262.	nm	nm	nm	BC: no NAPL
U07-10I	U07-10I	6.65-8.15	28-Aug-07	8.120	33.164	32.993	11000	nd	na	4.405	28.588	0.37	7.4	13.1	735.	nm	nm	nm	---
U07-10I	U07-10I	6.65-8.15	9-Apr-08	7.977	33.164	32.993	20	nd	na	3.216	29.777	0.18	6.69	9.5	390.	nm	nm	nm	---
U07-10I	U07-10I	6.65-8.15	28-Aug-08	8.034	33.164	32.993	60	nd	na	3.86	29.133	0.3	7.27	12.4	496.	nm	nm	nm	---
U07-10I	U07-10I	6.65-8.15	27-Apr-09	8.020	33.164	32.993	100	nd	na	3.982	29.011	0.5	7.24	9.7	461.	nm	nm	nm	Clear
U07-10I	U07-10I	6.65-8.15	3-Sep-09	8.060	33.164	32.993	2200	nd	na	4.463	28.53	0.2	6.94	12.	989.	nm	nm	nm	Clear
U07-10I	U07-10I	6.65-8.15	19-Apr-10	8.050	33.164	32.993	nd	nd	na	3.82	29.173	0.1	7.4	10.	447.	nm	nm	nm	Clear low sediment
U07-10I	U07-10I	6.65-8.15	7-Sep-10	7.590	33.164	32.993	430	nd	na	4.65	28.343	nm	7.17	13.3	714.	nm	nm	nm	Clear
U07-10I	U07-10I	6.65-8.15	4-May-11	7.481	33.164	32.993	15	nd	na	4.23	28.763	14.28	6.49	11.7	269.	nm	nm	nm	Clear, DUP-27
U07-10I	U07-10I	6.65-8.15	28-Sep-11	7.550	33.164	32.993	55	nd	na	4.135	28.858	1.1	7.17	13.75	484.	nm	nm	nm	Clear; some confusion over well ID - resolved
U07-10I	U07-10I	6.65-8.15	16-May-12	7.540	33.164	32.993	5	nd	na	4.42	28.573	3.2	7.83	11.6	358.	nm	nm	nm	Clear; 1.5 L purge
U07-10I	U07-10I	6.65-8.15	9-Apr-13	7.460	33.164	32.993	nd	nd	na	2.75	30.243	5.25	6.66	9.32	434.	nm	nm	nm	Turbid
U07-10I	U07-10I	6.65-8.15	3-Sep-13	7.380	33.164	32.993	nd	nd	na	4.52	28.473	0.88	6.7	13.38	814.	nm	nm	nm	Cloudy
U07-10I	U07-10I	6.65-8.15	28-May-14	7.340	33.164	32.993	50	nd	na	3.695	29.298	3.61	6.66	13.65	454.	0.377	0.28	-19.8	Clear
U07-10I	U07-10I	6.65-8.15	27-Aug-14	7.410	33.164	32.993	370	nd	na	4.24	28.753	0.39	5.94	20.12	335.	0.24	0.18	116.4	Slightly turbid
U07-10I	U07-10I	6.65-8.15	10-Apr-15	7.410	33.164	32.993	5	nd	na	3.31	29.683	7.54	6.65	12.04	326.	0.282	0.21	58.9	---
U07-10I	U07-10I	6.65-8.15	2-Sep-15	7.350	33.164	32.993	25	nd	na	4.8	28.193	4.09	7.04	15.69	394.	0.312	0.23	12.5	Slightly turbid
U07-10I	U07-10I	6.65-8.15	15-Mar-16	7.450	33.164	32.993	5	nd	na	2.38	30.613	4.73	7.11	11.53	160.	0.14	0.1	54.2	Clear
U07-10I	U07-10I	6.65-8.15	21-Sep-16	7.430	33.164	32.993	25	nd	na	4.31	28.683	0.48	6.97	14.95	384.	0.309	0.23	-34.2	Silty
U07-10I	U07-10I	6.65-8.15	25-Apr-17	7.470	33.164	32.993	nd	nd	na	2.84	30.153	2.94	6.86	10.97	191.	0.17	0.13	38.6	---
U07-10I	U07-10I	6.65-8.15	21-Sep-17	7.490	33.164	32.993	nd	nd	na	4.21	28.783	0.63	6.55	14.63	595.	0.483	0.37	-22.2	Clear
U07-10I	U07-10I	6.65-8.15	16-Apr-18	7.480	33.164	32.993	15	nd	na	2.82	30.173	7.98	7.08	10.53	446.	0.401	0.3	131.7	Clear
U07-10I	U07-10I	6.65-8.15	10-Sep-18	7.476	33.164	32.993	35	nd	na	4.774	28.219	2.6	7.24	15.21	760.	0.607	0.46	-337.3	Slightly turbid; sampled
U07-10S	U07-10S	4.7-6.2	4-Jul-07	6.150	33.112	32.950	2200	nd	na	4.74	28.21	nm	6.29	14.6	358.	nm	nm	nm	BC: Clear
U07-10S	U07-10S	4.7-6.2	28-Aug-07	6.150	33.112	32.950	4950	nd	na	4.82	28.13	1.55	6.24	13.6	940.	nm	nm	nm	---
U07-10S	U07-10S	4.7-6.2	9-Apr-08	6.109	33.112	32.950	8250	nd	na	4.393	28.557	0.72	6.78	8.9	649.	nm	nm	nm	pH collected at lab
U07-10S	U07-10S	4.7-6.2	27-Apr-09	6.035	33.112	32.950	2200	nd	na	4.8	28.15	nm	6.32	11.3	1937.	nm	nm	nm	BC: Sheen strong odour (9:30-10:10)
U07-10S	U07-10S	4.7-6.2	19-Apr-10	6.150	33.112	32.950	60	nd	na	4.15	28.8	nm	nm	nm	nm	nm	nm	nm	Product in well, not sampled.
U07-10S	U07-10S	4.7-6.2	4-May-11	6.130	33.112	32.950	60	nd	na	4.429	28.521	0.37	5.94	11.7	1006.	nm	nm	nm	Clear, sheen observation
U07-10S	U07-10S	4.7-6.2	21-Sep-11	6.130	33.112	32.950	10230	nd	na	4.92	28.03	0.85	5.98	13.69	665.	nm	nm	nm	Clear with sheen on top; DUP-34 (DUP of VOC/SVOC only)
U07-10S	U07-10S	4.7-6.2	27-Aug-14	6.140	33.112	32.950	>11000	nd	na	4.5	28.45	1.62	6.08	17.32	1060.	0.807	0.62	-66.5	Clear
U07-10S	U07-10S	4.7-6.2	10-Apr-15	6.130	33.112	32.950	1080	nd	na	4.15	28.8	1.73	5.89	11.69	747.	0.651	0.5	-22.9	Sheen in water
U07-10S	U07-10S	4.7-6.2	2-Sep-15	6.130	33.112	32.950	>11000	nd	na	4.4	28.55	0.36	6.27	15.31	964.	0.769	0.59	-47.7	Clear; Dark coloured, heavy, fibrous and liquid substance on tubing; DUP-13
U07-10S	U07-10S	4.7-6.2	15-Mar-16	6.130	33.112	32.950	40	nd	na	3.81	29.14	1.55	6.52	11.18	689.	0.608	0.48	-33.1	Dark coloured, heavy, fibrous and liquid substance at the bottom; Hydrocarbon odour
U07-10S	U07-10S	4.7-6.2	21-Sep-16	6.130	33.112	32.950	470	nd	na	4.59	28.36	0.06	6.19	15.83	945.	0.746	0.57	-39.7	Clear with creosote-like odour
U07-10S	U07-10S	4.7-6.2	25-Apr-17	6.150	33.112	32.950	nd	nd	na	3.92	29.03	0.99	6.28	10.73	807.	0.721	0.55	-51.1	Clear
U07-10S	U07-10S	4.7-6.2	21-Sep-17	6.150	33.112	32.950	10	nd	na	4.48	28.47	0.98	6.09	15.79	729.	0.575	0.44	-23.1	Clear
U07-10S	U07-10S	4.7-6.2	12-Apr-18	6.157	33.112	32.950	360	nd	na	4.004	28.946	0.75	6.57	10.89	519.	0.961	0.35	80	Strong hydrocarbon odour; sheen; Brown globules present very small; Clear
U07-10S	U07-10S	4.7-6.2	10-Sep-18	6.443	33.112	32.950	810	nd	na	4.555	28.395	0.89	5.87	15.6	1005.	0.791	0.61	25.8	Solid tune at the bottom, sheen in the water
U6	ns	0.9-3.9	19-Sep-05	3.900	32.889	32.789	400	nd	na	1.6	31.189	nm	nm	nm	nm	nm	nm	nm	Developed well, cloudy, very silty
U6	A3-U6	0.9-3.9	21-Sep-05	3.900	32.889	32.789	nm	nd	na	1.84	30.949	nm	6.73	16.5	1157.	nm	nm	nm	---
U6	U6	0.9-3.9	29-Mar-06	3.920	32.889	32.789	660	nd	na	0.72	32.069	10.07	7.	9.	60.9	nm	nm	nm	---
U6	U6	0.9-3.9	30-Aug-06	3.910	32.889	32.789	10	nd	na	2.79	29.999	0.65	5.96	15.15	676.	nm	nm	nm	---
U6	U6	0.9-3.9	4-Apr-07	3.900	32.889	32.789	600	nd	na	0.7	32.089	2.36	7.01	8.7	109.1	nm	nm	nm	---
U6	U6	0.9-3.9	28-Aug-07	3.910	32.889	32.789	75	nd	na	1.33	31.459	0.16	6.87	17.3	190.	nm	nm	nm	---
U6	U6	0.9-3.9	9-Apr-08	3.893	32.889	32.789	20	nd	na	0.626	32.163	7.86	7.31	11.2	64.9	nm	nm	nm	pH collected at lab
U6	U6	0.9-3.9	28-Aug-08	3.911	32.889	32.789	75	nd	na	0.509	32.28	6.2	6.58	17.3	65.6	nm	nm	nm	Clear
U6	U6	0.9-3.9	27-Apr-09	3.910	32.889	32.789	25	nd	na	0.715	32.074	9.	6.96	12.3	216.	nm	nm	nm	Clear
U6	U6	0.9-3.9	3-Sep-09	3.916	32.889	32.789	10	nd	na	1.165	31.624	0.2	6.97	18.1	125.8	nm	nm	nm	Clear
U6	U6	0.9-3.9	19-Apr-10	3.908	32.889	32.789	nd	nd	na	0.732	32.057	0.24	6.76	11.3	97.5	nm	nm	nm	Clear low sediment
U6	U6	0.9-3.9	7-Sep-10	3.900	32.889	32.789	nd	nd	na	0.655	32.134	0.17	5.8	18.7	61.	nm	nm	nm	Clear
U6	U6	0.9-3.9	4-May-11	3.905	32.889	32.789	nd	nd	na	0.653	32.136	5.09	6.65	13.3	90.	nm	nm	nm	Clear
U6	U6	0.9-3.9	22-Sep-11	3.900	32.889	32.789	45	nd	na	0.645	32.144	5.05	6.03	16.85	78.	nm	nm	nm	Clear
U6	U6	0.9-3.9	15-May-12	3.910	32.889	32.789	5	nd	na	0.79	31.999	0.66	6.38	11.39	73.	nm	nm	nm	Clear
U6	U6	0.9-3.9	18-Sep-12	3.920	32.889	32.789	35	nd	na	2.65	30.139	0.83	6.51	13.15	209.	nm	nm	nm	Clear
U6	U6	0.9-3.9	10-Apr-13	3.910	32.889	32.789	5	nd	na	0.56	32.229	5.26	6.11	9.47	331.	nm	nm	nm	Clear
U6	U6	0.9-3.9	27-Aug-13	3.920	32.889	32.789	30	nd	na	1.52	31.269	0.6	5.78	16.83	464.	nm	nm	nm	Clear
U6	U6	0.9-3.9	28-May-14	3.910	32.889	32.789	90	nd	na	0.68	32.109	3.67	5.55	13.03	126.	0.106	0.08	-5.3	Clear
U6	U6	0.9-3.9	27-Aug-14	3.930	32.889	32.789	130	nd	na	0.9	31.889	0.55	6.	17.56	172.	0.131	0.1	56.7	Clear
U6	U6	0.9-3.9	9-Apr-15	3.910	32.889	32.789	110	nd	na	0.68	32.109	5.04	4.69	10.96	98.	0.87	0.06	143	Clear
U6	U6	0.9-3.9	2-Sep-15	3.910	32.889	32.789	45	nd	na	0.26	32.529	5.16	6.4	17.89	118.	0.089	0.06	14.3	Clear
U6	U6	0.9-3.9	15-Mar-16	3.910	32.889	32.789	nd	nd	na	0.65	32.139	4.08	6.89	10.84	65.	0.058	0.04	87.5	Clear
U6	U6	0.9-3.9	19-Sep-16	3.810	32.889	32.789	35	nd	na	0.62	32.169	2.61	6.36	17.92	105.	0.079	0.06	47.5	Clear
U6	U6	0.9-3.9	20-Apr-17	3.920	32.889	32.789	25	nd	na	0.67	32.119	6.18	5.43	11.13	67.	0.06	0.04	103.3	Clear
U6	U6	0.9-3.9	14-Sep-17	3.960	32.889	32.789	80	nd	na	3.36	29.429	0.11	6.38	17.16	318.	0.243	0.18	-78.1	Clear
U6	U6	0.9-3.9	17-Apr-18	3.920	32.889	32.789	25	nd	na	0.66	32.129	0.75	4.	8.98	98.	0.093	0.07	198.4	Clear
U6	U6	0.9-3.9	25-Sep-18	3.911	32.889	32.789	35	nd	na	0.69	32.099	2.25	6.22	16.72	85.	0.066	0.05	233	Clear
U7	ns	1.2-5.8	19-Sep-05	5.800	32.783	32.618	550	nd	na	3.29	29.328	nm	nm	nm	nm	nm	nm	nm	Developed well; cloudy; very silty
U7	U7	1.2-5.8	21-Sep-05	5.800	32.783	32.618	nm	nd	na	3.11	29.508	nm	6.83	13.3	490.	nm	nm	nm	---
U7	U7	1.2-5.8	29-Mar-06	5.750	32.783	32.618	70	nd	na	1.765	30.853	1.85	6.84	8.9	148.3	nm	nm	nm	---
U7	U7	1.2-5.8	30-Aug-06	5.780	32.783	32.618	85	nd	na	3.23	29.388	0.53	6.14	13.65	498.	nm	nm	nm	---
U7	U7	1.2-5.8	4-Apr-07	5.780	32.783	32.618	90	nd	na	1.97	30.648	0.71	6.75	8.4	269.	nm	nm	nm	---
U7	U7	1.2-5.8	28-Aug-07	5.770	32.783	32.618	50	nd	na	2.72	29.898	0.21	6.76	12.91	396.	nm	nm	nm	---
U7	U7	1.2-5.8	9-Apr-08	5.742	32.783	32.618	70	nd	na	1.409	31.209	4.69	7.63	9.4	90.5	nm	nm	nm	pH collected at lab
U7	U7	1.2-5.8	28-Aug-08	5.705	32.783	32.618	100	nd	na	1.123	31.495	1.1	6.53	17.	224.	nm	nm	nm	Clear
U7	U7	1.2-5.8	27-Apr-09	5.705	32.783	32.618	75	nd	na	1.915	30.703	1.4	7.1	10.6	711.	nm	nm	nm	Clear minimal sediment
U7	U7	1.2-5.8	3-Sep-09	5.680	32.783	32.618	20	nd	na	3.	29.618	0.2	6.31	12.3	492.	nm	nm	nm	Clear

TABLE A-1
AREAS 1 AND 3 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)1	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
U7	U7	1.2-5.8	19-Apr-10	5.618	32.783	32.618	nd	nd	na	1.895	30.723	1.98	6.57	10.4	298.	nm	nm	nm	J -plug not in place clear; low sediment
U7	U7	1.2-5.8	7-Sep-10	5.600	32.783	32.618	190	nd	na	2.89	29.728	0.16	6.11	13.7	488.	nm	nm	nm	Clear
U7	U7	1.2-5.8	4-May-11	5.530	32.783	32.618	40	nd	na	0.692	31.926	1.87	6.16	12.6	209.	nm	nm	nm	Clear
U7	U7	1.2-5.8	22-Sep-11	5.575	32.783	32.618	60	nd	na	2.455	30.163	3.74	6.04	15.44	353.	nm	nm	nm	Clear; DUP-35
U7	U7	1.2-5.8	15-May-12	5.470	32.783	32.618	75	nd	na	2.05	30.568	0.31	6.63	9.72	257.	nm	nm	nm	Clear
U7	U7	1.2-5.8	18-Sep-12	5.480	32.783	32.618	85	nd	na	2.8	29.818	0.32	6.79	12.4	400.	nm	nm	nm	Clear
U7	U7	1.2-5.8	10-Apr-13	5.530	32.783	32.618	65	nd	na	0.83	31.788	1.96	5.35	8.54	255.	nm	nm	nm	Clear
U7	U7	1.2-5.8	27-Aug-13	5.510	32.783	32.618	130	nd	na	2.82	29.798	0.81	6.01	13.54	974.	nm	nm	nm	Clear
U7	U7	1.2-5.8	29-May-14	5.550	32.783	32.618	1210	nd	na	2.05	30.568	0.41	6.1	10.43	473.	0.426	0.32	-80.8	Clear
U7	U7	1.2-5.8	27-Aug-14	5.570	32.783	32.618	500	nd	na	2.7	29.918	0.27	6.09	15.19	592.	0.474	0.36	-9.5	Clear
U7	U7	1.2-5.8	9-Apr-15	5.540	32.783	32.618	55	nd	na	1.86	30.758	2.2	6.06	10.44	375.	0.337	0.25	-19.9	Clear
U7	U7	1.2-5.8	2-Sep-15	5.500	32.783	32.618	220	nd	na	2.58	30.038	0.54	6.26	15.23	482.	0.386	0.29	-62.6	Clear
U7	U7	1.2-5.8	16-Mar-16	5.560	32.783	32.618	nm	nd	na	0.65	31.968	1.6	7.13	9.8	177.	0.162	0.12	65.6	Road box filled of water, J-plug off and well water compromised; Used riser pipe to purge 6 times well volume prior to collecting sample; Clear
U7	U7	1.2-5.8	21-Sep-16	5.540	32.783	32.618	20	nd	na	2.28	30.338	2.95	6.52	15.53	407.	0.323	0.24	131.3	Clear
U7	U7	1.2-5.8	1-May-17	5.580	32.783	32.618	35	nd	na	1.53	31.088	2.18	4.35	9.96	186.	0.169	0.12	210.8	Clear
U7	U7	1.2-5.8	14-Sep-17	6.520	32.783	32.618	200	nd	na	4.38	28.238	0.18	6.25	14.63	382.	0.31	0.23	0.6	Clear
U7	U7	1.2-5.8	17-Apr-18	6.540	32.783	32.618	55	nd	na	1.06	31.558	3.38	5.36	10.5	56.	0.052	0.04	132.6	Clear
U7	U7	1.2-5.8	25-Sep-18	6.540	32.783	32.618	130	nd	na	3.114	29.504	0.78	6.28	14.86	322.	0.26	0.19	-367.6	Clear; sampled; DUP-8

Abbreviations:

BC	Bailer confirmed
°C	Degree Celsius
DUP	Duplicate
g/L	Grams per litre
L	Litres
m	Metres
mASL	Metres above sea level
mbgs	Metres below ground surface
mg/L	Milligrams per litre
mL	Millilitres
mV	Millivolts
µS/cm	Microsiemens per centimeter
na	Not applicable/ available
nd	Not detected
nm	Not monitored
ns	Not sampled
ORP	Oxidation reduction potential
ppmv	Parts per million by volume
ppt	Parts per thousand
TDS	Total dissolved solids
TOC	Top of casing
---	No observations noted

Notes:

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

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A1-3D	A1-3D	10.9-15.5		4-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		21-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		4-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		31-Aug-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		5-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		28-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		10-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		26-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3D	A1-3D	10.9-15.5		22-Sep-10	---	---	<250.	310.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-3D	A1-3D	10.9-15.5		3-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-3D	A1-3D	10.9-15.5		20-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5		16-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5		04-Sep-12	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5		05-Sep-12	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
A1-3D	A1-3D	10.9-15.5		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5		27-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1464702-3	3-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1522243-1	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	0.64	<0.5	0.81	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1611514-5	13-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1677757-10	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1572244-1	5-Apr-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-3D	A1-3D	10.9-15.5	L1833762-2	22-Sep-16	---	---	<250.	<250.	---	---	<0.5	<0.5	<0.5	<0.75	---	0.55	AW-
A1-3D	A1-3D	10.9-15.5	L1910707-3	6-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-3D	A1-3D	10.9-15.5	L1984002-2	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-3D	A1-3D	10.9-15.5	L2078315-3	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-3D	A1-3D	10.9-15.5	L2159148-6	05-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-3D	DUP-5	10.9-15.5	L2159148-7	05-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				5-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	
A1-3S	A1-3S	1.1-4.1		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3S	A1-3S	1.1-4.1		20-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-3S	A1-3S	1.1-4.1		20-Sep-10	---	---	<250.	350.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-3S	A1-3S	1.1-4.1		3-May-11	---	---	<250.	510.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-3S	A1-3S	1.1-4.1	L1910707-2	6-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-3S	A1-3S	1.1-4.1	L2078315-2	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12S	A1-12S	1.0-2.5		06-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		19-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		19-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		15-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		04-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		02-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		28-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		08-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		02-Sep-08	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12S	A1-12S	1.0-2.5		07-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12S	A1-12S	1.0-2.5		26-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12S	A1-12S	1.0-2.5		20-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5		18-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5		23-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5		16-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5		3-Sep-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1459753-1	23-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1511474-1	2-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1594270-1	1-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1666479-1	1-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1745658-1	16-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1838680-1	4-Oct-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12S	A1-12S	1.0-2.5	L1919077-1	28-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12S	A1-12S	1.0-2.5	L1991780-2	14-Sep-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12S	A1-12S	1.0-2.5	L2078315-8	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12S	A1-12S	1.0-2.5	L2154662-1	28-Aug-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12S	DUP-3	1.0-2.5	L2154662-3	28-Aug-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				28-Aug-18	---	---	---	---	---	---	---	---	---	---	---	---	
A1-12C	A1-12C	5.2-6.7		06-May-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		19-Oct-04	300.	<1000.	300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		19-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		15-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		04-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		05-Sep-06	---	---	310.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		02-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		28-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		08-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		26-Aug-08	---	---	280.	280.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12C	A1-12C	5.2-6.7		07-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12C	A1-12C	5.2-6.7		26-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12C	A1-12C	5.2-6.7		20-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7		18-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7		23-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7		16-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7		3-Sep-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1459753-3	23-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1511474-3	2-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1594270-3	1-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1666479-3	1-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1745658-2	16-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1838680-3	4-Oct-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12C	A1-12C	5.2-6.7	L1919061-2	27-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12C	A1-12C	5.2-6.7	L1991780-3	14-Sep-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12C	A1-12C	5.2-6.7	L2077579-2	09-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12C	A1-12C	5.2-6.7	L2156437-1	30-Aug-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12D	A1-12D	1.7-3.2		06-May-04	---	---	520.	<1000.	180.	180.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		19-Oct-04	---	---	630.	<1000.	160.	160.	<0.5	<1.	<0.5	<1.	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH $_W$ (C10-<C19)[2, 3]	EPH $_W$ (C19-C32)[3]	VH w (C6-C10)	VPH$_W$	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A1-12D	A1-12D	1.7-3.2		19-Apr-05	---	---	560.	<1000.	120.	120.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		15-Sep-05	400.	<1000.	400.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		04-Apr-06	400.	<250.	400.	<250.	120.	120.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		05-Sep-06	480.	<250.	480.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		02-Apr-07	**540.**	<250.	540.	<250.	120.	120.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
A1-12D	A1-12D	1.7-3.2		28-Aug-07	350.	<250.	350.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		08-Apr-08	**550.**	<250.	550.	<250.	110.	110.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
A1-12D	A1-12D	1.7-3.2		28-Aug-08	**510.**	<250.	510.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
A1-12D	A1-12D	1.7-3.2		21-Apr-09	450.	<250.	450.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		25-Aug-09	---	---	470.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		07-Apr-10	---	---	470.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A1-12D	A1-12D	1.7-3.2		07-Sep-10	---	---	480.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12D	A1-12D	1.7-3.2		26-Apr-11	---	---	380.	<250.	110.	110.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A1-12D	A1-12D	1.7-3.2		20-Sep-11	---	---	340.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2		18-May-12	---	---	380.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2		23-Aug-12	---	---	330.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2		16-Apr-13	---	---	280.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2		3-Sep-13	---	---	310.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1459753-2	23-May-14	---	---	330.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1511474-2	2-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1594270-2	1-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1666479-2	1-Sep-15	---	---	380.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1745658-2	16-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1838680-2	4-Oct-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A1-12D	A1-12D	1.7-3.2	L1919061-1	27-Apr-17	---	---	260.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12D	A1-12D	1.7-3.2	L1991780-1	14-Sep-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12D	A1-12D	1.7-3.2	L2077579-1	09-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A1-12D	DUP-2	1.7-3.2	L2077579-3	09-Apr-18	---	---	<250.	<250.	120.	120.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				09-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	
A1-12D	A1-12D	1.7-3.2	L2154662-2	28-Aug-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-05	MW02-05	2.4-6.1		05-May-04	<300.	<1000.	<300.	<1000.	<100.	<100.	0.73	<1.	0.72	<1.	---	---	AW-
A3MW02-05	MW02-05	2.4-6.1		25-Oct-04	330.	<1000.	420.	<1000.	<100.	<100.	4.85	<1.	1.99	2.5	---	---	AW-
A3MW02-05	MW02-05	2.4-6.1		26-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	MW02-05	2.4-6.1		20-Sep-05	**620.**	<1000.	790.	<1000.	<100.	<100.	14.2	<1.	2.52	3.4	---	---	**AW+**
A3MW02-05	A3 MW02-05	2.4-6.1		30-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		28-Jun-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		24-Jul-06	450.	<250.	550.	<250.	<100.	<100.	<0.8	<1.	0.86	<1.2	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		31-Aug-06	**850.**	550.	1060.	550.	<100.	<100.	9.3	<1.	1.7	2.6	---	---	**AW+**
A3MW02-05	MW02-05	2.4-6.1		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	MW02-05	2.4-6.1		28-Aug-07	**510.**	560.	540.	560.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
A3MW02-05	A3 MW02-05	2.4-6.1		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		04-Sep-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		03-Sep-09	320.	<250.	350.	<250.	<100.	<100.	0.51	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		19-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		20-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		27-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		16-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1		20-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1		10-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1357011-1	3-Sep-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1461846-4	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1509397-5	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1597132-1	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1667283-4	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1745655-2	16-Mar-16	310.	470.	320.	470.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1830885-1	19-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1917194-1	25-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1995423-1	21-Sep-17	**2430.**	2640.	2430.	2650.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	**AW+**
A3MW02-05	A3MW02-05	2.4-6.1	L2087551-2	01-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	<0.5	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L2164059-1	13-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-06	MW02-06	3.4-6.4		05-May-04	**530.**	<1000.	540.	<1000.	220.	220.	0.77	<1.	<0.5	1.8	---	---	**AW+**
A3MW02-06	MW02-06	3.4-6.4		25-Oct-04	460.	<1000.	460.	<1000.	230.	230.	<0.5	<1.	<0.5	2.	---	---	AW-
A3MW02-06	MW02-06	3.4-6.4		26-Apr-05	500.	<1000.	500.	<1000.	300.	300.	<0.5	<1.	<0.5	3.8	---	---	AW-
A3MW02-06	A1-MW02-06	3.4-6.4		19-Sep-05	**540.**	<1000.	550.	<1000.	140.	140.	<0.5	<1.	<0.5	1.1	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		30-Mar-06	470.	<250.	460.	<250.	230.	220.	<0.5	<1.	<0.5	<2.	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		28-Jun-06	500.	<250.	510.	<250.	230.	230.	<0.5	<1.	<0.5	1.8	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		31-Aug-06	440.	<250.	450.	<250.	210.	210.	<0.5	<1.	<0.5	1.2	---	---	AW-
A3MW02-06	MW02-06	3.4-6.4		04-Apr-07	490.	<250.	490.	<250.	140.	140.	<0.5	<2.	<0.5	2.5	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		28-Aug-07	**530.**	<250.	540.	<250.	120.	120.	<0.5	<1.	<0.5	2.3	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		09-Apr-08	**540.**	<250.	540.	<250.	190.	190.	<0.5	<1.	<0.5	<2.5	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		28-Aug-08	480.	<250.	480.	<250.	<120.	<120.	<0.5	<1.	<0.5	<3.5	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		27-Apr-09	470.	<250.	480.	<250.	270.	270.	<0.5	<1.	<0.5	1.6	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		03-Sep-09	**540.**	<250.	550.	<250.	210.	210.	<0.5	<1.	<0.5	1.	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		19-Apr-10	**530.**	<250.	530.	<250.	250.	250.	<0.5	<1.	<0.5	2.5	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		07-Sep-10	**570.**	380.	570.	380.	250.	260.	<0.5	<1.	<0.5	1.52	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		04-May-11	**590.**	<250.	610.	<250.	400.	390.	<7.4	<1.	6.94	3.51	---	---	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4		27-Sep-11	360.	<250.	370.	<250.	200.	200.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3 MW02-06	3.4-6.4		15-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4		20-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4		10-Apr-13	<250.	<250.	<250.	<250.	130.	130.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4		3-Sep-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1461846-5	28-May-14	290.	<250.	300.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1509397-6	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1597132-2	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1667283-5	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1745655-3	16-Mar-16	<250.	<250.	<250.	<250.	130.	130.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1830885-2	19-Sep-16	320.	<250.	320.	<250.	<100.	<150.	<0.5	<0.5	<0.5	<0.75	---	2.06	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1917194-2	25-Apr-17	360.	<250.	360.	<250.	290.	290.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1994653-1	20-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L2081247-1	17-Apr-18	260.	<250.	270.	<250.	150.	150.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L2170535-3	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-07	MW02-07	3.1-6.2		05-May-04	---	---	<300.	<1000.	<100.	<100.	0.69	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	MW02-07	3.1-6.2		25-Oct-04	---	---	390.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	MW02-07	3.1-6.2		26-Apr-05	---	---	450.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3-MW02-07	3.1-6.2		19-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		30-Mar-06	280.	<250.	350.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH $_W$ (C10-<C19)[2, 3]	EPH $_W$ (C19-C32)[3]	VH w (C6-C10)	VPH$_W$	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A3MW02-07	A3 MW02-07	3.1-6.2		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		03-Sep-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		19-Apr-10	340.	<250.	440.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		07-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW02-07	A3 MW02-07	3.1-6.2		15-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2		20-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2		10-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2		28-Aug-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1461850-2	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1509407-4	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1597133-2	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1667287-2	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1745659-2	16-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1830885-3	19-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1915574-1	20-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1994653-2	20-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L2081247-2	17-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-07	DUP-6	3.1-6.2	L2081247-6	17-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				17-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	
A3MW02-07	A3MW02-07	3.1-6.2	L2170535-4	25-Sep-18	<250.	<250.	300.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L2181036-1	15-Oct-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-08	MW02-08	1.5-5.5		04-May-04	---	---	<300.	<1000.	<100.	<100.	2.76	<1.	1.33	<1.	---	---	AW-
A3MW02-08	MW02-08	1.5-5.5		25-Oct-04	---	---	<300.	<1000.	<100.	<100.	0.64	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	MW02-08	1.5-5.5		26-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	MW02-08	1.5-5.5		19-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	0.51	<1.	<0.5	2.9	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		30-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	1.9	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	5.5	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		03-Sep-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	0.87	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		19-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		07-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.55	<1.	0.77	1.38	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW02-08	A3 MW02-08	1.5-5.5		15-May-12	<250.	770.	<250.	780.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5		20-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5		10-Apr-13	<250.	270.	<250.	270.	<100.	200.	<0.5	8.58	31.4	133.	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5		27-Aug-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1461850-3	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1509407-5	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1597133-3	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1667287-3	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1745659-3	16-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1830885-4	19-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1915574-2	20-Apr-17	<250.	280.	<250.	280.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1994653-3	20-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L2081247-3	17-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L2170535-5	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-01	MW03-01	1.5-6.1		04-May-04	---	---	<300.	<1000.	<100.	<100.	4.52	<1.	0.99	<1.	---	---	AW-
A3MW03-01	MW03-01	1.5-6.1		25-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	MW03-01	1.5-6.1		26-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3-MW03-01	1.5-6.1		20-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		30-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		03-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH $_W$ (C10-<C19)[2, 3]	EPH $_W$ (C19-C32)[3]	VH w (C6-C10)	VPH$_W$	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A3MW03-01	A3 MW03-01	1.5-6.1		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		03-Sep-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		19-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		07-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		04-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		28-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1		16-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1		18-Sep-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1		9-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1354933-1	28-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1462453-1	29-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1509407-1	27-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1597689-1	10-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1668411-1	3-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1745070-1	15-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1832800-1	21-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1917918-1	26-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1995423-2	21-Sep-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1	L2080618-1	16-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	4.75	2.95	15.7	<0.5	---	AW-
A3MW03-01	A3 MW03-01	1.5-6.1	L2161509-1	10-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-02	MW03-02	2.3-8.3		04-May-04	**920.**	<1000.	930.	<1000.	1020.	900.	119.	<2.	1.9	<2.	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		25-Oct-04	**870.**	<1000.	870.	<1000.	770.	620.	137.	1.4	2.18	3.6	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		26-Apr-05	**1120.**	<1000.	1140.	<1000.	1120.	1070.	41.8	1.7	9.29	2.4	---	---	**AW+**
A3MW03-02	A3-MW03-02	2.3-8.3		20-Sep-05	**580.**	<1000.	580.	<1000.	270.	220.	54.	<1.	0.76	<1.	---	---	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3		30-Mar-06	**830.**	280.	840.	280.	660.	620.	36.8	1.4	3.83	2.8	---	---	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3		31-Aug-06	460.	<250.	460.	<250.	200.	180.	18.5	<2.	0.64	<1.5	---	---	AW-
A3MW03-02	MW03-02	2.3-8.3		04-Apr-07	**700.**	<250.	700.	<250.	580.	530.	45.5	<2.	2.64	2.3	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		28-Aug-07	**920.**	<250.	920.	<250.	500.	420.	82.6	<2.5	<1.3	<2.5	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		03-Apr-08	**1000.**	<250.	1000.	<250.	770.	720.	43.4	<2.	<1.	<7.	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		28-Aug-08	**750.**	<250.	750.	<250.	770.	750.	23.9	1.1	<0.5	<1.8	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		27-Apr-09	**1080.**	<250.	1090.	<250.	1240.	1210.	25.4	<2.	1.	7.6	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		03-Sep-09	**580.**	<250.	580.	<250.	360.	350.	8.73	<1.	<0.5	<1.	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		19-Apr-10	**960.**	<250.	960.	<250.	740.	730.	4.73	<1.	<0.5	4.8	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		07-Sep-10	**720.**	<250.	720.	<250.	530.	550.	12.9	<1.	<0.5	0.72	---	---	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3		04-May-11	**610.**	<250.	610.	<250.	390.	390.	<0.83	<1.	<0.5	0.73	---	---	**AW+**
A3MW03-02	MW03-02	2.3-8.3		28-Sep-11	**830.**	<250.	830.	<250.	720.	720.	<5.	0.98	<0.5	1.81		---	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3		16-May-12	**580.**	<250.	580.	<250.	250.	250.	2.2	<0.6	<0.5	<0.75	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3		18-Sep-12	**550.**	<250.	550.	<250.	510.	500.	1.36	0.54	<0.5	<0.75	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3		9-Apr-13	290.	<250.	300.	<250.	<100.	<100.	0.56	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-02	A3MW03-02	2.3-8.3		28-Aug-13	**610.**	<250.	610.	<250.	550.	550.	<2.	0.87	<0.5	1.3	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1462453-2	29-May-14	**560.**	<250.	560.	<250.	330.	330.	<0.5	0.56	<0.5	1.34	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1509407-2	27-Aug-14	**520.**	<250.	520.	<250.	340.	340.	<0.5	<0.53	<0.5	0.91	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1597689-2	10-Apr-15	**690.**	<250.	690.	<250.	590.	590.	<0.9	<2.	<0.5	3.85	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1668411-2	3-Sep-15	470.	<250.	470.	<250.	810.	810.	<0.9	0.99	<0.5	2.11	---	---	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1745070-2	15-Mar-16	**930.**	<250.	940.	<250.	990.	990.	<0.5	1.5	0.68	4.04	---	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1832800-2	21-Sep-16	**720.**	<250.	720.	<250.	<1200.	<1200.	<2.	1.57	<0.5	2.68	---	226.	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1917918-2	26-Apr-17	**950.**	<250.	960.	<250.	930.	930.	<0.7	1.25	<0.5	4.04	<0.5	---	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3	L1995423-3	21-Sep-17	**820.**	<250.	830.	<250.	700.	700.	<2.	1.41	<0.5	3.25	<0.5	---	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3	L2079613-2	12-Apr-18	**1150.**	<250.	1150.	<250.	1130.	1120.	<0.5	1.65	<0.5	5.91	<0.5	---	**AW+**
A3MW03-02	DUP-5	2.3-8.3	L2079613-6	12-Apr-18	**1100.**	<250.	1110.	<250.	1080.	1070.	<0.6	1.57	<0.5	5.91	<0.5	---	**AW+**
QA/QC RPD				12-Apr-18	---	---	---	---	4.5%	4.6%	---	---	---	0.0%	---	---	
A3MW03-02	A3 MW03-02	2.3-8.3	L2161509-2	10-Sep-18	<250.	<250.	<250.	<250.	560.	560.	<2.5	1.09	<0.5	<0.75	<0.5	---	AW-
A3MW03-03	MW03-03	0.8-6.9		04-May-04	---	---	1290.	<1000.	710.	610.	8.2	<5.	82.5	10.1	---	---	AW-
A3MW03-03	MW03-03	0.8-6.9		25-Oct-04	---	---	820.	<1000.	590.	540.	2.61	<1.	42.1	9.4	---	---	AW-
A3MW03-03	MW03-03	0.8-6.9		26-Apr-05	---	---	490.	<1000.	330.	290.	0.94	<1.	41.2	1.7	---	---	AW-
A3MW03-03	A3-MW03-03	0.8-6.9		20-Sep-05	---	---	1290.	<1000.	920.	740.	4.34	<1.	164.	9.6	---	---	AW-
A3MW03-03	A3 MW03-03	0.8-6.9		12-Apr-06	**610.**	340.	620.	340.	960.	940.	3.31	<1.	11.3	<1.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		31-Aug-06	**2860.**	2050.	2870.	2060.	730.	660.	<3.	<5.	74.	<7.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		04-Apr-07	340.	260.	340.	260.	720.	710.	2.83	<1.	2.86	<1.	---	---	AW-
A3MW03-03	A3 MW03-03	0.8-6.9		28-Aug-07	**810.**	300.	810.	300.	<250.	<250.	2.8	<5.	42.3	<5.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<1.	<1.	<0.5	<1.	---	---	AW-
A3MW03-03	A3 MW03-03	0.8-6.9		28-Aug-08	**720.**	260.	730.	260.	310.	300.	1.13	<1.	10.4	<1.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		27-Apr-09	270.	<250.	270.	<250.	300.	300.	1.6	<1.	<0.5	<1.	---	---	AW-
A3MW03-03	A3 MW03-03	0.8-6.9		03-Sep-09	**990.**	400.	990.	400.	460.	450.	3.95	<1.	5.28	<1.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		19-Apr-10	**660.**	610.	660.	610.	420.	420.	<2.	<1.	<0.5	<1.	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		20-Sep-10	**900.**	520.	890.	520.	1160.	1.3	14.4	5.5	4.7	<3.5	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		04-May-11	**550.**	<250.	550.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		21-Sep-11	**940.**	<250.	950.	<250.	<100.	<100.	<0.5	0.76	<0.5	<0.75	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		16-May-12	**920.**	410.	920.	410.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-03	A3 MW03-03	0.8-6.9		20-Sep-12	**960.**	450.	960.	450.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		9-Apr-13	440.	280.	440.	280.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9		3-Sep-13	**920.**	430.	920.	430.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9	L1461846-3	28-May-14	380.	<250.	380.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1509397-4	27-Aug-14	**930.**	740.	930.	740.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9	L1639257-1	8-Jul-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1667283-3	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1745655-1	16-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1843040-1	12-Oct-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1917194-3	25-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1994653-4	20-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-03	A3 MW03-03	0.8-6.9	L2087551-1	01-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	47.3	AW-
A3MW03-03	A3 MW03-03	0.8-6.9	L2170535-6	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-04	MW03-04	1.5-6.7		04-May-04	---	---	830.	<1000.	540.	390.	39.6	1.3	58.8	47.	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7		25-Oct-04	---	---	1060.	<1000.	860.	500.	144.	5.3	69.3	141.	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7		26-Apr-05	---	---	600.	<1000.	1080.	930.	66.2	2.3	28.7	55.3	---	---	AW-
A3MW03-04	A3-MW03-04	1.5-6.7		19-Sep-05	**560.**	<1000.	570.	<1000.	490.	430.	8.26	<1.	40.6	6.8	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		12-Apr-06	**860.**	<250.	870.	<250.	1640.	1360.	181.	4.5	22.3	78.4	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		31-Aug-06	**530.**	<250.	540.	<250.	800.	750.	25.9	<2.	12.9	6.6	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		04-Apr-07	360.	<250.	370.	<250.	1350.	1240.	70.3	2.2	15.	21.1	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A3MW03-04	MW03-04	1.5-6.7		28-Aug-07	**960.**	<250.	960.	<250.	1390.	1150.	132.	10.5	13.7	85.6	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		09-Apr-08	260.	<250.	260.	<250.	490.	480.	4.3	<1.	1.45	1.6	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7		28-Aug-08	**620.**	<250.	620.	<250.	1070.	960.	63.8	9.4	8.35	26.2	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		27-Apr-09	400.	<250.	410.	<250.	2300.	**1900.**	203.	8.3	77.4	117.	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		03-Sep-09	**570.**	<250.	570.	<250.	1340.	1290.	27.4	<3.	2.4	12.3	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		19-Apr-10	350.	<250.	360.	<250.	1680.	**1550.**	55.2	2.2	51.6	17.4	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		07-Sep-10	**970.**	<250.	970.	<250.	1420.	**1690.**	131.	8.1	76.7	53.1	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7		15-May-12	**550.**	<250.	550.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-04	A3MW03-04	1.5-6.7	L1212478-1	20-Sep-12	**1070.**	290.	1070.	290.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-04	A3MW03-04	1.5-6.7		9-Apr-13	**640.**	<250.	640.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A3MW03-04	MW03-04	1.5-6.7		28-Aug-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1461850-1	28-May-14	290.	<250.	290.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1509407-3	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1597133-1	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1667287-1	2-Sep-15	<250.	<250.	250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1745659-1	16-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L1830885-5	19-Sep-16	<250.	<250.	<250.	<250.	---	---	<0.5	<0.5	<0.5	<0.75	---	4.78	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1917194-4	25-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1994653-5	20-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L2081872-1	18-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A3MW03-04	MW03-04	1.5-6.7	L2170535-7	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1A	G1-1A	3.1-6.1		03-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		20-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	A1-G1-1A	3.1-6.1		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		05-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		30-Aug-07	---	---	<250.	320.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		26-Aug-08	---	---	370.	1740.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		05-May-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		24-Aug-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		06-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1A	G1-1A	3.1-6.1		02-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1A	G1-1A	3.1-6.1		28-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1A	G1-1A	3.1-6.1		19-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1		14-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1204527-5	04-Sep-12	<250.	260.	<250.	260.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1		3-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1		26-Aug-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1463846-3	2-Jun-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1522243-2	23-Sep-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1606759-1	4-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1668270-1	3-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1752106-3	4-Apr-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1833762-4	22-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1A	G1-1A	3.1-6.1	L1910706-1	7-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1A	G1-1A	3.1-6.1	L1984002-4	30-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1A	G1-1A	3.1-6.1	L2078315-5	10-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1A	G1-1A	3.1-6.1	L2159148-4	05-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1B	G1-1B	10.8-12.3		03-May-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		20-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		21-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	A1-G1-1B	10.8-12.3		22-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		06-Nov-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		05-Apr-07	---	---	<250.	380.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		30-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		26-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1B	G1-1B	10.8-12.3		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1B	G1-1B	10.8-12.3		03-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1B	G1-1B	10.8-12.3		19-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3		14-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3		04-Sep-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1463846-4	2-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1522243-3	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1606759-2	4-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1668270-2	3-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1752106-2	4-Apr-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1833762-5	22-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1B	G1-1B	10.8-12.3	L1910706-2	7-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1B	G1-1B	10.8-12.3	L1984002-5	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1B	G1-1B	10.8-12.3	L2078315-6	10-Apr-18	---	---	<250.	480.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1B	G1-1B	10.8-12.3	L2159148-3	05-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1C	G1-1C	19.8-21.3		03-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		21-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	A1-G1-1C	19.8-21.3		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		31-Aug-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		05-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G1-1C	G1-1C	19.8-21.3		30-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		26-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-1C	G1-1C	19.8-21.3		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1C	G1-1C	19.8-21.3		04-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-1C	G1-1C	19.8-21.3		20-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3		04-Sep-12	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3		05-Sep-12	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
G1-1C	G1-1C	19.8-21.3		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3		26-Aug-13	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1463846-5	2-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1522243-4	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1606759-3	4-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1668270-3	3-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1572244-2	5-Apr-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1833762-6	22-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-1C	G1-1C	19.8-21.3	L1910706-3	7-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1C	G1-1C	19.8-21.3	L1984002-6	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1C	G1-1C	19.8-21.3	L2078315-7	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-1C	G1-1C	19.8-21.3	L2159148-2	05-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2A	G1-2A	1.8-3.4		04-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		21-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		27-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	A1-G1-2A	1.8-3.4		21-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		04-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		13-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		30-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		09-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		26-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2A	G1-2A	1.8-3.4		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-2A	G1-2A	1.8-3.4		27-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-2A	G1-2A	1.8-3.4		14-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4		10-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1466577-1	5-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1512240-1	3-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1601619-1	21-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1666481-1	1-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1745068-1	15-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2A	G1-2A	1.8-3.4	L1847163-1	21-Oct-16	<250.	<250.	<250.	<250.	---	---	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G1-2A	G1-2A	1.8-3.4	L1914925-1	19-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2A	G1-2A	1.8-3.4	L1984726-4	31-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2A	G1-2A	1.8-3.4	L2080617-1	16-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	12.4	7.62	41.9	<0.5	---	AW-
G1-2A	G1-2A	1.8-3.4	L2160015-1	06-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2B	G1-2B	4.6-6.1		04-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		21-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		27-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	A1-G1-2B	4.6-6.1		21-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		04-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		13-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		30-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		09-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		26-Aug-08	---	---	<250.	330.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-2B	G1-2B	4.6-6.1		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-2B	G1-2B	4.6-6.1		27-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-2B	G1-2B	4.6-6.1		14-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1		10-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1466577-3	5-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1512240-2	3-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1601619-2	21-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1666481-2	1-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1745068-2	15-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1835097-2	26-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-2B	G1-2B	4.6-6.1	L1914925-2	19-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2B	G1-2B	4.6-6.1	L1984726-5	31-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2B	G1-2B	4.6-6.1	L2080617-2	16-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	6.62	4.08	22.5	<0.5	---	AW-
G1-2B	G1-2B	4.6-6.1	L2160015-2	06-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-2B	DUP-6	4.6-6.1	L2160015-3	06-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				6-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	
G1-5	G1-5	9.1-12.2		04-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		21-Apr-05	---	---	440.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	A1-G1-5	9.1-12.2		23-Sep-05	---	---	310.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		30-Mar-06	---	---	340.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		31-Aug-06	---	---	360.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		28-Aug-07	350.	330.	350.	330.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		03-Apr-08	310.	310.	310.	310.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		26-Aug-08	450.	330.	450.	330.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		21-Apr-09	390.	<250.	390.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		25-Aug-09	---	---	440.	250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		07-Apr-10	370.	<250.	370.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-5	G1-5	9.1-12.2		02-Sep-10	400.	<250.	400.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-5	G1-5	9.1-12.2		04-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-5	G1-5	9.1-12.2		19-Sep-11	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2		20-Sep-11	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G1-5	G1-5	9.1-12.2		14-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2		04-Sep-12	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2		05-Sep-12	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
G1-5	G1-5	9.1-12.2		03-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1463846-1	2-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1511464-1	2-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1611514-1	13-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1677757-2	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1752106-5	4-Apr-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1833762-1	22-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-5	G1-5	9.1-12.2	L1910707-1	6-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-5	G1-5	9.1-12.2	L1984002-1	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-5	G1-5	9.1-12.2	L2078315-1	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-5	G1-5	9.1-12.2	L2160015-4	06-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-6	G1-6	7.9-11		03-May-04	---	---	<300.	<1000.	<100.	<100.	1.09	<1.	8.65	13.7	---	4.91	AW-
G1-6	G1-6	7.9-11		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		21-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	A1-G1-6	7.9-11		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-6	G1-6	7.9-11		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		31-Aug-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		04-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		28-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		26-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-6	G1-6	7.9-11		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-6	G1-6	7.9-11		28-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-6	G1-6	7.9-11		04-Sep-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1463846-2	2-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1521897-1	22-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1611514-2	13-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1677757-1	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1752106-1	4-Apr-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1833762-3	22-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-6	G1-6	7.9-11	L1910707-4	6-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-6	G1-6	7.9-11	L1984002-3	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-6	G1-6	7.9-11	L2078315-4	10-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-6	G1-6	7.9-11	L2159148-5	05-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7A	G1-7A	0.9-2.4		04-May-04	---	---	<300.	<1000.	<100.	<100.	2.22	<1.	8.18	11.7	---	2.25	AW-
G1-7A	G1-7A	0.9-2.4		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		21-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	A1-G1-7A	0.9-2.4		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		05-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		27-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		09-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		25-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		20-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7A	G1-7A	0.9-2.4		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-7A	G1-7A	0.9-2.4		28-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-7A	G1-7A	0.9-2.4		19-Sep-11	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4		20-Sep-11	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
G1-7A	G1-7A	0.9-2.4		14-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1464702-1	2-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1521897-2	22-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1606759-4	4-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1677757-5	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1746135-1	17-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1833759-1	22-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L1910706-4	7-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7A	G1-7A	0.9-2.4	L1984002-7	30-Aug-17	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7A	G1-7A	0.9-2.4	L1984726-6	31-Aug-17	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L2079008-1	11-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7A	G1-7A	0.9-2.4	L2158081-1	04-Sep-18	---	---	<250.	1100.	---	---	---	---	---	---	---	---	AW-
G1-7A	G1-7A	0.9-2.4	L2159148-1	05-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G1-7B	G1-7B	6.1-9.1		04-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		21-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		30-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		05-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		27-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		09-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		25-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		20-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-7B	G1-7B	6.1-9.1		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-7B	G1-7B	6.1-9.1		03-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-7B	G1-7B	6.1-9.1		19-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1		14-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1		3-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1		27-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1464702-2	3-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1522243-5	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1606759-5	4-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1677757-6	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1746135-2	17-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1833759-2	22-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-7B	G1-7B	6.1-9.1	L1910706-5	7-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7B	G1-7B	6.1-9.1	L1984726-1	31-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7B	G1-7B	6.1-9.1	L2079008-2	11-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-7B	G1-7B	6.1-9.1	L2158081-2	04-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
G1-8	G1-8	7.0-13.1		04-May-04	---	---	540.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		21-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		27-Apr-05	---	---	400.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	A1-G1-8	7.0-13.1		22-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		04-Apr-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		13-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		03-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		04-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		04-Sep-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		21-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		25-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G1-8	G1-8	7.0-13.1		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-8	G1-8	7.0-13.1		28-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G1-8	G1-8	7.0-13.1		15-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1		04-Sep-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1		27-Aug-13	---	---	<250.	310.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1465609-2	4-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1522243-7	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1611514-3	13-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1677757-4	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1747001-2	21-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1835097-1	26-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G1-8	G1-8	7.0-13.1	L1914925-5	19-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-8	G1-8	7.0-13.1	L1984726-3	31-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-8	G1-8	7.0-13.1	L2079613-5	12-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
G1-8	G1-8	7.0-13.1	L2158081-4	04-Sep-18	---	---	<250.	290.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
MW03-07	MW03-07	0.6-2.2		03-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		21-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		27-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		04-Apr-06	---	---	<250.	400.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		07-Apr-07	<250.	390.	<250.	390.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		27-Aug-07	<250.	720.	<250.	720.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		03-Apr-08	<250.	300.	<250.	300.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		26-Aug-08	<250.	260.	<250.	260.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		20-Apr-09	<250.	390.	<250.	390.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		24-Aug-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		06-Apr-10	<250.	<400.	<250.	<400.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-07	MW03-07	0.6-2.2		02-Sep-10	<250.	480.	<250.	480.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
MW03-07	MW03-07	0.6-2.2		28-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
MW03-07	MW03-07	0.6-2.2		15-Sep-11	<250.	280.	<250.	280.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2		14-May-12	<250.	290.	<250.	290.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2		09-Aug-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2		10-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1354937-1	28-Aug-13	<250.	<300.	<250.	<300.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1465606-1	4-Jun-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1512995-2	4-Sep-14	<250.	330.	<250.	330.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1602111-1	22-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1673248-7	15-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1746133-1	17-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1833819-1	23-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-07	MW03-07	0.6-2.2	L1913256-2	13-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-07	MW03-07	0.6-2.2	L1983999-1	30-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-07	MW03-07	0.6-2.2	L2079613-3	12-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-07	MW03-07	0.6-2.2	L2158080-1	4-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
NDM97-2	NDM97-2	2.3-5.1		03-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		21-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		27-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	A1-NDM97-2	2.3-5.1		21-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		04-Apr-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		31-Aug-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		13-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		28-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		26-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		21-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		07-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		27-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
NDM97-2	NDM97-2	2.3-5.1		14-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1		26-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1465609-1	4-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1522243-6	23-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1611514-4	13-May-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1677757-3	23-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1747001-1	21-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1835097-3	26-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L1914925-6	19-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	AW-
NDM97-2	NDM97-2	2.3-5.1	L1984726-2	31-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	AW-
NDM97-2	NDM97-2	2.3-5.1	L2079613-4	12-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
NDM97-2	NDM97-2	2.3-5.1	L2158081-3	04-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
NDM97-3	NDM97-3	6.1-9.1		03-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		20-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		27-Apr-05	---	---	<300.	<1000.	<100.	<100.	1.14	<1.	<0.5	<1.	---	---	AW-
NDM97-3	A1-NDM97-3	6.1-9.1		21-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		30-Mar-06	---	---	<250.	260.	<100.	<100.	0.94	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		05-Sep-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		12-Apr-07	---	---	<250.	<250.	<100.	<100.	0.56	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		27-Aug-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		03-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		25-Aug-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		20-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		24-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		06-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		02-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		28-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		14-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		14-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		09-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		4-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1		28-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1464701-1	3-Jun-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1512995-1	4-Sep-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1601618-1	21-Apr-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1673248-8	15-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1746133-2	17-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1833819-2	23-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L1913256-3	13-Apr-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
NDM97-3	NDM97-03	6.1-9.1	L1983999-2	30-Aug-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
NDM97-3	NDM97-3	6.1-9.1	L2079008-5	11-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
NDM97-3	DUP-4	6.1-9.1	L2079008-4	11-Apr-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				10-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	
NDM97-3	NDM97-3	6.1-9.1	L2160017-1	06-Sep-18	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U6	A3-U6	0.9-3.9		21-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
U6	U6	0.9-3.9		30-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		03-Sep-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		19-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U6	U6	0.9-3.9		07-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U6	U6	0.9-3.9		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U6	U6	0.9-3.9		22-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9		15-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9		18-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9		10-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9		27-Aug-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1461850-4	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1509407-6	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1597133-4	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1667287-4	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1745659-3	16-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U6	U6	0.9-3.9	L1830885-6	19-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
U6	U6	0.9-3.9	L1915574-3	20-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U6	U6	0.9-3.9	L1991781-1	14-Sep-17	<250.	<250.	<250.	<250.	<300.	<300.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U6	U6	0.9-3.9	L2081247-4	17-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U6	U6	0.9-3.9	L2170535-1	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw[3]	HEPHw[3]	EPH w (C10-<C19)[2, 3]	EPH w (C19-C32)[3]	VH w (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards[4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
U7	A3-U7	1.2-5.8		21-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<0.5	<1.	<1.	---	---	AW-
U7	U7	1.2-5.8		30-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		31-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		04-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		28-Aug-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	1.9	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		28-Aug-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		03-Sep-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		19-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U7	U7	1.2-5.8		07-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U7	U7	1.2-5.8		04-May-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U7	U7	1.2-5.8		22-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	0.78	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8		15-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8		18-Sep-12	---	---	4120.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8		15-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8		27-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	2.71	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1462453-3	29-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1509407-7	27-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1597133-5	9-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1667287-5	2-Sep-15	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1745659-5	16-Mar-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U7	U7	1.2-5.8	L1832800-3	21-Sep-16	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
U7	U7	1.2-5.8	L1919609-1	1-May-17	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U7	U7	1.2-5.8	L1991781-2	14-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U7	U7	1.2-5.8	L2081247-5	17-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U7	U7	1.2-5.8	L2170535-2	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U7	DUP-8	1.2-5.8	L2170535-9	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				25-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	
U07-10S	U07-10S	4.7-6.2		04-Jul-07	**3000.**	350.	3610.	350.	200.	<100.	83.4	4.6	3.93	13.4	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2		28-Aug-07	**5100.**	450.	**6890.**	450.	360.	230.	94.8	10.1	5.7	204.	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2		9-Apr-08	**7710.**	1430.	**11400.**	1740.	350.	270.	49.2	9.1	5.	19.7	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2		27-Apr-09	**3490.**	1070.	**7190.**	1380.	270.	<200.	42.4	7.8	5.	17.7	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2		4-May-11	**9970.**	1600.	**17000.**	2000.	170.	<100.	60.1	14.4	23.9	33.9	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2		21-Sep-11	**10400.**	2390.	**18100.**	2830.	110.	<100.	39.	8.57	11.7	16.5	---	---	**AW+/SSSL+**
U07-10S	U7-10S	4.7-6.2		3-Sep-13	**47000.**	33300.	**108000.**	54500.	250.	110.	58.	12.8	26.9	38.	---	---	**AW+/SSSL+**
U07-10S	U7-10S	4.7-6.2	L1462454-1	29-May-14	**6700.**	1300.	**11400.**	1500.	<100.	<100.	20.8	3.32	5.54	9.82	---	---	**AW+/SSSL+**
U07-10S	U7-10S	4.7-6.2	L1509397-1	27-Aug-14	**19400.**	3190.	**25600.**	3270.	180.	<100.	66.3	12.4	21.5	30.8	---	---	**AW+/SSSL+**
U07-10S	U7-10S	4.7-6.2	L1597686-1	10-Apr-15	**8590.**	2660.	**16300.**	3690.	190.	<100.	38.1	8.3	17.5	25.8	---	---	**AW+/SSSL+**
U07-10S	U7-10S	4.7-6.2	L1668445-1	3-Sep-15	**8140.**	320.	**15900.**	440.	200.	<100.	58.	10.7	23.	32.1	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L1745069-1	15-Mar-16	**84600.**	47100.	**157000.**	74100.	300.	<200.	40.7	10.9	30.1	40.6	---	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L1832785-1	21-Sep-16	**5870.**	<250.	**18100.**	<250.	<400.	<400.	73.8	13.	29.6	38.1	---	293.	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L1917194-6	25-Apr-17	**8250.**	560.	**14500.**	730.	260.	110.	58.3	12.6	32.7	44.2	<0.5	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L1995423-4	21-Sep-17	**4080.**	<250.	**13200.**	250.	210.	100.	41.1	8.62	26.5	35.9	<0.5	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L1995424-1	21-Sep-17	---	---	---	---	---	---	34.8	8.94	28.4	38.2	<0.5	574	AW-
U07-10S	U07-10S	4.7-6.2	L2079614-1	12-Apr-18	---	---	---	---	---	---	16.3	4.51	11.3	17.6	0.83	542.	AW-
U07-10S	U07-10S	4.7-6.2	L2161509-3	10-Sep-18	**8440.**	560.	**17500.**	740.	220.	130.	40.9	10.8	15.9	29.6	1.11	---	**AW+/SSSL+**
U07-10S	U07-10S	4.7-6.2	L2161512-1	10-Sep-18	---	---	---	---	---	---	39.3	9.68	25.9	35.5	1.51	406.	AW-
U07-10I	U07-10I	6.65-8.15		04-Jul-07	**2380.**	630.	2400.	630.	120.	120.	0.6	<1.	<0.5	3.3	---	---	**AW+**
U07-10I	U07-10I	6.65-8.15		28-Aug-07	**1330.**	420.	1340.	420.	<100.	<100.	1.84	<1.	<0.5	3.4	---	---	**AW+**
U07-10I	U07-10I	6.65-8.15		09-Apr-08	**1010.**	610.	1010.	610.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
U07-10I	U07-10I	6.65-8.15		28-Aug-08	**610.**	320.	620.	330.	110.	110.	0.9	<1.	<0.5	<1.	---	---	**AW+**
U07-10I	U07-10I	6.65-8.15		27-Apr-09	**640.**	360.	640.	370.	<100.	<100.	0.91	<1.	<0.5	<1.	---	---	**AW+**
U07-10I	U07-10I	6.65-8.15		03-Sep-09	450.	<250.	450.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10I	U07-10I	6.65-8.15		19-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10I	U07-10I	6.65-8.15		07-Sep-10	440.	<250.	450.	<250.	120.	120.	0.8	<1.	<0.5	0.79	---	---	AW-
U07-10I	U07-10I	6.65-8.15		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U07-10I	U07-10I	6.65-8.15		28-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U07-10I	6.65-8.15		16-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U07-10I	6.65-8.15		9-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15		3-Sep-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1461846-1	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1509397-2	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1597686-2	10-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1667283-1	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1745069-2	15-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10I	U7-10I	6.65-8.15	L1832785-2	21-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	12.9	AW-
U07-10I	U07-10I	6.65-8.15	L1917194-5	25-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U07-10I	U07-10I	6.65-8.15	L1995423-5	21-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U07-10I	U07-10I	6.65-8.15	L2080618-2	16-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	3.61	2.5	12.2	<0.5	---	AW-
U07-10I	U07-10I	6.65-8.15	L2161509-4	10-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	0.55	<0.5	<0.75	<0.5	---	AW-
U07-10D	U07-10D	8.5-10.65		04-Jul-07	420.	<250.	450.	<250.	210.	210.	0.57	<1.	<0.5	<1.	---	---	AW-
U07-10D	U07-10D	8.5-10.65		28-Aug-07	**710.**	260.	750.	260.	220.	220.	<1.3	<2.5	<1.3	<2.5	---	---	**AW+**
U07-10D	U07-10D	8.5-10.65		09-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10D	U07-10D	8.5-10.65		28-Aug-08	<250.	<250.	<250.	<250.	330.	330.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10D	U07-10D	8.5-10.65		27-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10D	U07-10D	8.5-10.65		03-Sep-09	500.	<250.	530.	<250.	360.	360.	<0.5	<1.	<0.5	1.4	---	---	AW-
U07-10D	U07-10D	8.5-10.65		19-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U07-10D	U07-10D	8.5-10.65		07-Sep-10	<250.	<250.	<250.	<250.	120.	120.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U07-10D	U07-10D	8.5-10.65		04-May-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U07-10D	U07-10D	8.5-10.65		28-Sep-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U07-10D	8.5-10.65		16-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U07-10D	8.5-10.65		18-Sep-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U07-10D	8.5-10.65		9-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65		3-Sep-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65	L1461846-2	28-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65	L1509397-3	27-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-

TABLE A-2
AREAS 1 AND 3 CONCENTRATIONS OF EXTRACTABLE PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH $_W$ (C10-<C19) [2, 3]	EPH $_W$ (C19-C32) [3]	VH w (C6-C10)	VPH$_W$	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000 [1]	NS	15000 [1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	720	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
U07-10D	U7-10D	8.5-10.65	L1597686-3	10-Apr-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65	L1667283-2	2-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65	L1745069-3	15-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U07-10D	U7-10D	8.5-10.65	L1832785-3	21-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	10.2	AW-
U07-10D	U07-10D	8.5-10.65	L1917918-3	26-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U07-10D	U07-10D	8.5-10.65	L1995423-6	21-Sep-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U07-10D	U07-10D	8.5-10.65	L2080618-3	16-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	2.15	1.38	7.4	<0.5	---	AW-
U07-10D	U07-10D	8.5-10.65	L2170535-8	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U07-10D	DUP-9	8.5-10.65	L2170535-10	25-Sep-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				25-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	
Travel Blank	TRAVEL BLANK-02		L2077580-7	09-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-03		L2078315-9	10-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-04		L2079007-2	11-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-05		L2079613-7	12-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-1		L2081247-7	17-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-1		L2081872-2	18-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-5		L2154662-4	28-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-6		L2155598-4	29-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-6		L2156437-2	30-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-7		L2158080-2	04-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-8		L2159148-8	05-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-9		L2160015-5	06-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-10		L2161509-5	10-Sep-18	---	---	---	---	<100.	<100.	<0.7	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-11		L2164059-2	13-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-12		L2170535-11	25-Sep-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-13		L2181036-2	15-Oct-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Reported Detection Limit					250.	250.	250.	250.	100.	100.	0.5	1.	0.5	1.	0.5	1.	

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 12 Amendments, January 2019)
LEPHw	Light extractable petroleum hydrocarbons in water
HEPHw	Heavy extractable petroleum hydrocarbons in water
EPHw	Extractable petroleum hydrocarbons in water
VHw	Volatile hydrocarbons in water
VPHw	Volatile petroleum hydrocarbons in water
MTBE	Methyl tert-butyl ether
QA/QC	Quality assurance / quality control
RPD	Relative percent difference
NS	No standard established for indicated parameter.
mbgs	Metres below ground surface
ppb	Parts per billion
µg/L	Micrograms per litre
<	Sample concentration less than the reported detection limit indicated
---	Sample not analyzed for indicated parameter

BOLD	Sample concentration greater than CSR standard for aquatic life (AW).
BOLD RED HIGHLIGHTED	Exceeds Site Specific Screening Levels (SSSLs)

Notes:

1 Standards are applicable at all sites, irrespective of water use
2 BC MOE groundwater AW standard (500 µg/L) is for LEPH corrected for PAHs;
EPH (C10<-C19) is LEPH uncorrected for PAHs and therefore conservative.
3 Some LEPH/HEPH and EPH10-19/EPH19-32 results from ALS were affected by laboratory contamination. The former values are available upon request.
4 Criterion concentrations reported in µg/L

TABLE A-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site-Specific Screening Levels (SSSLs)				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																	
A1-12C	A1-12C	5.2-6.7		05-May-04	0.116	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.269	<0.05	<0.35	<0.05	<0.05	<0.2	AW-
A1-12C	A1-12C	5.2-6.7		19-Oct-04	0.133	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.338	<0.05	<0.4	<0.05	<0.05	<0.06	AW-
A1-12C	A1-12C	5.2-6.7		19-Apr-05	0.172	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.356	<0.05	<0.3	<0.05	<0.05	<0.15	AW-
A1-12C	A1-12C	5.2-6.7		15-Sep-05	0.107	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.262	<0.05	<0.2	<0.05	<0.05	<0.2	AW-
A1-12D	A1-12D	1.7-3.2		15-Sep-05	0.384	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.92	<0.05	<0.5	<0.05	<0.05	<0.3	AW-
A1-12D	A1-12D	1.7-3.2		04-Apr-06	0.405	<0.1	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.05	<0.05	<2.	<0.05	<0.05	<0.4	AW-
A1-12D	A1-12D	1.7-3.2		05-Sep-06	0.411	<0.1	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.969	<0.05	<1.	<0.05	<0.05	<0.4	AW-
A1-12D	A1-12D	1.7-3.2		02-Apr-07	0.543	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.48	<0.05	<2.	<0.05	<0.05	<0.2	AW-
A1-12D	A1-12D	1.7-3.2		28-Aug-07	0.345	<0.08	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.05	<0.05	<0.6	<0.05	<0.05	<0.3	AW-
A1-12D	A1-12D	1.7-3.2		08-Apr-08	0.485	<0.09	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.2	<0.05	<2.	<0.05	<0.05	<0.3	AW-
A1-12D	A1-12D	1.7-3.2		28-Aug-08	0.472	0.084	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.36	<0.05	<0.7	<0.05	<0.05	<0.4	AW-
A1-12D	A1-12D	1.7-3.2		21-Apr-09	0.412	<0.09	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.27	<0.05	<1.5	<0.05	<0.05	<0.3	AW-
A3MW02-05	MW02-05	2.4-6.1		05-May-04	4.24	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.847	<0.05	9.84	0.337	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		25-Oct-04	19.2	0.392	0.267	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.147	6.54	<0.05	**53.6**	**4.28**	0.072	<0.05	**AW+**
A3MW02-05	MW02-05	2.4-6.1		26-Apr-05	1.96	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.185	<0.05	2.03	0.052	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		20-Sep-05	35.8	**0.547**	0.643	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.951	12.7	<0.05	**115.**	**12.**	**0.456**	<0.05	**AW+**
A3MW02-05	A3 MW02-05	2.4-6.1		30-Mar-06	0.887	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		28-Jun-06	1.56	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	1.95	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		24-Jul-06	16.7	0.36	0.118	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.066	5.69	<0.05	**77.5**	2.48	<0.05	<0.05	**AW+**
A3MW02-05	A3 MW02-05	2.4-6.1		31-Aug-06	35.6	<1.	0.378	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.155	10.7	<0.05	**154.**	**6.22**	0.107	<0.05	**AW+**
A3MW02-05	MW02-05	2.4-6.1		04-Apr-07	1.04	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.153	<0.05	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		28-Aug-07	4.	<0.3	<0.05	<0.05	0.011	<0.05	<0.05	<0.05	<0.05	<0.05	0.674	<0.05	**21.4**	0.141	<0.08	<0.05	**AW+**
A3MW02-05	MW02-05	2.4-6.1		09-Apr-08	0.914	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		28-Aug-08	1.49	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.112	<0.05	0.269	0.129	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		27-Apr-09	0.868	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	MW02-05	2.4-6.1		03-Sep-09	5.14	<0.2	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.01	<0.05	**33.2**	0.146	<0.05	<0.05	**AW+**
A3MW02-05	MW02-05	2.4-6.1		19-Apr-10	0.852	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.082	0.096	<0.05	0.099	0.156	0.071	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		20-Sep-10	1.28	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.087	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		04-May-11	<0.7	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.2	<0.07	<0.05	<0.25	<0.07	<0.15	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		27-Sep-11	0.695	<0.05	0.092	0.103	<0.03	<0.1	<0.05	0.341	<0.05	<0.05	0.072	<0.05	<0.05	0.156	<0.05	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1		16-May-12	0.123	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1		20-Sep-12	0.148	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1		10-Apr-13	0.157	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1		03-Sep-13	<0.05	<0.05	<0.05	<0.05	0.014	<0.1	<0.05	<0.05	<0.05	0.064	<0.05	<0.05	0.054	0.105	0.061	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1461846-4	28-May-14	0.442	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1509397-5	27-Aug-14	0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1597132-1	09-Apr-15	0.658	<0.07	<0.04	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.101	<0.01	<0.05	<0.02	0.02	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1667283-4	02-Sep-15	3.08	<0.05	0.064	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.958	<0.05	0.067	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1745655-2	16-Mar-16	5.5	<0.08	0.197	0.515	**0.264**	0.536	0.091	0.362	<0.05	**2.52**	1.83	0.095	0.094	<0.06	**2.32**	<0.05	**AW+**
A3MW02-05	A3MW02-05	2.4-6.1	L1830885-1	19-Sep-16	1.03	<0.06	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.151	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1917194-1	25-Apr-17	0.737	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.114	0.475	<0.05	<0.05	<0.05	0.17	<0.05	AW-
A3MW02-05	A3MW02-05	2.4-6.1	L1995423-1	21-Sep-17	2.48	<0.06	<0.05	<0.5	<0.2	0.246	0.069	<0.9	<0.04	**2.89**	1.23	<0.05	<0.09	<0.08	**2.83**	<0.2	**AW+**
A3MW02-05	A3 MW02-05	2.4-6.1	L2087551-2	1-May-18	0.024	<0.02	0.012	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.016	0.01	<0.01	<0.05	<0.02	0.017	<0.05	AW-
A3MW02-05	A3 MW02-05	2.4-6.1	L2164059-1	13-Sep-18	0.988	<0.2	<0.04	<0.05	<0.03	0.019	0.013	<0.07	<0.007	0.191	0.055	0.01	<0.05	<0.02	0.2	<0.05	AW-
A3MW02-06	MW02-06	3.4-6.4		05-May-04	4.58	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.22	<0.05	<1.	0.322	<0.05	<0.05	AW-
A3MW02-06	MW02-06	3.4-6.4		25-Oct-04	4.15	<0.05	0.068	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.19	<0.05	0.497	0.367	<0.05	<0.3	AW-
A3MW02-06	MW02-06	3.4-6.4		26-Apr-05	4.72	<0.05	0.061	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.39	<0.05	<0.5	0.415	<0.05	<0.3	AW-
A3MW02-06	MW02-06	3.4-6.4		19-Sep-05	4.41	<0.05	0.067	<0.05	0.012	<0.05	<0.05	<0.1	<0.05	<0.05	1.32	<0.05	<0.4	0.445	<0.05	<0.05	AW-
A3MW02-06	A3MW02-06	3.4-6.4		30-Mar-06	3.93	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.946	<0.05	<0.9	0.294	<0.05	<0.3	AW-
A3MW02-06	A3MW02-06	3.4-6.4		28-Jun-06	3.93	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.971	<0.05	0.813	0.295	<0.05	<0.3	AW-
A3MW02-06	A3MW02-06	3.4-6.4		24-Jul-06	4.6	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.18	<0.05	<0.6	0.295	<0.05	<0.05	AW-
A3MW02-06	A3MW02-06	3.4-6.4		31-Aug-06	4.04	<0.05	0.055	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.06	<0.05	<1.	0.359	<0.05	<0.5	AW-
A3MW02-06	MW02-06	3.4-6.4		04-Apr-07	4.61	<0.05	0.077	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.11	<0.05	<2.	0.398	<0.05	<0.4	AW-
A3MW02-06	A3MW02-06	3.4-6.4		28-Aug-07	4.46	<0.05	0.051	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.05	<0.05	<0.5	0.284	<0.05	<0.3	AW-
A3MW02-06	A3MW02-06	3.4-6.4		09-Apr-08	4.54	<0.05	0.057	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.07	<0.05	<2.	0.433	<0.05	<0.4	AW-
A3MW02-06	A3MW02-06	3.4-6.4		28-Aug-08	3.57	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.842	<0.05	<0.45	0.412	<0.05	<0.3	AW-
A3MW02-06	A3MW02-06	3.4-6.4		27-Apr-09	4.34	<0.05	0.063	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.912	<0.05	<1.5	0.434	<0.05	<0.35	AW-
A3MW02-06	A3MW02-06	3.4-6.4		03-Sep-09	4.43	<0.05	0.074	<0.05	0.017	<0.1	<0.05	<0.05	<0.05	0.071	1.09	<0.05	<0.8	0.552	0.054	<0.5	AW-
A3MW02-06	A3MW02-06	3.4-6.4		19-Apr-10	3.87	<0.05	0.096	<0.05	0.078	0.181	0.06	0.065	<0.05	0.115	0.877	0.065	<0.7	0.386	0.124	<0.35	AW-
A3MW02-06	A3MW02-06	3.4-6.4		07-Sep-10	4.07	<0.07	0.149	0.117	0.1	0.227	0.082	0.161	<0.05	0.489	0.925	0.082	<0.9	0.565	**0.426**	<0.3	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4		04-May-11	7.55	0.179	0.498	<0.05	<0.03	<0.1	<0.05	<0.05	<0.05	1.78	5.48	<0.05	8.55	**4.49**	**1.06**	<0.7	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4		27-Sep-11	4.02	<0.05	0.133	<0.05	<0.03	<0.1	<0.05	<0.05	<0.05	0.598	2.47	<0.05	1.87	0.539	**0.47**	<0.3	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4		15-May-12	0.248	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.062	0.063	<0.05	0.121	<0.05	0.06	<0.05	AW-
A3MW02-06	A3MW02-06	3.4-6.4		20-Sep-12	0.15	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.103	<0.05	<0.05	<0.05	AW-
A3MW02-06	A3MW02-06	3.4-6.4		10-Apr-13	2.17	<0.05	0.135	<0.05	0.047	<0.122	<0.05	0.054	<0.05	0.464	0.18	<0.05	<0.4	<0.2	**0.345**	0.122	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4		03-Sep-13	0.516	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.054	0.21	<0.05	0.501	0.074	<0.05	<0.05	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1461846-5	28-May-14	1.4	<0.05	0.134	0.061	0.058	0.155	0.051	<0.2	<0.05	0.533	0.583	<0.05	<0.5	0.083	**0.455**	<0.2	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4	L1509397-6	27-Aug-14	1.23	<0.05	0.077	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.204	0.291	<0.05	<0.3	<0.05	0.131	<0.07	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1597132-2	09-Apr-15	1.57	<0.15	<0.03	0.029	0.021	0.052	0.021	0.024	<0.01	0.575	1.07	0.019	<0.8	0.14	**0.444**	<0.4	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4	L1667283-5	02-Sep-15	0.834	<0.05	0.102	<0.05	0.022	<0.1	<0.05	<0.05	<0.05	0.226	0.66	<0.05	<0.4	<0.05	0.18	<0.3	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1745655-3	16-Mar-16	2.04	<0.05	0.078	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.184	1.75	<0.05	<0.7	<0.05	0.124	<0.9	AW-
A3MW02-06	A3MW02-06	3.4-6.4	L1830885-2	19-Sep-16	2.11	<0.2	0.128	0.062	0.064	0.106	0.054	0.081	0.009	0.496	2.05	<0.05	<0.4	0.066	**0.393**	<1.5	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4	L1917194-2	25-Apr-17	3.32	<0.05	<0.2	<0.05	0.0075	<0.1	<0.05	<0.05	<0.005	0.46	3.25	<0.05	<2.	<0.05	**0.31**	<2.	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4	L1994653-2	20-Sep-17	2.3	<0.05	0.134	<0.05	0.0228	<0.1	<0.05	<0.06	<0.005	0.534	2.37	<0.05	<0.8	0.062	**0.38**	<2.	**AW+**
A3MW02-06	A3MW02-06	3.4-6.4	L2081247-1	17-Apr-18	3.24	<0.2	<0.2	<0.05	0.028	<0.1	<0.05	<0.05	<0.006	0.471	2.61	<0.05	<1.	0.094	**0.339**	<2.	**AW+**
A3MW02-06	A3 MW02-06	3.4-6.4	L2170535-3	25-Sep-18	2.74	<0.09	<0.1	<0.02	<0.005	<0.015	<0.01	<0.03	<0.005	0.31	1.63	<0.01	<0.08	<0.02	**0.206**	<0.7	**AW+**
A3MW02-07	A3-MW02-07	3.1-6.2		19-Sep-05	19.3	<0.05	0.19	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.139	7.78	<0.05	0.679	0.213	0.068	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		30-Mar-06	39.1	<0.05	0.382	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.242	13.1	<0.05	**12.2**	**4.56**	0.116	<0.05	**AW+**
A3MW02-07	A3MW02-07	3.1-6.2		28-Jun-06	32.1	<0.05	0.245	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.137	11.3	<0.05	2.84	1.05	0.067	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		24-Jul-06	22.5	<0.05	0.215	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.167	8.83	<0.05	0.752	0.318	0.088	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		31-Aug-06	17.	<0.05	0.165	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.128	6.39	<0.05	0.37	0.264	0.06	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		04-Apr-07	22.4	<0.05	0.201	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.107	7.68	<0.05	0.73	0.585	0.054	<0.08	AW-
A3MW02-07	A3MW02-07	3.1-6.2		28-Aug-07	18.6	<0.05	0.201	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.106	6.48	<0.05	0.176	0.505	0.06	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		09-Apr-08	21.9	<0.05	0.186	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.097	7.1	<0.05	0.38	0.631	0.055	<0.1	AW-
A3MW02-07	A3MW02-07	3.1-6.2		28-Aug-08	13.9	<0.05	0.134	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.121	4.61	<0.05	0.409	0.184	0.073	<0.06	AW-
A3MW02-07	A3MW02-07	3.1-6.2		27-Apr-09	26.6	<0.05	0.21	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.105	7.89	<0.05	0.298	0.712	0.056	<0.15	AW-
A3MW02-07	A3MW02-07	3.1-6.2		03-Sep-09	17.7	<0.05	0.177	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.141	6.13	<0.05	<0.08	0.1	0.075	<0.08	AW-
A3MW02-07	A3MW02-07	3.1-6.2		19-Apr-10	51.1	0.063	0.476	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.311	20.4	<0.05	**16.1**	**8.71**	0.142	<0.2	**AW+**
A3MW02-07	A3MW02-07	3.1-6.2		07-Sep-10	19.7	<0.05	0.271	<0.05	0.017	<0.1	<0.05	<0.05	<0.05	0.355	8.63	<0.05	<0.5	1.44	**0.228**	<0.07	**AW+**
A3MW02-07	A3MW02-07	3.1-6.2		04-May-11	0.627	<0.05	<0.05	<0.05	0.012	<0.1	<0.05	<0.05	<0.05	0.145	0.134	<0.05	0.621	0.284	0.13	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		15-May-12	1.54	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.273	<0.05	4.92	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		20-Sep-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		10-Apr-13	12.9	<0.05	0.105	<0.05	0.017	<0.1	<0.05	<0.05	<0.05	0.101	3.86	<0.05	1.58	0.164	0.061	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2		28-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1461850-2	28-May-14	3.42	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.867	<0.05	1.5	0.116	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1509407-4	27-Aug-14	0.264	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.054	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1597133-2	9-Apr-15	20.6	<0.02	0.095	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	0.024	5.42	<0.01	1.75	0.836	0.01	<0.1	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1667287-2	2-Sep-15	2.69	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.71	<0.05	0.088	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1745659-2	16-Mar-16	20.5	<0.05	0.335	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.469	9.2	<0.05	1.2	0.611	**0.215**	<0.3	**AW+**
A3MW02-07	A3MW02-07	3.1-6.2	L1830885-3	19-Sep-16	1.7	<0.05	0.163	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.276	2.44	<0.05	<0.05	<0.05	0.135	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1915574-1	20-Apr-17	0.711	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.356	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L1994653-1	20-Sep-17	5.17	<0.05	0.082	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.09	1.72	<0.05	<0.08	<0.05	<0.05	<0.06	AW-
A3MW02-07	A3MW02-07	3.1-6.2	L2081247-2	17-Apr-18	28.8	<0.07	0.595	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.922	16.5	<0.05	<0.7	<0.2	**0.448**	<0.7	**AW+**
A3MW02-07	DUP-6	3.1-6.2	L2081247-6	17-Apr-18	36.6	<0.07	0.656	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.91	17.	<0.05	<0.7	<0.2	**0.44**	<0.6	**AW+**
QA/QC RPD				17-Apr-18	23.9%	---	9.8%	---	---	---	---	---	---	1.3%	3.0%	---	---	---	1.8%	---	

TABLE A-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site-Specific Screening Levels (SSSLs)				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																	
A3MW02-07	A3 MW02-07	3.1-6.2	L2170535-4	25-Sep-18	69.8	<0.2	**1.42**	0.012	<0.005	<0.015	<0.01	<0.01	<0.005	**2.13**	32.6	<0.01	**13.9**	1.53	**0.947**	<2.	**AW+**
A3MW02-07	A3MW02-07	3.1-6.2	L2181036-1	15-Oct-18	32.8	<0.05	0.536	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.711	15.1	<0.01	<0.3	0.164	**0.378**	<0.4	**AW+**
A3MW02-08	A3-MW02-08	1.5-5.5		19-Sep-05	16.5	<0.05	0.81	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	1.18	7.38	<0.05	15.6	**4.14**	**0.716**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		30-Mar-06	11.8	<0.05	0.486	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.449	4.44	<0.05	13.4	1.8	**0.272**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		28-Jun-06	15.6	<0.05	0.62	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.841	6.18	<0.05	10.9	**3.29**	**0.486**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		24-Jul-06	16.	<0.05	0.653	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.918	6.56	<0.05	18.	**3.74**	**0.55**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		31-Aug-06	13.9	<0.05	0.479	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.53	5.33	<0.05	13.3	2.46	**0.307**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		04-Apr-07	16.1	<0.05	0.632	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.843	6.44	<0.05	20.3	**3.77**	**0.507**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		28-Aug-07	15.9	<0.05	0.565	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.795	6.11	<0.05	15.1	**3.13**	**0.471**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		09-Apr-08	16.	<0.1	<0.75	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.93	6.58	<0.05	13.2	**4.09**	**0.571**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		28-Aug-08	16.9	<0.05	0.603	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.999	6.62	<0.05	14.4	2.32	**0.594**	<0.1	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		27-Apr-09	18.8	<0.05	0.765	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.997	7.29	<0.05	16.8	**4.64**	**0.598**	<0.06	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		03-Sep-09	15.7	<0.05	0.609	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.908	6.37	<0.05	13.3	**3.35**	**0.522**	<0.2	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		19-Apr-10	17.6	<0.05	0.742	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	1.12	7.54	<0.05	13.5	**5.05**	**0.66**	<0.07	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		07-Sep-10	10.8	<0.05	0.45	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.627	4.63	<0.05	6.47	1.73	**0.378**	<0.2	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		04-May-11	7.4	<0.05	0.178	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.265	2.61	<0.05	11.2	0.408	**0.207**	<0.06	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		15-May-12	0.528	<0.05	0.083	<0.05	0.028	<0.104	<0.05	<0.05	<0.05	0.276	0.273	<0.05	0.21	0.255	**0.285**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5		20-Sep-12	0.712	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.116	0.319	<0.05	0.202	0.067	0.112	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5		10-Apr-13	1.96	0.079	0.099	<0.05	0.014	<0.1	<0.05	<0.05	<0.05	0.189	0.769	<0.05	1.11	0.261	0.148	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5		27-Aug-13	0.665	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.069	0.346	<0.05	0.077	<0.05	0.059	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1461850-3	28-May-14	1.97	<0.05	0.089	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.131	0.845	<0.05	0.546	0.122	0.103	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1509407-5	27-Aug-14	1.35	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.072	0.69	<0.05	0.201	<0.05	0.052	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1597133-3	9-Apr-15	2.4	<0.06	0.136	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	0.258	1.08	<0.01	0.162	0.109	0.178	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1667287-3	2-Sep-15	1.67	<0.05	0.126	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.142	0.731	<0.05	0.971	0.051	0.106	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1745659-3	16-Mar-16	4.3	<0.05	0.134	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.323	2.06	<0.05	0.067	<0.05	**0.208**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5	L1830885-4	19-Sep-16	2.65	<0.05	0.091	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.181	1.39	<0.05	0.141	<0.05	0.129	<0.05	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L1915574-2	20-Apr-17	2.5	<0.05	0.11	<0.05	0.0292	<0.1	<0.05	<0.05	<0.005	0.338	1.17	<0.05	0.159	0.073	**0.286**	<0.05	**AW+**
A3MW02-08	A3MW02-08	1.5-5.5	L1994653-3	20-Sep-17	4.13	<0.05	0.115	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	0.244	1.96	<0.05	<2.	0.066	0.17	<0.08	AW-
A3MW02-08	A3MW02-08	1.5-5.5	L2081247-3	17-Apr-18	2.02	<0.05	0.097	<0.05	0.01	<0.1	<0.05	<0.05	<0.005	0.269	1.05	<0.05	0.218	<0.05	**0.222**	<0.05	**AW+**
A3MW02-08	A3 MW02-08	1.5-5.5	L2170535-5	25-Sep-18	4.16	<0.03	0.168	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.432	1.96	<0.01	0.587	0.044	**0.28**	<0.08	**AW+**
A3MW03-01	A3MW03-01	1.5-6.1		30-Mar-06	<0.05	<0.05	<0.05	<0.05	0.022	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		28-Jun-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		24-Jul-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		31-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		04-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		28-Aug-07	<0.05	<0.05	<0.05	<0.05	0.012	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		03-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		28-Aug-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1		27-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-01	A3MW03-01	1.5-6.1	L1597689-1	10-Apr-15	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.07	AW-
A3MW03-02	MW03-02	2.3-8.3		05-May-04	1.57	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.35	<0.05	<1.	0.259	<0.05	<0.05	AW-
A3MW03-02	MW03-02	2.3-8.3		25-Oct-04	1.82	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.5	<0.05	<0.6	0.373	<0.05	<0.4	AW-
A3MW03-02	MW03-02	2.3-8.3		26-Apr-05	2.11	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.86	<0.05	**19.5**	0.399	<0.05	<0.5	**AW+**
A3MW03-02	MW03-02	2.3-8.3		20-Sep-05	1.41	<0.05	0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.35	<0.05	<0.6	0.148	<0.05	<0.5	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		30-Mar-06	2.2	<0.07	<0.05	<0.05	0.053	<0.05	<0.05	0.052	<0.05	<0.05	1.66	<0.05	6.15	0.329	<0.05	<0.2	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		28-Jun-06	1.66	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.31	<0.05	<0.9	0.152	<0.05	<0.05	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		24-Jul-06	1.62	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.36	<0.05	<0.7	0.16	<0.05	0.337	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		31-Aug-06	0.859	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.781	<0.05	<0.7	0.13	<0.05	<0.05	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		04-Apr-07	1.99	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.08	<0.05	<2.	0.051	<0.05	<0.1	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		28-Aug-07	1.82	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.75	<0.05	<0.6	0.192	<0.05	<0.3	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		03-Apr-08	2.39	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.71	<0.05	<2.	0.321	<0.05	<0.2	AW-
A3MW03-02	MW03-02	2.3-8.3		28-Aug-08	2.34	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.62	<0.05	<0.5	0.24	<0.05	<0.5	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		27-Apr-09	2.3	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.66	<0.05	<1.5	0.405	<0.05	<0.65	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		03-Sep-09	4.5	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.63	<0.05	<0.6	0.131	<0.05	<0.3	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		19-Apr-10	2.56	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.98	<0.05	<1.5	0.419	<0.05	<0.65	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		07-Sep-10	1.3	0.054	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.49	<0.05	<1.	0.259	<0.05	<0.2	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		04-May-11	3.54	<0.05	0.072	0.075	0.025	<0.1	<0.05	<0.05	<0.05	0.412	2.08	<0.05	<2.	0.92	**0.31**	<0.6	**AW+**
A3MW03-02	A3 MW03-02	2.3-8.3		28-Sep-11	1.85	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.85	<0.05	<2.	0.252	<0.05	<0.6	AW-
A3MW03-02	A3 MW03-02	2.3-8.3		16-May-12	2.17	<0.05	0.059	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.379	1.67	<0.05	<2.	0.838	**0.275**	<0.3	**AW+**
A3MW03-02	A3MW03-02	2.3-8.3		18-Sep-12	1.45	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.51	<0.05	<0.6	<0.05	<0.05	<0.3	AW-
A3MW03-02	A3MW03-02	2.3-8.3		9-Apr-13	1.61	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.905	<0.05	<0.3	<0.05	<0.05	<0.1	AW-
A3MW03-02	A3MW03-02	2.3-8.3		28-Aug-13	<2.	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.31	<0.05	<0.9	<0.05	<0.05	<0.1	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1462453-2	29-May-14	1.1	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.915	<0.05	<0.8	0.122	<0.05	<0.3	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1509407-2	27-Aug-14	1.34	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.06	<0.05	<0.5	0.05	<0.05	<0.3	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1597689-2	10-Apr-15	2.62	<0.07	0.095	0.017	<0.01	<0.02	<0.01	<0.01	<0.01	0.221	1.78	<0.01	<1.5	1.58	0.155	<0.8	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1668411-2	3-Sep-15	1.53	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.45	<0.05	<1.	0.163	<0.05	<4.	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1745070-2	15-Mar-16	1.87	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.6	<0.05	<2.	0.294	<0.05	<4.	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1832800-2	21-Sep-16	1.37	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.05	<0.05	1.39	<0.05	<0.8	0.255	<0.05	<3	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1917918-2	26-Apr-17	2.36	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	1.91	<0.05	<2.	0.352	<0.05	<6.	AW-
A3MW03-02	A3MW03-02	2.3-8.3	L1995423-3	21-Sep-17	1.67	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	2.04	<0.05	<2.	0.438	<0.05	<3.	AW-
A3MW03-02	A3 MW03-02	2.3-8.3	L2079613-2	12-Apr-18	1.96	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	1.88	<0.05	<2.	0.448	<0.05	<4.	AW-
A3MW03-02	DUP-5	2.3-8.3	L2079613-6	12-Apr-18	1.98	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	1.69	<0.05	<2.	0.411	<0.05	<4.	AW-
QA/QC RPD				12-Apr-18	1.0%	---	---	---	---	---	---	---	---	---	10.6%	---	---	8.6%	---	---	
A3MW03-02	A3 MW03-02	2.3-8.3	L2161509-2	10-Sep-18	1.09	<0.05	<0.03	<0.01	0.006	<0.015	<0.01	<0.01	<0.005	0.013	1.11	<0.01	<0.6	0.133	0.012	<0.5	AW-
A3MW03-03	A3MW03-03	0.8-6.9		12-Apr-06	<0.3	0.406	0.106	0.109	**0.155**	0.069	0.103	0.268	<0.05	<0.05	0.247	<0.05	<0.8	0.637	0.156	<0.2	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		28-Jun-06	0.522	<0.5	<0.08	0.101	**0.1**	<0.05	0.054	0.144	<0.05	0.051	0.491	<0.05	3.45	0.612	0.176	<0.3	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		24-Jul-06	<0.8	**<0.6**	0.114	0.163	**0.189**	0.074	0.108	0.224	<0.05	0.071	0.594	<0.05	3.6	0.703	**0.221**	<0.05	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		31-Aug-06	1.22	**<0.9**	<0.2	0.33	**0.41**	0.22	0.283	0.483	0.108	0.137	0.745	0.055	4.63	0.52	**0.455**	<0.4	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		04-Apr-07	0.247	<0.4	<0.05	0.128	**0.969**	0.057	0.072	0.15	<0.05	0.054	0.24	<0.05	0.21	0.373	0.159	<0.05	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		28-Aug-07	0.393	<0.3	<0.05	0.072	0.084	<0.05	0.058	0.14	<0.05	<0.05	0.293	<0.05	<0.4	0.134	0.109	<0.2	AW-
A3MW03-03	A3MW03-03	0.8-6.9		09-Apr-08	0.082	<0.05	<0.05	<0.05	0.012	<0.1	<0.05	<0.05	<0.05	<0.05	0.091	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9		28-Aug-08	1.5	0.173	<0.15	0.1	0.052	<0.05	<0.05	<0.15	<0.05	0.484	0.874	<0.05	1.54	1.14	**0.402**	<0.25	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		27-Apr-09	0.554	<0.2	<0.08	0.057	0.046	<0.05	<0.05	<0.1	<0.05	0.154	0.372	<0.05	<0.2	0.134	0.169	<0.1	AW-
A3MW03-03	A3MW03-03	0.8-6.9		03-Sep-09	1.37	<0.5	<0.2	<0.2	**0.143**	0.071	0.093	<0.2	<0.05	0.219	0.899	<0.05	2.6	0.291	**0.303**	<0.4	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		19-Apr-10	0.516	**0.604**	<0.15	0.206	**0.253**	0.158	0.131	0.26	<0.06	0.232	0.527	<0.05	<0.25	0.256	**0.346**	<0.15	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		20-Sep-10	0.802	**<0.6**	<0.15	0.213	**<0.3**	<0.1563	0.163	0.411	<0.07	0.105	<0.86	<0.05	1.67	0.922	**0.336**	<0.31	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		04-May-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.06	AW-
A3MW03-03	A3MW03-03	0.8-6.9		21-Sep-11	1.6	0.09	0.102	0.076	0.035	<0.101	<0.05	0.053	<0.05	0.487	0.804	<0.05	1.41	1.17	**0.381**	0.151	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		16-May-12	0.147	<0.05	<0.05	<0.05	0.02	<0.1	<0.05	<0.05	<0.05	<0.05	0.168	<0.05	<0.06	<0.05	0.087	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9		20-Sep-12	0.199	<0.2	<0.1	<0.2	**<0.2**	<0.1	0.078	<0.2	<0.05	0.224	0.306	<0.05	<0.06	<0.05	**0.283**	<0.05	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		9-Apr-13	<0.05	<0.2	<0.05	0.105	**0.104**	<0.119	0.055	0.13	<0.05	0.15	0.099	<0.05	<0.05	<0.05	**0.208**	<0.05	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9		3-Sep-13	0.066	<0.2	<0.05	<0.05	<0.05	<0.1	<0.05	<0.07	<0.05	0.079	0.103	<0.05	0.088	<0.06	0.128	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1461846-3	28-May-14	0.054	<0.2	<0.05	<0.05	<0.02	<0.1	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	0.072	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1509397-4	27-Aug-14	<0.05	<0.2	0.054	<0.1	**0.108**	<0.15	0.068	<0.2	<0.05	0.073	0.077	<0.05	<0.05	<0.05	0.163	<0.05	**AW+**
A3MW03-03	A3MW03-03	0.8-6.9	L1639257-1	8-Jul-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1667283-3	2-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1745655-1	16-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1843040-1	12-Oct-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1917194-3	25-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L1994653-4	20-Sep-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L2087551-1	1-May-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
A3MW03-03	A3MW03-03	0.8-6.9	L2170535-6	25-Sep-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-

TABLE A-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site-Specific Screening Levels (SSSLs)				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																	
A3MW03-04	A3-MW03-04	1.5-6.7		19-Sep-05	0.185	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.173	<0.05	3.76	0.153	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		12-Apr-06	<0.4	<0.2	<0.07	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.388	<0.05	4.84	0.514	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		28-Jun-06	0.07	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	1.34	0.06	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		24-Jul-06	0.075	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.29	0.055	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		31-Aug-06	0.154	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.144	<0.05	1.12	0.119	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		04-Apr-07	0.181	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.197	<0.05	4.03	0.211	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		28-Aug-07	0.233	<0.07	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.242	<0.05	4.48	0.207	<0.05	<0.2	AW-
A3MW03-04	MW03-04	1.5-6.7		09-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.064	<0.05	<0.4	0.055	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		28-Aug-08	0.24	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.243	<0.05	<1.5	0.21	<0.05	<0.3	AW-
A3MW03-04	MW03-04	1.5-6.7		27-Apr-09	0.145	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.141	<0.05	1.19	0.12	<0.05	<0.15	AW-
A3MW03-04	MW03-04	1.5-6.7		03-Sep-09	0.313	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.319	<0.05	<0.75	0.247	<0.05	<0.35	AW-
A3MW03-04	MW03-04	1.5-6.7		19-Apr-10	0.184	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.069	0.169	<0.05	0.843	0.179	0.059	<0.15	AW-
A3MW03-04	MW03-04	1.5-6.7		07-Sep-10	0.356	<0.05	<0.05	<0.05	0.018	<0.1	<0.05	<0.05	<0.05	0.158	0.292	<0.05	<2.8	0.328	0.132	<0.16	AW-
A3MW03-04	MW03-04	1.5-6.7		04-May-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7		15-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7		20-Sep-12	<0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	0.08	<0.3	AW-
A3MW03-04	A3MW03-04	1.5-6.7		9-Apr-13	<0.07	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	AW-
A3MW03-04	A3MW03-04	1.5-6.7		28-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1461850-1	28-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1509407-3	27-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1597133-1	9-Apr-15	0.011	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.025	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1667287-1	2-Sep-15	<0.05	<0.05	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1745659-1	16-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1830885-5	19-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1917194-4	25-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L1994653-5	20-Sep-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	A3MW03-04	1.5-6.7	L2081872-1	18-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A3MW03-04	MW03-04	1.5-6.7	L2170535-7	25-Sep-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		20-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		05-May-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		24-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		06-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		02-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		28-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		19-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		14-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		04-Sep-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		3-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	0.055	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1		26-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1463846-3	2-Jun-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1522243-2	23-Sep-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1606759-1	4-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1668270-1	3-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1752106-3	4-Apr-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1833762-4	22-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1910706-1	7-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L1984002-4	30-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L2078315-5	10-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1A	G1-1A	3.1-6.1	L2159148-4	5-Sep-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G1-1B	G1-1B	10.8-12.3		03-May-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1B	G1-1B	10.8-12.3		20-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1B	G1-1B	10.8-12.3		21-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1B	A1-G1-1B	10.8-12.3		22-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-1B	G1-1B	10.8-12.3		06-Nov-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-2A	G1-2A	1.8-3.4		26-Aug-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-2A	G1-2A	1.8-3.4	L1847163-1	21-Oct-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-5	G1-5	9.1-12.2		04-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.171	<0.05	AW-
G1-5	G1-5	9.1-12.2		28-Aug-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-5	G1-5	9.1-12.2		03-Apr-08	<0.05	<0.05	<0.05	<0.05	0.03	<0.1	<0.05	<0.07	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	0.139	<0.05	AW-
G1-5	G1-5	9.1-12.2		26-Aug-08	0.136	<0.05	<0.05	<0.05	0.011	<0.05	<0.05	0.062	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	0.085	<0.05	AW-
G1-5	G1-5	9.1-12.2		21-Apr-09	0.301	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.137	<0.05	<0.25	<0.05	0.081	<0.05	AW-
G1-5	G1-5	9.1-12.2		07-Apr-10	0.214	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.2	<0.05	0.05	<0.05	AW-
G1-5	G1-5	9.1-12.2		02-Sep-10	<0.08	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-7A	G1-7A	0.9-2.4	L1833759-1	22-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-7B	G1-7B	6.1-9.1	L1833759-2	22-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		04-Apr-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		31-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		13-Apr-07	<0.08	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		28-Aug-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		03-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		04-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G1-8	G1-8	7.0-13.1		21-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		05-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		27-Aug-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		03-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	AW-
MW03-07	MW03-07	0.6-2.2		26-Aug-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		20-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		24-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		06-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		02-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		28-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		15-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		14-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		09-Aug-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		10-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2		28-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1465606-1	4-Jun-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1512995-2	4-Sep-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1602111-1	22-Apr-15	<0.01	<0.01	0.013	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1673248-7	15-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1746133-1	17-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1833819-1	23-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1913256-2	13-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L1983999-1	30-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L2079613-3	12-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-07	MW03-07	0.6-2.2	L2158080-1	4-Sep-18	<0.01	<0.02	<0.01	0.011	0.012	0.016	0.011	0.01	<0.005	0.02	0.036	0.012	<0.05	<0.02	0.021	<0.05	AW-

TABLE A-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site-Specific Screening Levels (SSSLs)				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																	
NDM97-3	NDM97-3		L1673248-8	15-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	A3-U6	0.9-3.9		21-Sep-05	<0.05	<0.05	<0.05	<0.05	0.042	0.052	<0.05	0.071	<0.05	0.09	<0.05	<0.05	0.057	0.075	0.112	<0.05	AW-
U6	U6	0.9-3.9		30-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		28-Jun-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		24-Jul-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		31-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		04-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		28-Aug-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		09-Apr-08	0.427	<0.05	<0.08	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.12	<0.25	<0.05	1.68	0.362	0.087	<0.05	AW-
U6	U6	0.9-3.9		28-Aug-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		27-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		03-Sep-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		19-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.059	<0.05	<0.05	0.056	0.079	<0.05	<0.05	AW-
U6	U6	0.9-3.9		07-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		04-May-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		22-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.088	<0.05	<0.05	<0.08	0.098	0.066	<0.05	AW-
U6	U6	0.9-3.9		15-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		18-Sep-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		10-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9		27-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1461850-4	28-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1509407-6	27-Aug-14	<0.05	<0.05	<0.05	<0.05	0.02	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.082	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1597133-4	9-Apr-15	<0.01	<0.01	0.022	<0.01	<0.01	0.021	<0.01	<0.01	<0.01	0.012	<0.01	<0.01	<0.05	<0.02	0.013	<0.05	AW-
U6	U6	0.9-3.9	L1667287-4	2-Sep-15	<0.05	<0.05	0.072	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1745659-4	17-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1830885-6	19-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1915574-3	20-Apr-17	<0.05	<0.05	<0.05	<0.05	0.0076	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L1991781-1	14-Sep-17	<0.05	0.075	<0.05	<0.1	**0.12**	0.513	0.141	<0.4	0.025	0.283	<0.05	0.116	<0.05	<0.05	**0.318**	<0.05	**AW+**
U6	U6	0.9-3.9	L2081247-4	17-Apr-18	<0.05	<0.05	<0.05	<0.05	0.01	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U6	U6	0.9-3.9	L2170535-1	25-Sep-18	<0.01	<0.01	0.014	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
U7	A3-U7	1.2-5.8		21-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		30-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		28-Jun-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		24-Jul-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		31-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		04-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		28-Aug-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		09-Apr-08	0.153	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.078	0.082	<0.05	0.38	0.211	0.055	<0.05	AW-
U7	U7	1.2-5.8		28-Aug-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		27-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8		22-Sep-11	<0.05	<0.05	<0.05	<0.05	0.011	<0.1	<0.05	<0.05	<0.05	0.057	<0.05	<0.05	<0.05	0.058	0.073	<0.05	AW-
U7	U7	1.2-5.8		22-Jan-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8	L1462453-3	29-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8	L1597133-5	9-Apr-15	<0.01	<0.01	0.017	<0.01	<0.01	0.027	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.05	<0.02	0.017	<0.05	AW-
U7	U7	1.2-5.8	L1991781-2	14-Sep-17	<0.05	<0.05	<0.05	<0.05	0.0336	<0.131	<0.05	<0.08	0.0072	0.07	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	AW-
U7	U7	1.2-5.8	L2081247-5	17-Apr-18	<0.05	<0.05	<0.05	<0.05	0.008	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U7	U7	1.2-5.8	L2170535-2	25-Sep-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
U7	DUP-8	1.2-5.8	L2170535-9	25-Sep-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				25-Sep-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
U07-10S	U07-10S	4.7-6.2		4-May-11	**690.**	**<20.**	**50.6**	**26.1**	**10.6**	23.89	2.81	**19.**	0.821	**211.**	**300.**	3.65	**5410.**	**632.**	**160.**	<4.	**AW+**
U07-10S	U07-10S	4.7-6.2		21-Sep-11	**859.**	**12.9**	**31.2**	**31.9**	**10.5**	22.89	2.15	**19.5**	0.71	**232.**	**299.**	3.1	**5770.**	**682.**	**163.**	<2.	**AW+**
U07-10S	U7-10S	4.7-6.2		3-Sep-13	**9970.**	**<200.**	**1750.**	**1830.**	**675.**	1479.	136.	**1070.**	43.8	**10600.**	**6100.**	192.	**21100.**	**22100.**	**8070.**	<3.	**AW+**
U07-10S	U7-10S	4.7-6.2	L1462454-1	29-May-14	**343.**	**8.85**	**13.**	**14.**	**5.46**	12.21	1.22	**9.95**	0.4	**77.8**	**132.**	1.56	**4060.**	**213.**	**55.1**	1.89	**AW+**
U07-10S	U7-10S	4.7-6.2	L1509397-1	27-Aug-14	**401.**	**12.7**	**11.**	**4.28**	**1.3**	2.93	0.287	**2.98**	0.083	**42.2**	**160.**	0.38	**5420.**	**209.**	**29.**	<3.	**AW+**
U07-10S	U7-10S	4.7-6.2	L1597686-1	10-Apr-15	**817.**	**<20.**	**125.**	**77.3**	**30.4**	67.5	7.2	**51.7**	2.29	**534.**	**405.**	9.92	**5080.**	**1270.**	**387.**	<2.	**AW+**
U07-10S	U7-10S	4.7-6.2	L1668445-1	3-Sep-15	**504.**	**9.05**	**<20.**	**7.18**	**2.44**	4.98	0.48	**5.19**	0.155	**65.2**	**173.**	0.658	**6850.**	**234.**	**45.4**	<0.2	**AW+**
U07-10S	U07-10S	4.7-6.2	L1745069-1	15-Mar-16	**12600.**	**<200.**	**1620.**	**1800.**	**648.**	1246.	144.	**1020.**	49.5	**14000**	**6290.**	196.	**22800.**	**28700.**	**10600.**	<20.	**AW+**
U07-10S	U07-10S	4.7-6.2	L1832785-1	21-Sep-16	**639.**	**8.13**	**6.51**	**2.61**	**0.695**	1.409	0.147	**1.68**	0.0479	**16.7**	86.7	0.199	**11400.**	**102.**	**11.4**	<0.2	**AW+**
U07-10S	U07-10S	4.7-6.2	L1917194-6	25-Apr-17	**460.**	<20.	<20.	**11.**	**4.07**	7.76	0.704	**8.79**	0.268	**82.8**	**178.**	1.08	**5330.**	**258.**	**63.1**	<2.	**AW+**
U07-10S	U07-10S	4.7-6.2	L1995423-4	21-Sep-17	**467.**	<8.	<8.	**1.91**	**0.59**	1.225	0.089	**1.18**	0.0332	**36.6**	**163.**	0.126	**8270.**	**178.**	**23.8**	<2.	**AW+**
U07-10S	U07-10S	4.7-6.2	L2161509-3	10-Sep-18	**596.**	**13.4**	**26.**	**10.6**	**3.5**	6.03	0.779	**8.38**	0.291	**97.3**	**271.**	1.19	**7820.**	**379.**	**70.2**	<9.	**AW+**
U07-10I	U07-10I	6.65-8.15		28-Aug-07	1.64	<0.5	<0.5	<0.05	0.026	<0.05	0.053	0.064	<0.05	0.051	0.56	<0.05	<0.5	<0.5	0.102	<0.5	AW-
U07-10I	U07-10I	6.65-8.15		09-Apr-08	<0.5	<0.1	<0.05	<0.5	0.042	<0.1	<0.05	<0.5	<0.05	<0.5	<0.5	<0.05	<0.5	<0.06	**<0.5**	<0.5	**AW+**
U07-10I	U07-10I	6.65-8.15		28-Aug-08	2.4	<0.5	<0.6	0.61	**0.222**	0.332	0.055	<0.5	<0.05	**4.09**	1.41	0.069	0.63	**4.78**	**3.19**	<0.5	**AW+**
U07-10I	U07-10I	6.65-8.15		27-Apr-09	0.409	<0.15	<0.07	<0.05	0.026	<0.05	<0.05	<0.07	<0.05	0.124	0.326	<0.05	1.42	0.265	0.137	<0.05	AW-
U07-10I	U07-10I	6.65-8.15		03-Sep-09	0.344	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.182	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15		19-Apr-10	0.15	<0.05	<0.05	<0.05	0.012	<0.1	<0.05	<0.05	<0.05	<0.05	0.134	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15		07-Sep-10	9.01	<0.07	0.184	0.115	0.022	<0.1	<0.05	0.063	<0.05	1.43	1.58	<0.05	0.909	0.585	**0.84**	<0.05	**AW+**
U07-10I	U07-10I	6.65-8.15		04-May-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.052	0.075	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15		28-Sep-11	3.78	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.432	<0.05	<0.3	0.058	<0.05	<0.07	AW-
U07-10I	U07-10I	6.65-8.15		16-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15		9-Apr-13	0.055	<0.05	0.061	0.107	0.078	0.172	<0.05	0.119	<0.05	0.329	0.053	<0.05	<0.05	0.133	**0.269**	<0.05	**AW+**
U07-10I	U7-10I	6.65-8.15		3-Sep-13	1.1	<0.05	0.094	0.091	0.045	<0.121	<0.05	0.07	<0.05	0.496	0.248	<0.05	0.502	0.941	**0.377**	<0.05	**AW+**
U07-10I	U7-10I	6.65-8.15	L1461846-1	28-May-14	<0.05	<0.05	<0.05	<0.05	0.011	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10I	U7-10I	6.65-8.15	L1509397-2	27-Aug-14	<0.05	<0.05	<0.05	<0.05	0.015	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.141	<0.05	<0.05	<0.05	AW-
U07-10I	U7-10I	6.65-8.15	L1597686-2	10-Apr-15	0.076	<0.05	<0.2	0.144	0.09	0.209	0.096	0.096	<0.02	0.431	0.053	0.06	0.26	0.244	**0.389**	<0.05	**AW+**
U07-10I	U7-10I	6.65-8.15	L1667283-1	2-Sep-15	<0.05	<0.05	0.213	<0.05	0.024	<0.1	<0.05	<0.05	<0.05	0.114	<0.05	<0.05	0.055	<0.05	0.093	<0.05	AW-
U07-10I	U07-10I	6.65-8.15	L1745069-2	15-Mar-16	0.681	<0.05	0.07	0.073	0.022	<0.1	<0.05	<0.05	<0.05	0.384	0.364	<0.05	1.84	0.958	**0.292**	<0.05	**AW+**
U07-10I	U07-10I	6.65-8.15	L1832785-2	21-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	0.272	<0.05	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15	L1917194-5	25-Apr-17	0.223	<0.05	0.101	0.370	**0.148**	0.317	0.092	0.296	<0.02	1.35	0.152	0.062	0.475	0.443	**1.07**	<0.05	**AW+**
U07-10I	U07-10I	6.65-8.15	L1995423-5	21-Sep-17	0.632	<0.05	0.079	<0.05	0.0072	<0.1	<0.05	<0.05	<0.005	0.18	0.392	<0.05	9.14	0.472	0.119	<0.2	AW-
U07-10I	U07-10I	6.65-8.15	L2080618-2	16-Apr-18	<0.05	<0.05	<0.05	<0.05	0.02	<0.1	<0.05	<0.05	0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10I	U07-10I	6.65-8.15	L2161509-4	10-Sep-18	0.032	<0.01	0.016	0.018	<0.02	0.016	0.021	<0.03	<0.005	0.06	0.055	<0.01	<0.2	0.039	0.054	<0.06	AW-
U07-10D	U07-10D	8.5-10.65		28-Aug-07	30.4	<0.2	0.322	<0.05	0.034	<0.05	<0.05	<0.09	<0.05	0.442	5.45	<0.05	<2.	2.07	**0.273**	<0.3	**AW+**
U07-10D	U07-10D	8.5-10.65		09-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		28-Aug-08	10.3	<0.05	0.068	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	0.176	1.29	<0.05	<0.15	0.247	0.101	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		27-Apr-09	0.055	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		03-Sep-09	26.7	<0.05	0.157	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.124	7.27	<0.05	<2.	0.981	0.059	<5.	AW-
U07-10D	U07-10D	8.5-10.65		19-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		07-Sep-10	8.58	<0.05	0.079	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.207	1.34	<0.05	<0.4	0.251	0.123	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		04-May-11	0.916	<0.05	0.149	0.201	0.059	0.155	<0.05	0.123	<0.05	1.25	0.557	<0.05	0.457	2.1	**0.926**	<0.05	**AW+**
U07-10D	U07-10D	8.5-10.65		28-Sep-11	7.	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.2	<0.05	<0.3	0.177	<0.05	<0.07	AW-
U07-10D	U07-10D	8.5-10.65		16-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		18-Sep-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65		9-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U7-10D	8.5-10.65		3-Sep-13	1.97	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.157	0.098	<0.05	<0.05	AW-
U07-10D	U7-10D	8.5-10.65	L1461846-2	28-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U7-10D	8.5-10.65	L1509397-3	27-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U7-10D	8.5-10.65	L1597686-3	10-Apr-15	0.065	<0.01	0.031	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.022	<0.01	0.055	<0.02	<0.01	<0.05	AW-
U07-10D	U07-10D	8.5-10.65	L1667283-2	2-Sep-15	0.324	<0.05	0.094	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.113	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65	L1745069-3	15-Mar-16	0.386	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.167	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65	L1832785-3	21-Sep-16	0.31	<0.05	<0.05	<0.05	<0.005	<0.01	<0.05	<0.05	<0.005	<0.05	0.158	<0.05	0.053	<0.05	<0.05	<0.05	AW-

TABLE A-3
AREAS 1 AND 3 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site-Specific Screening Levels (SSSLs)				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																	
U07-10D	U07-10D	8.5-10.65	L1917918-3	26-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65	L1995423-6	21-Sep-17	2.96	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.638	<0.05	<0.3	<0.05	<0.05	<0.3	AW-
U07-10D	U07-10D	8.5-10.65	L2080618-3	16-Apr-18	<0.05	<0.05	<0.05	<0.05	0.007	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U07-10D	U07-10D	8.5-10.65	L2170535-8	25-Sep-18	0.305	<0.01	<0.02	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.13	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
U07-10D	DUP-9	8.5-10.65	L2170535-10	25-Sep-18	0.371	<0.01	<0.03	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.174	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				25-Sep-18	19.5%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
Equipment Blank	EB-1		L1668270-4	3-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
Equipment Blank	EB-2		L1745070-3	15-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
Equipment Blank	EB-3		L1745070-4	15-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
Equipment Blank	E-BLANK-3		L1917194-8	25-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
Reported Detection Limit					0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 12 Amendments, January 2019)
NS	No standard established for indicated parameter
QA/QC	Quality assurance / quality control
RPD	Relative percent difference
mbgs	Metres below ground surface
µg/L	Micrograms per litre
ppb	Parts per billion
<	Sample concentration less than the reported detection limit indicated
---	Sample not analyzed for indicated parameter
BOLD	Sample concentration greater than CSR standard for aquatic life (AW)
BOLD RED HIGHLIGHTED	Exceeds Site Specific Screening Levels (SSSLs)

Notes

1 CSR AW standards apply to both freshwater and marine receiving environments
2 Criterion concentration reported in µg/L

Appendix B Area 2 Perimeter Monitoring Program

1 SCOPE OF WORK

In 2018, AECOM completed two groundwater monitoring and sampling events as part of the semi-annual Perimeter Monitoring Program (PMP) in Area 2 of the Parkland Burnaby Refinery (Refinery). The planning and execution of the events were timed such that one event was completed during the wet season and the other event was completed during the dry season. The dates of the 2018 sampling events are provided in Table 1.

Table 1 - Schedule

Event	Period
Wet Season	April 19 to May 30, 2018
Dry Season	August 20 to August 28, 2018

The Area 2 PMP included the monitoring and sampling (when sufficient water is present) of 39 groundwater monitoring wells. Each well is monitored and sampled in accordance with the field program methods for this program (Appendix E). The monitoring wells included in the 2018 PMP for Area 2 are included in Table 2.

Table 2 - Area 2 Monitoring Wells Included in the 2018 PMP, (Figure 3)

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

1.1 MONITORING SUMMARY

As part of the PMP, each groundwater monitoring well was monitored for headspace vapour, depth to product (if present), depth to water, and total depth of the monitoring well. If sufficient water was present the following parameters were measured in the field (current and historical data are provided in Table B-1):

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

During the 2018 PMP, seven wells were not sampled during the wet season event due to insufficient groundwater; two monitoring wells (G2-3B and G2-3C) were omitted from the sampling program due to a work plan adjustment miscommunication. These two monitoring wells were sampled during the 2018 dry season sampling event and will continue to be monitored on a semi-annual basis. During the dry season event, 22 monitoring wells could not be sampled due to insufficient groundwater.

To evaluate whether the missed sampling events were of concern, time series graphs (Graph B-1 through Graph B-3) were prepared for key detectable parameters in samples from monitoring wells G2-3B and G2-3C. As shown on Graphs B-1 through B-3, the groundwater quality in these wells has been historically stable, except for an increase in MTBE during the 2018 dry season sampling event in G2-3B. The reported concentration of MTBE in the August 2018 sample from G2-3B was 41.5 µg/L, which is less than one percent of the applicable CSR AW standard.

The list of monitoring wells that could not be sampled during the 2018 PMP are provided in Table 3, by sampling event. Unless otherwise indicated the wells could not be sampled due to insufficient water.

Table 3 - List of Monitoring Wells Not Sampled During 2018 PMP, by Event (Figure 3)

Wet Sampling Event (April/May)		Dry Sampling Event (August)	
PW03-2A	G2-3B*	PW03-2A	PW03-1A
PW03-2B	G2-3C*	PW03-2B	PW03-1B
PW03-4		PW03-4	PW03-03
PW03-6		PW03-6	PW03-05
MW02-02		MW02-02	U8
A2MW09-06S		A2MW09-06S	U9
A2MW09-10		A2MW09-10	MW02-03
		MW03-02	MW02-04
		MW03-03	A2MW09-11
		A2MW09-14	A2MW09-12
		A2MW09-15	A2MW09-13

Note:
** indicates a well not sampled for reasons other than insufficient water (additional information provided within text of the report)*

The field monitoring data collected for Area 2 monitoring wells are presented in Table B-1.

2 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples collected as part of the 2018 PMP were analyzed for one or more of the following parameters of concern:

- Petroleum hydrocarbons (PHCs) including one or more of light and heavy extractable petroleum hydrocarbons in water (LEPHw/HEPHw) and/or extractable petroleum hydrocarbons in water (EPHwC10-C19/EPHwC19-C32),
- Volatile hydrocarbons in water (VHwC6-C10),
- Volatile petroleum hydrocarbons in water (VPHw),
- Benzene/toluene/ethylbenzene/xylenes (BTEX),
- Styrene
- Methyl tert-butyl ether (MTBE),

- Polycyclic aromatic hydrocarbons (PAHs), and,
- Dissolved metals.

The current and historical reported analytical results for groundwater samples from these monitoring wells are presented in Tables B-2 through Table B-4. For reference, the 2018 laboratory Certificates of Analysis for the 2018 PMP data is provided in Appendix F.

The completed 2018 PMP analytical program for Area 2 is summarized in Table 4.

Table 4 - Area 2 PMP Analytical Program Summary

	Number of Monitoring Wells Sampled	
Parameter	**Wet Event**	**Dry Event**
LEPHw / HEPHw	30	17*
PAHs	30	17*
BTEX/VPHw/Styrene	30	17*
MTBE	5	7
Dissolved Metals	6	6

Note:
** - discrepancies in number of monitoring wells sampled are due to dry monitoring wells during the dry event; see report for details*

Site-Specific Screening Levels (SSSLs) for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of AECOM, to evaluate potential risks from impacted Site groundwater to Burrard Inlet. Refer to Appendix D for additional information on the development of the SSSLs. The results of the PMP groundwater samples are compared to the SSSLs as well as the Contaminated Sites Regulation (CSR) standards for the protection of marine aquatic life (AW) (CSR standards). SSSLs represent a concentration above which will indicate the need for further assessment/evaluation or remedial action. For those parameters where SSSLs are not available, the CSR standards will be the basis to evaluate the need for further assessment or remedial action. A summary of the number of samples containing concentrations of the analyzed parameters above and below the established triggers for further assessment are summarized in Table 5.

Table 5 - Overview of Area 2 Groundwater Results

Parameter	**Wet Event**			**Dry Event**		
	Result Below RDL	**Detectable Result Below SSSLs**	**Result Above SSSLs**	**Result Below RDL**	**Detectable Result Below SSSLs**	**Result Above SSSLs**
LEPHw	23	7	0	16	1	0
EPHw (C10-<C19)	23	7	0	16	1	0
PAHs	20	10	0	11	6	0

Parameter	Wet Event			Dry Event		
	Result Below RDL	Detectable Result Below SSSLs	Result Above SSSLs	Result Below RDL	Detectable Result Below SSSLs	Result Above SSSLs
BTEX	24	5	1	12	5	0
VHw (C6-C10)	24	6	0	15	2	0
VPHw	24	6	0	15	2	0
Styrene	30	0	0	17	0	0
MTBE	2	3	0	1	6	0
Dissolved Metals	0	6	0	0	6	0

Note:
RDL= Reported Detection Limit

Reported concentrations in groundwater samples above the SSSLs and CSR standards applicable at the Refinery for at least one sampling event in 2018 are summarized, by well, in Table 6 and Figure 3 (Main Report).

Table 6 - Summary of Samples with Concentrations Above the Site Standards

Monitoring Well ID	Parameter Greater Than the CSR AW Standards	Parameters Greater Than the SSSLs
G2-3B	Pyrene	-
G2-10	Pyrene	-
MW03-03	LEPHw	-
A2 MW09-05I	LEPHw	-
A2MW09-06I	LEPHw, Acridine*, and Pyrene	-
A2MW09-11	LEPHw, VPHw, and Naphthalene	Xylenes
A2MW09-15	LEPHw	-
U9	LEPHw	-

Note:
**The RDL for acridine in A2MW09-06I was raised above the CSR AW standard.*

Additional details for samples collected from the monitoring wells listed in Table 6 are summarized below. Interpretation of groundwater quality trends with respect to the PES operation is provided in the main body of the 2018 PMP and PES report.

- The single Area 2 SSSL exceedance in 2018 was the reported xylenes concentration in the sample collected from A2MW09-11 during the wet season event. The reported concentrations of LEPHw, VPHw, and naphthalene were above the CSR AW standards in the same sample. A2MW09-11 could not be sampled during the dry season sampling event due to insufficient water in the well. In all instances the reported concentrations were within the historical ranges observed in samples from this well between 2016 and 2017 for their respective parameters. A time series graph for these parameters is provided as Graph B-4. This well is located down gradient of the central section of the PES in the vicinity of UEIB-46. Additional evaluation of the groundwater concentrations reported for A2MW09-11 with respect to legacy contamination in this area and the upgradient PES performance are evaluated within the main body of this report.
- G2-3B was sampled once in 2018 during the dry season event. The reported concentration of pyrene was above CSR AW standards and generally consistent with samples collected historically from this monitoring well. G2-3B is located west of the PES and outside of its influence.
- The concentration of pyrene in samples collected from G2-10 in May and August 2018 was 0.296 µg/L and 0.015 µg/L, respectively. These represent the first detections of pyrene at this location since PAH analyses were added to the program for this well in 2015. The reported concentration of pyrene from the August 2018 sample is below the CSR AW standard as well as the reported detection limit historically reported for pyrene. This monitoring well is located east of the PES and outside of its influence.
- MW03-03 was sampled once in 2018 during the wet season event. The reported concentration of LEPHw was lower than the 2017 wet season sampling event and within the range of historical concentrations. This well is located downgradient of the eastern section of the PES in the vicinity of UEIB-29.
- A2MW09-05I was sampled twice during the wet season event and once during the dry season event. As part of the quality assurance program, a parent sample and a duplicate sample were collected and analyzed for LEPH/HEPH, VPH, BTEX, and PAH parameters. The relative percent differences (RPDs) between the parent and duplicate sample were acceptable (i.e. <10.6%), except for the LEPHw/HEPHw parameters where there was an RPD of approximately 125%. Due to this discrepancy, A2MW09-05I was re-sampled on May 30, 2018. At that time a parent and duplicate sample were collected and acceptable RPDs were observed between the two samples. Of the three parent samples collected in 2018, the reported concentration of LEPHw in the sample collected on April 26, 2018 represents the single CSR AW exceedance. In this instance, the reported concentration of LEPHw was within the historical range observed at this sample location. Additionally, the reported concertation of LEPHw in the two subsequent samples was less than the CSR AW standard. This monitoring well is located downgradient of the central section of the PES in the vicinity of UEIB-51.
- A2MW09-06I was sampled in 2018 during both events. During the 2018 wet season event, the highest reported concentrations for LEPHw and pyrene were observed. Also during the wet sampling event, the RDL for acridine was raised above the CSR AW standard. During the dry season event, the reported concentrations of LEPHw, acridine, and pyrene were below the CSR AW standards and generally consistent with historically concentrations collected from this monitoring well. This monitoring well is located down gradient of the west section of the PES in the vicinity of UEIB-32.
- A2MW09-15 was sampled once in 2018 during the wet season event. The reported concentration of LEPHw was generally consistent with samples historically collected from this monitoring well. This well is located down gradient of the eastern section of the PES in the vicinity of UEIB-56.
- U9 was sampled once in 2018 during the wet season event; U9 could not be sampling during the dry sampling event due to insufficient water. The 2018 reported concentration of LEPHw (560 µg/L) was the highest reported concentration since the 2012 wet season event. U9 is located down gradient of the central section of the PES in the vicinity of UEIB-51 and UEIB-52.

In addition to PHC related parameters, samples collected from MW11-3S/I/D and MW11-4S/I/D have been analyzed for dissolved metals. The analyses of dissolved metals were first introduced in 2014 to

MW11-4S and MW11-4I. In 2015 dissolved metal analyses was expanded to MW11-3S/I/D and MW11-4D as a result of the dissolved copper reported in samples from MW11-4S. At no time since their introduction to the PMP have reported concentrations of dissolved metals exceeded the CSR AW standards in samples from MW11-3S/I/D or MW-114I/D. Since the 2017 dry season sampling event the concentration of dissolved copper in samples collected from MW11-4S have also been below the CSR AW standard.

2.1 MTBE REMEDIATION

The remediation of MTBE in Area 2 is considered complete (AECOM, 2017). In 2017, sampling activities in the vicinity of this dormant system were reduced to five groundwater monitoring wells (G2-9A, G2-9B, G2-10, WS2-D, and WS2-D2). These monitoring wells are screened across the water table and provide appropriate coverage to monitor groundwater. Ongoing sampling of the five wells continue to support MTBE (and PHC) monitoring of the area. An additional two wells (G2-3B and G2-3C), which were sampled as part of the 2018 PMP, included MTBE analysis due to their proximity to the remediated MTBE area. The concentrations of MTBE reported in samples collected during the 2018 PMP were generally similar to concentrations reported in 2017 samples.

3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To confirm the integrity and reliability of the data, AECOM field staff followed pre-existing QA/QC protocols during the 2018 PMP. These procedures have resulted in a high-quality dataset that is representative of the groundwater quality and achieves the project objectives for monitoring as described in Appendix G.

3.1 Travel Blanks

During the 2018 wet and dry season events, ten travel blank samples were submitted with groundwater samples and analyzed for BTEX/VPHw, VHw_{C6-C10}, styrene and MTBE. Concentrations for all samples were less than the reported detection limits (RDLs), except for Travel Blank-1 that had detectable xylenes concentrations. The reported analytical results for the travel blanks are represented in the laboratory Certificates of Analysis provided in Appendix F and summarized in Table B-2.

Based on review of the analytical associated with Travel Blank-1 and consultation with the project laboratory it doesn't appear that the travel blank result would affect the findings, conclusions, or recommendations associated with the accompanying analyses.

3.2 Precision

Relative percent differences (RPDs) are presented for duplicate samples in Tables B-2, B-3, and B-4.

RPDs were calculated for BTEX/VPHw, VHw_{C6-C10}, LEPHw/HEPHw, $EPHw_{C10-C19}$/$EPHw_{C19-C32}$, PAHs, styrene, dissolved metals, and MTBE in instances where the concentrations were five times the reported detection limit or greater. The average and median values were calculated using the absolute RPD numbers. It should be noted that the data set is small for statistical purposes as the majority of reported concentrations were less than the RDLs. During the 2018 wet and dry season sampling events, 8 duplicates samples were collected. Of the samples collected, a total of 19 parameters were suitable for RDP calculations. The average, median, maximum, and minimum RPDs of the field duplicates are presented below:

Relative Percent Differences (RPDs) of Duplicate Analyses

Sample Type	Average RPD (%)	Median RPD (%)	Maximum RPD (%)	Minimum RPD (%)
Groundwater Samples				
Organic Parameters (LEPHw/HEPHw, EPHw, VPHw, VHw, BTEX, MTBE, and PAHs)	4.2	2.3	11.9	0.7
Inorganic Parameters (Dissolved Metals)	2.3	1.4	8.1	0.0

The average RPD value of organic parameters (4.2%) indicates a good correlation for duplicate pairings for the entire analytical program. The maximum RPD value of 11.9% was calculated using the reported fluorene concentration from well A2MW09-05I and its corresponding duplicate (DUP-14). The average RPD value of inorganic parameters (2.3%) indicates a good correlation for duplicate pairings for the entire analytical program. The maximum RPD value of 8.1% was calculated using the reported calcium concentration from well MW11-3S and its corresponding duplicate (DUP-1).

The British Columbia (BC) Ministry of Environment and Climate Change Strategy (ENV) has provided guidance indicating that field RPDs[5] within 1.5 times the laboratory RPDs as defined in the BC Environmental Laboratory Manual[6] are acceptable. Therefore, acceptable field RPDs of 30% and 45% are acceptable for inorganic and organic parameters, respectively. Based on this guidance and the above results, the calculated RPDs for organic and inorganic parameters in groundwater are within acceptable limits; therefore, they do not add uncertainty to the findings of the monitoring program.

Although the parent sample collected from A2MW09-05I on April 26, 2018 was below five times the RDL, the discrepancy between the parent sample and its duplicate of 125% was flagged as a concern. In response to the data concern the well was resampled on May 30, 2018 where both a parent and duplicate sample were collected. The parent sample collected on April 26 and May 30 as well as the field duplicate collected on May 30, 2018 are included in Tables A-2 and A-3.

3.3 Accuracy

Analytical accuracy was confirmed in a review of percent recoveries reported in the laboratory reports. Percent recoveries are obtained when the project laboratory analyzes samples with known concentrations and compares their analytical results to the known concentrations. The laboratory provided percent recoveries for the majority of the organic parameter analyses. All reported laboratory control spike (LCS) sample recoveries and matrix control spike (MS) sample recoveries were within laboratory quality control (QC) limits or were outside of laboratory QC limits but associated results were not affected.

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

3.4 Completeness

No samples from either sampling events were invalidated by ALS Canada Ltd., the project laboratory. Completeness for the 2018 program was therefore 100%.

[5] British Columbia Environmental Laboratory Manual (2015) http://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a.pdf

[6] BC ENV, 2015. British Columbia Environmental Laboratory Manual - Section A: Laboratory Quality Assurance / Quality Control: 2015. Victoria, BC. https://www2.gov.bc.ca/assets/gov/environment/research-monitoring-and-reporting/monitoring/emre/lab-manual/section-a.pdf

4 SUMMARY AND CONCLUSIONS

The semi-annual PMP was successfully completed in Area 2 of the Parkland Burnaby Refinery. All reported concentrations were below the SSSLs established for the Refinery except for the reported xylenes concentration at A2MW09-11 which last exceeded the SSSLs for xylenes in 2016. Due to A2MW09-11 location downgradient of the PES the increase in this well will be further evaluated alongside the PES performance in the main body of the report. The concentration of xylenes will continue to be monitored in 2019.

Concentrations of select parameters, above the applicable CSR AW standards, were reported for samples collected from eight monitoring wells (G2-3B, G2-10, MW03-03, A2MW09-05I, A2MW09-06I, A2MW09-11, A2MW09-15, and U9). The parameters, by well, are summarized in Table 7.

Table 7 - Summary of Samples below SSSLs but above the CSR AW Standards

Monitoring Well ID	Parameter Greater Than the CSR AW Standards
G2-3B	Pyrene
G2-10	Pyrene
MW03-03	LEPHw
A2 MW09-05I	LEPHw
A2MW09-06I	LEPHw, Acridine*, Pyrene
A2MW09-11	LEPHw, VPHw, and Naphthalene
A2MW09-15	LEPHw
U9	LEPHw

Note:

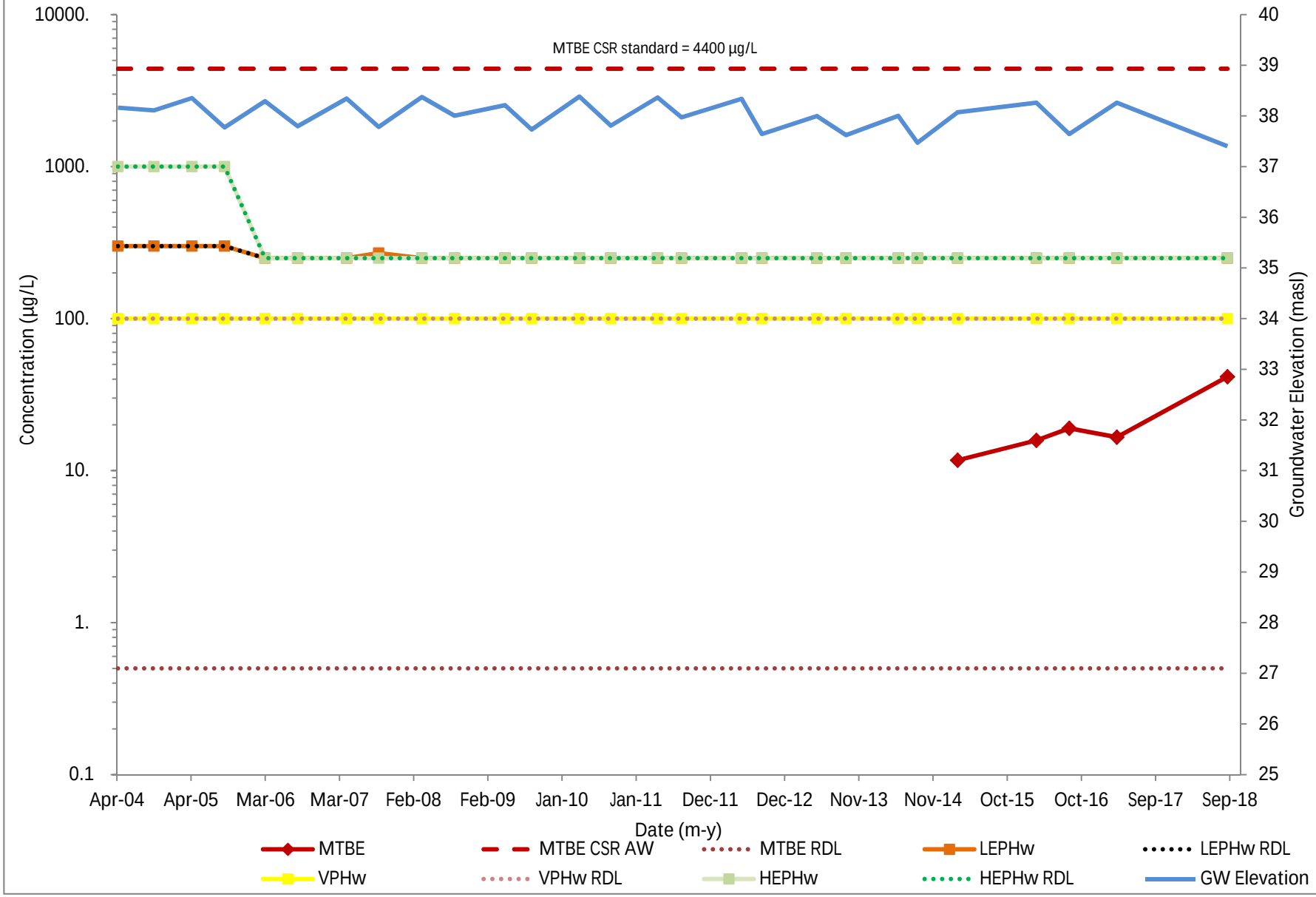
**The RDL for acridine in A2MW09-06I was raised above the CSR AW standard.*

All monitoring wells listed in Table 7 except for G2-3B and G2-10 are located down gradient of the PES. Further analysis of the groundwater sampling results is discussed in context with the PES operation in the main body of the 2018 PMP and PES summary report. The concentration of pyrene in the two wells outside of the PES influence (G2-3B and G2-10) were marginally above the CSR AW standard of 0.2 µg/L and below the SSSL of 40 µg/L.

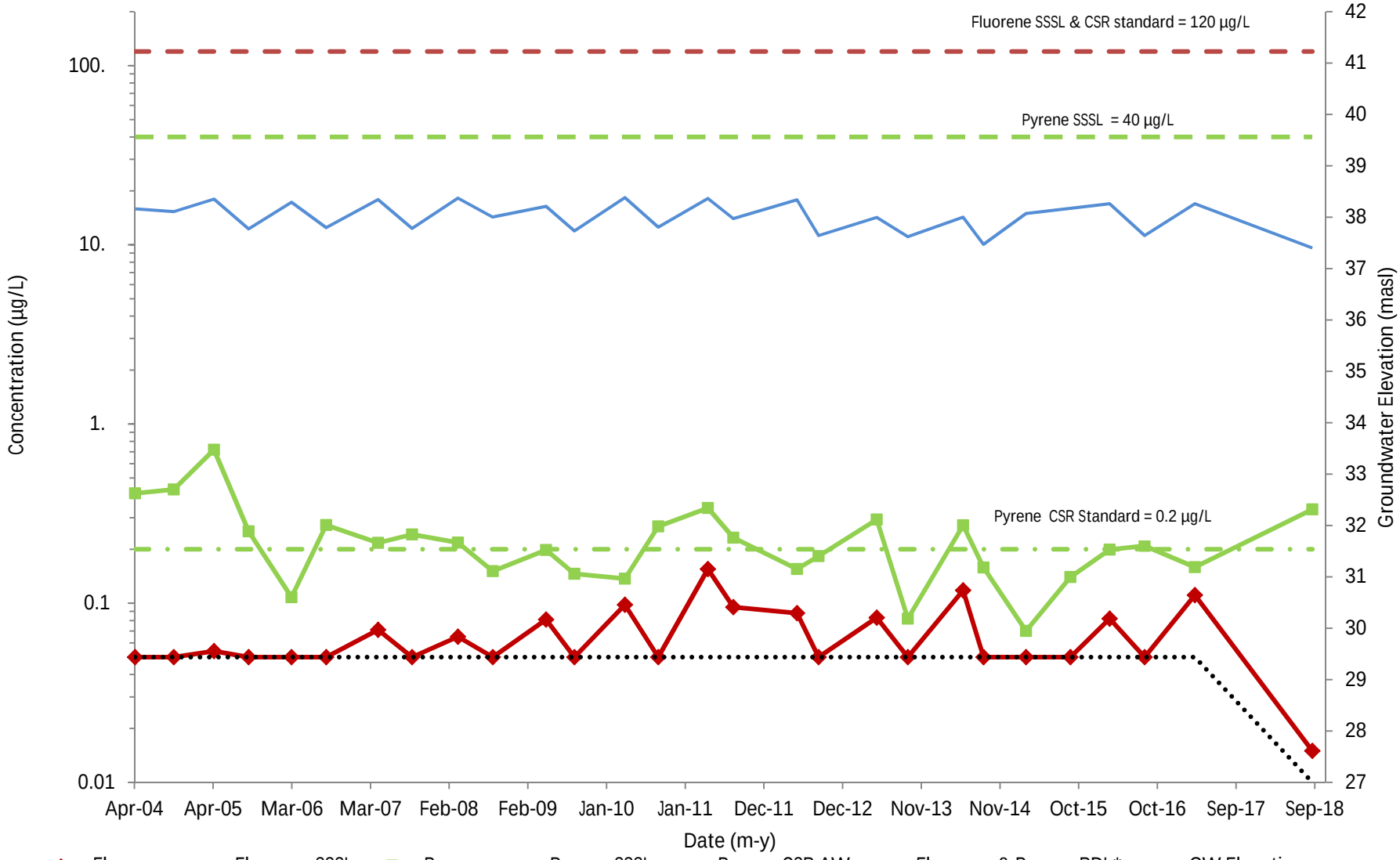
Due to the observed reduction of dissolved copper in the 2018 samples from MW11-4S and the historical stability of dissolved copper below the CSR AW standard in samples collected from MW11-3S/I/D and MW11-4I/D, dissolved metals analyses will be removed from the PMP analytical program for five wells (MW11-3S/I/D and MW11-4I/D). The sample collected from MW11-4S will continue to be analyzed for dissolved copper throughout 2019.

The 2018 Site perimeter groundwater quality conditions have not significantly changed when compared to recent historical data. The results of the 2018 PMP for Area 2 do not indicate an immediate need for additional investigation, evaluation, or remediation outside of the continued operation of the PES.

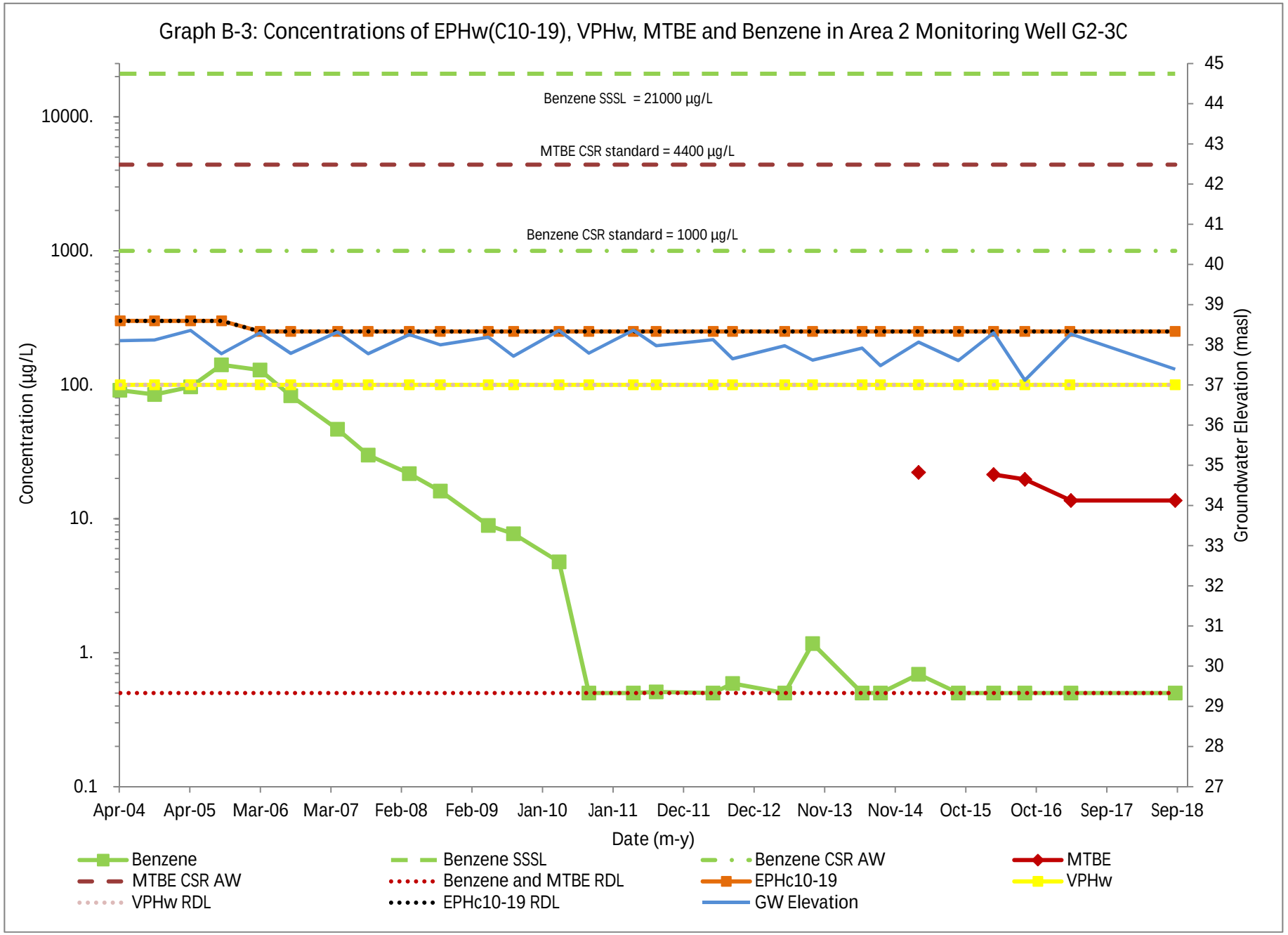
Graph B-1: Concentrations of LEPHw, HEPHw, VPHw, and MTBE in Area 2 Monitoring Well G2-3B



Graph B-2: Concentratons of Pyrene & Fluorene in Area 2 Monitoring Well G2-3B



* The laboratory reported detection limit (RDL) was reduced from 0.05 µg/l to 0.01 µg/L in 2018


Graph B-3: Concentrations of EPHw(C10-19), VPHw, MTBE and Benzene in Area 2 Monitoring Well G2-3C
Benzene SSSL = 21000 µg/L
MTBE CSR standard = 4400 µg/L
Benzene CSR standard = 1000 µg/L
Concentration (µg/L)
10000.
1000.
100.
10.
1.
0.1
Groundwater Elevation (masl)
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
Apr-04
Apr-05
Mar-06
Mar-07
Feb-08
Feb-09
Jan-10
Jan-11
Dec-11
Dec-12
Nov-13
Nov-14
Oct-15
Oct-16
Sep-17
Sep-18
Date (m-y)
Benzene
Benzene SSSL
Benzene CSR AW
MTBE
MTBE CSR AW
Benzene and MTBE RDL
EPHc10-19
VPHw
VPHw RDL
EPHc10-19 RDL
GW Elevation

Graph B-4: Concentration of LEPHw, VHw, Toluene, Xylenes, and Naphthalene in Area 2 Monitoring Well A2MW09-11

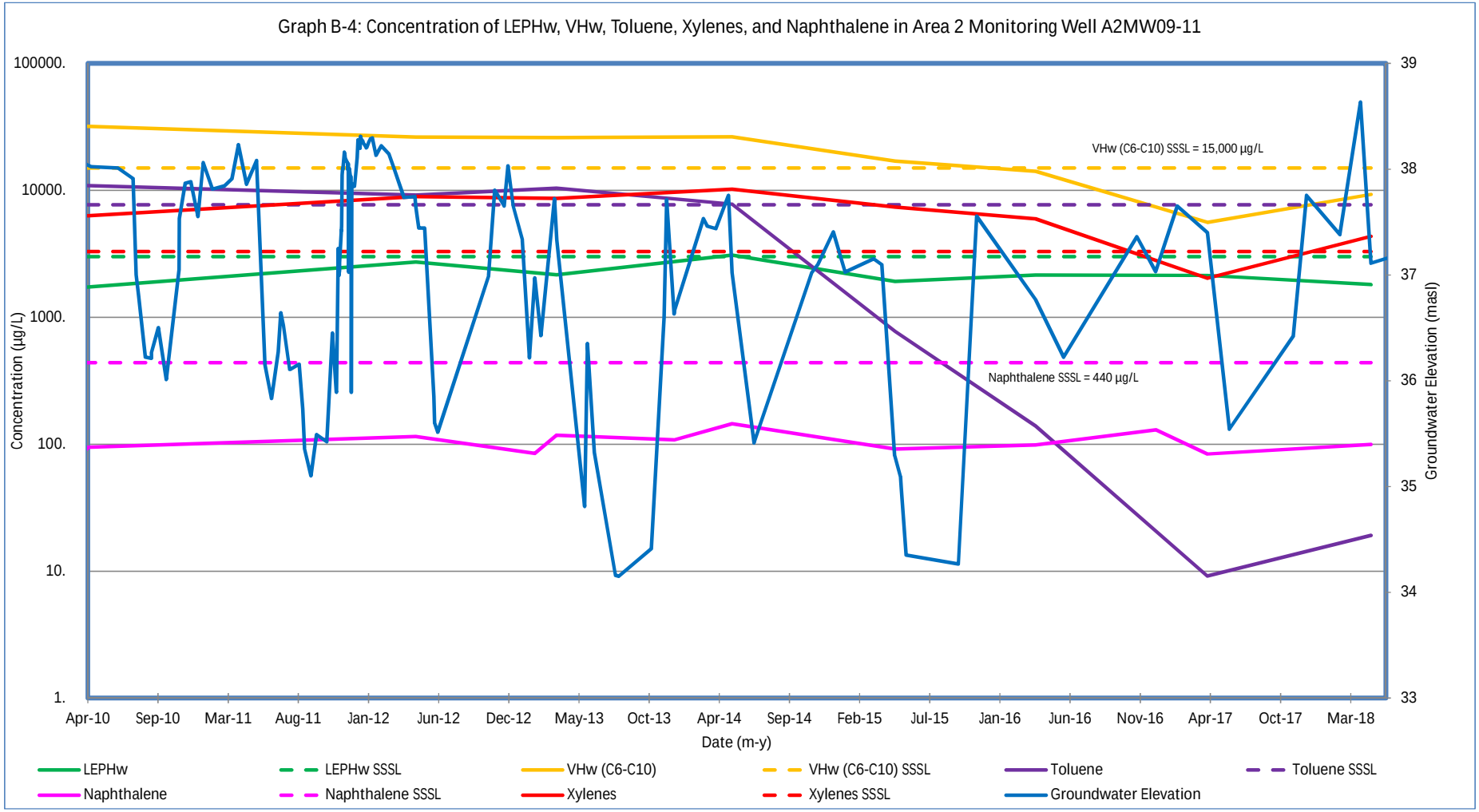


TABLE B-1
AREA 2 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)[1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
G2-3B	G2-3B	10.1-13.1	26-Apr-04	11.300	45.86	45.742	50	nd	na	7.580	38.162	nm	6.67	14.2	555	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	15-Oct-04	11.320	45.86	45.742	175	nd	na	7.632	38.110	nm	6.85	14.1	834	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	12-Apr-05	11.370	45.86	45.742	375	nd	na	7.390	38.352	nm	6.67	13.8	752	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	12-Sep-05	11.350	45.86	45.742	40	nd	na	7.970	37.772	nm	6.65	14.5	632	nm	nm	nm	Sample collected 13-Sept-05.
G2-3B	G2-3B	10.1-13.1	22-Mar-06	11.450	45.86	45.742	30	nd	na	7.450	38.292	8.65	nm	nm	nm	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	22-Aug-06	11.340	45.86	45.742	20	nd	na	7.945	37.797	1.95	6.75	14	50.7	nm	nm	nm	DUP-5
G2-3B	G2-3B	10.1-13.1	11-Apr-07	11.300	45.86	45.742	25	nd	na	7.400	38.342	0.29	6.94	13.2	759	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	10-Sep-07	11.320	45.86	45.742	60	nd	na	7.960	37.782	0.22	7.21	14.5	741	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	1-Apr-08	11.355	45.86	45.742	30	nd	na	7.370	38.372	0.24	6.27	13.3	707	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	2-Sep-08	11.321	45.86	45.742	50	nd	na	7.738	38.004	0.5	nm	13.6	748	nm	nm	nm	---
G2-3B	G2-3B	10.1-13.1	28-Apr-09	11.318	45.86	45.742	25	nd	na	7.530	38.212	0.6	6.62	15.4	1590	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	31-Aug-09	11.300	45.86	45.742	25	nd	na	8.010	37.732	0.6	6.34	14.1	721	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	14-Apr-10	11.320	45.86	45.742	5	nd	na	7.360	38.382	0.38	6.53	13.4	790	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	9-Sep-10	11.305	45.86	45.742	nd	nd	na	7.935	37.807	0.17	6.19	14.2	712	nm	nm	nm	Mostly Clear
G2-3B	G2-3B	10.1-13.1	18-Apr-11	10.365	45.86	45.742	80	nd	na	7.378	38.364	0.87	6.42	13.5	712	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	9-Aug-11	11.220	45.86	45.742	35	nd	na	7.770	37.972	0.53	6.38	12.58	431	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	17-May-12	10.385	45.86	45.742	20	nd	na	7.650	38.092	0.21	6.89	12.97	499	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	22-Aug-12	10.370	45.86	45.742	30	nd	na	8.100	37.642	0.29	6.7	13.3	570	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	8-May-13	10.385	45.86	45.742	20	nd	na	7.745	37.997	2.42	6.49	15.06	551	nm	nm	nm	Sampled with downhole pump; Clear
G2-3B	G2-3B	10.1-13.1	23-Sep-13	10.390	45.86	45.742	10	nd	na	8.120	37.622	4.16	6.3	14.15	220	nm	nm	nm	Clear
G2-3B	G2-3B	10.1-13.1	27-May-14	10.370	45.86	45.742	130	nd	na	7.740	38.002	2.25	6.03	14.41	568	0.463	0.35	-29	---
G2-3B	G2-3B	10.1-13.1	26-Aug-14	10.400	45.86	45.742	nm	nd	na	8.270	37.472	1.82	6.24	14.78	502	0.406	0.31	-79.1	Clear
G2-3B	G2-3B	10.1-13.1	3-Mar-15	10.380	45.86	45.742	5	nd	na	7.670	38.072	1.12	6.13	12.75	406	0.344	0.26	-172	---
G2-3B	G2-3B	10.1-13.1	16-Sep-15	10.420	45.86	45.742	30	nd	na	8.130	37.612	0.20	6.49	15.33	542	0.433	0.33	3.7	Clear
G2-3B	G2-3B	10.1-13.1	9-Mar-16	10.390	45.86	45.742	nd	nd	na	7.480	38.262	0.37	6.52	12.42	494	0.423	0.32	-142.7	Clear
G2-3B	G2-3B	10.1-13.1	11-Aug-16	10.390	45.86	45.742	5	nd	na	8.100	37.642	0.48	6.44	14.35	330	0.272	0.2	-46.4	Clear
G2-3B	G2-3B	10.1-13.1	23-Mar-17	10.390	45.86	45.742	nd	nd	na	7.480	38.262	0.57	6.31	13.64	490	0.41	0.31	-82.3	Clear
G2-3B	G2-3B	10.1-13.1	27-Aug-18	10.418	45.86	45.742	nd	nd	na	8.341	37.401	3.39	6.38	13.47	597	0.497	0.38	-20.2	Clear
G2-3C	G2-3C	18.3-22.9	26-Apr-04	21.260	45.82	45.717	20	nd	na	7.615	38.102	nm	7.03	13.7	580	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	15-Oct-04	21.230	45.82	45.717	100	nd	na	7.599	38.118	nm	7.09	13.9	704	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	12-Apr-05	20.950	45.82	45.717	425	nd	na	7.360	38.357	nm	7.07	13.1	816	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	12-Sep-05	21.040	45.82	45.717	70	nd	na	7.940	37.777	nm	7.11	14.6	736	nm	nm	nm	Sample collected 13-Sept-05.
G2-3C	G2-3C	18.3-22.9	22-Mar-06	21.050	45.82	45.717	225	nd	na	7.420	38.297	9.4	nm	nm	nm	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	22-Aug-06	21.020	45.82	45.717	15	nd	na	7.930	37.787	0.87	7.11	14.1	133.8	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	11-Apr-07	21.200	45.82	45.717	20	nd	na	7.400	38.317	0.17	7.24	13.1	890	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	10-Sep-07	21.050	45.82	45.717	80	nd	na	7.940	37.777	0.14	6.96	13.8	685	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	1-Apr-08	21.050	45.82	45.717	100	nd	na	7.465	38.252	0.28	6.62	12.9	833	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	2-Sep-08	21.023	45.82	45.717	50	nd	na	7.719	37.998	0.4	nm	13.8	917	nm	nm	nm	---
G2-3C	G2-3C	18.3-22.9	28-Apr-09	21.017	45.82	45.717	10	nd	na	7.528	38.189	0.3	6.62	15	1910	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	31-Aug-09	21.050	45.82	45.717	75	nd	na	8.000	37.717	0.3	6.96	13.7	878	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	14-Apr-10	21.045	45.82	45.717	nd	nd	na	7.360	38.357	0.03	6.93	13.1	949	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	9-Sep-10	21.015	45.82	45.717	nd	nd	na	7.925	37.792	0.1	6.59	14.9	918	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	18-Apr-11	21.020	45.82	45.717	nd	nd	na	7.354	38.363	0.25	6.82	14.1	875	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	9-Aug-11	21.000	45.82	45.717	45	nd	na	7.740	37.977	6.55	6.43	12.8	75	nm	nm	nm	Clear (DUP-3)
G2-3C	G2-3C	18.3-22.9	17-May-12	21.020	45.82	45.717	nd	nd	na	7.590	38.127	3.05	5.57	13.61	396	nm	nm	nm	Slightly silty; Purged dry at 27 L
G2-3C	G2-3C	18.3-22.9	22-Aug-12	21.000	45.82	45.717	35	nd	na	8.065	37.652	3.32	7.18	13.4	790	nm	nm	nm	Clear; used Bailer
G2-3C	G2-3C	18.3-22.9	8-May-13	21.020	45.82	45.717	15	nd	na	7.740	37.977	2.7	6.89	14.51	662	nm	nm	nm	Sampled with downhole pump; Clear
G2-3C	G2-3C	18.3-22.9	23-Sep-13	21.010	45.82	45.717	20	nd	na	8.100	37.617	0.76	6.71	12.99	635	nm	nm	nm	Clear
G2-3C	G2-3C	18.3-22.9	27-May-14	20.980	45.82	45.717	180	nd	na	7.800	37.917	2.03	6.47	14.13	608	0.498	0.38	-60.7	Clear
G2-3C	G2-3C	18.3-22.9	26-Aug-14	21.020	45.82	45.717	nm	nd	na	8.235	37.482	0.36	6.35	13.09	575	0.484	0.37	-20.5	Clear; DUP-17
G2-3C	G2-3C	18.3-22.9	3-Mar-15	21.010	45.82	45.717	20	nd	na	7.650	38.067	7.61	6.75	11.35	406	0.357	0.27	-60.2	---
G2-3C	G2-3C	18.3-22.9	16-Sep-15	21.080	45.82	45.717	15	nd	na	8.110	37.607	0.82	5.82	13.24	542	0.454	0.34	-20.5	Clear
G2-3C	G2-3C	18.3-22.9	9-Mar-16	20.750	45.82	45.717	25	nd	na	7.420	38.297	0.81	6.86	12	488	0.422	0.32	-133.4	Clear
G2-3C	G2-3C	18.3-22.9	11-Aug-16	21.030	45.82	45.717	10	nd	na	8.600	37.117	2.59	7.46	14.1	493	0.404	0.3	-50	Clear
G2-3C	G2-3C	18.3-22.9	28-Mar-17	20.980	45.82	45.717	nd	nd	na	7.450	38.267	0.26	6.97	12.06	495	0.397	0.2	-151.3	Clear
G2-3C	G2-3C	18.3-22.9	27-Aug-18	21.213	45.82	45.717	40	nd	na	8.324	37.393	1.65	7.14	14.79	564	0.455	0.34	-52.3	Clear, Dup-2
G2-9A	G2-9A	6.1-9.1	7-May-04	9.100	44.51	44.639	>11000	nd	na	7.870	36.769	nm	6.37	13.5	336	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	15-Oct-04	9.050	44.51	44.639	4950	nd	na	7.690	36.949	nm	6.86	14.5	604	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	12-Apr-05	9.000	44.51	44.639	2200	nd	na	7.175	37.464	nm	6.43	13	379	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	12-Sep-05	9.090	44.51	44.639	10	nd	na	8.450	36.189	nm	6.45	15.8	478	nm	nm	nm	Sample collected 13-Sept-05
G2-9A	G2-9A	6.1-9.1	21-Mar-06	9.100	44.51	44.639	440	nd	na	7.450	37.189	1.7	6.77	12.2	265	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	30-Aug-06	9.100	44.51	44.639	150	nd	na	8.420	36.219	1.37	6.57	13.4	46.1	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	17-Apr-07	9.100	44.51	44.639	150	nd	na	7.460	37.179	0.48	6.75	13.8	400	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	10-Sep-07	9.100	44.51	44.639	40	nd	na	8.390	36.249	0.23	6.55	21.4	495	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	1-Apr-08	9.081	44.51	44.639	125	nd	na	7.372	37.267	0.12	6.63	11.8	373	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	27-Aug-08	9.092	44.51	44.639	50	nd	na	7.950	36.689	0.5	nm	13.8	577	nm	nm	nm	---
G2-9A	G2-9A	6.1-9.1	28-Apr-09	9.085	44.51	44.639	25	nd	na	7.421	37.218	0.7	7.06	13.9	889	nm	nm	nm	1st bailer clear mostly, 2nd cloudy
G2-9A	G2-9A	6.1-9.1	26-Aug-09	9.090	44.51	44.639	10	nd	na	7.230	37.409	0.2	6.29	14.8	488	nm	nm	nm	Low turbidity and sediment
G2-9A	G2-9A	6.1-9.1	14-Apr-10	9.100	44.51	44.639	nd	nd	na	7.125	37.514	0.06	6.18	15.6	619	nm	nm	nm	Clear
G2-9A	G2-9A	6.1-9.1	10-Sep-10	9.080	44.51	44.639	nd	nd	na	8.210	36.429	0.18	6.36	13.6	552	nm	nm	nm	Low turbidity and sediment
G2-9A	G2-9A	6.1-9.1	19-Apr-11	9.083	44.51	44.639	45	nd	na	7.077	37.562	0.39	nm	12.2	333	nm	nm	nm	Clear (pH probe not working)
G2-9A	G2-9A	6.1-9.1	9-Aug-11	9.075	44.51	44.639	15	nd	na	7.929	36.710	1.32	6.19	11.91	396	nm	nm	nm	Clear
G2-9A	G2-9A	6.1-9.1	17-May-12	9.090	44.51	44.639	15	nd	na	7.520	37.119	0.43	6.31	12.63	380	nm	nm	nm	Clear
G2-9A	G2-9A	6.1-9.1	22-Aug-12	9.080	44.51	44.639	5	nd	na	7.980	36.659	0.39	6.36	13.6	832	nm	nm	nm	Clear
G2-9A	G2-9A	6.1-9.1	14-May-13	8.080	44.51	44.639	10	nd	na	7.590	37.049	2.34	12.76	11.83	338	nm	nm	nm	Purged silty then Clear; PH not calibrated
G2-9A	ns	6.1-9.1	16-May-13	nm	44.51	44.639	nm	nm	na	nm	na	1.92	6.14	12.64	344	nm	nm	nm	Parameters Bailed out of well
G2-9A	G2-9A	6.1-9.1	23-Sep-13	9.080	44.51	44.639	45	nd	na	8.090	36.549	0.5	6.12	13.44	430	nm	nm	nm	Clear
G2-9A	G2-9A	6.1-9.1	26-May-14	9.070	44.51	44.639	20	nd	na	7.550	37.089	1.32	6.12	17.23	431	0.326	0.24	2.6	Murky
G2-9A	G2-9A	6.1-9.1	26-Aug-14	9.100	44.51	44.639	nm	nd	na	8.200	36.439	4.01	5.87	15.21	439	0.209	0.26	26.9	Slightly turbid
G2-9A	G2-9A	6.1-9.1	3-Mar-15	9.080	44.51	44.639	110	nd	na	7.440	37.199	0.25	5.89	13.07	344	0.29	0.22	64	---
G2-9A	G2-9A	6.1-9.1	16-Sep-15	9.110	44.51	44.639	300	nd	na	8.120	36.519	1.75	5.64	13.86	382	0.316	0.24	81.2	Clear
G2-9A	G2-9A	6.1-9.1	9-Mar-16	9.070	44.51	44.639	90	nd	na	6.990	37.649	0.47	6.04	12.56	252	0.215	0.16	97.9	Clear
G2-9A	G2-9A	6.1-9.1	11-Aug-16	9.080	44.51	44.639	15	nd	na	8.020	36.619	1.09	6.24	13.57	403	0.335	0.25	10.7	Clear
G2-9A	G2-9A	6.1-9.1	28-Mar-17	9.090	44.51	44.639	45	nd	na	6.990	37.649	0.6	6.06	12.66	257	0.219	0.16	-157.3	Clear
G2-9A	G2-9A	6.1-9.1	23-Aug-17	9.100	44.51	44.639	10	nd	na	8.210	36.429	0.48	5.86	14.9	411	0.331	0.25	55.1	Clear
G2-9A	G2-9A	6.1-9.1	1-May-18	9.063	44.51	44.639	nd	nd	na	7.417	37.222	1.97	6.06	13.53	376	0.313	0.23	60.2	Bailed; silty/grey
G2-9A	G2-9A	6.1-9.1	27-Aug-18	9.138	44.51	44.639	25	nd	na	8.309	36.330	4.35	6.31	13.5	475	0.395	0.3	116	Turbid
G2-9B	G2-9B	18.9-21.9	7-May-04	21.730	44.52	44.681	50	nd	na	8.160	36.521	nm	6.91	12.8	340	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	15-Oct-04	22.050	44.52	44.681	125	nd	na	7.901	36.780	nm	7.63	13.1	567	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	12-Apr-05	21.765	44.52	44.681	350	nd	na	7.530	37.151	nm	6.91	12.1	623	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	12-Sep-05	21.800	44.52	44.681	10	nd	na	8.580	36.101	nm	7.04	16.1	446	nm	nm	nm	Sample collected 13-Sept-05
G2-9B	G2-9B	18.9-21.9	21-Mar-06	21.800	44.52	44.681	70	nd	na	7.780	36.901	4.95	6.86	12.2	44	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	30-Aug-06	21.800	44.52	44.681	10	nd	na	8.540	36.141	1.5	7.38	13.8	81.2	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	17-Apr-07	21.800	44.52	44.681	10	nd	na	7.630	37.051	0.21	7.3	15.1	475	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	10-Sep-07	21.800	44.52	44.681	50	nd	na	8.570	36.111	0.14	7.27	15.4	473	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	1-Apr-08	21.800	44.52	44.681	100	nd	na	7.675	37.006	0.9	6.52	12	455	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	27-Aug-08	21.747	44.52	44.681	25	nd	na	8.091	36.590	0.3	nm	14	541	nm	nm	nm	---
G2-9B	G2-9B	18.9-21.9	28-Apr-09	21.768	44.52	44.681	nd	nd	na	7.763	36.918	0.5	7.32	14.4	1005	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	26-Aug-09	21.800	44.52	44.681	nd	nd	na	8.400	36.281	0.2	6.44	14.5	505	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	14-Apr-10	21.760	44.52	44.681	10	nd	na	7.490	37.191	0.08	6.85	13.1	541	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	9-Sep-10	21.760	44.52	44.681	nm	nd	na	8.430	36.251	0.3	6.99	15.2	522	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	19-Apr-11	21.760	44.52	44.681	nd	nd	na	7.608	37.073	0.3	nm	11.8	285	nm	nm	nm	Clear (pH probe not working)
G2-9B	G2-9B	18.9-21.9	9-Aug-11	21.744	44.52	44.681	15	nd	na	8.180	36.501	0.73	6.92	12.38	356	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	17-May-12	21.780	44.52	44.681	20	nd	na	7.870	36.811	1.36	7.06	13.1	421	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	20-Aug-12	21.760	44.52	44.681	10	nd	na	8.360	36.321	0.79	6.35	13.35	383	nm	nm	nm	Clear; DUP-11
G2-9B	G2-9B	18.9-21.9	8-May-13	21.770	44.52	44.681	nd	nd	na	7.920	36.761	1.15	7	14.36	400	nm	nm	nm	Sampled with downhole pump; Clear
G2-9B	G2-9B	18.9-21.9	23-Sep-13	21.760	44.52	44.681	5	nd	na	8.330	36.351	0.57	6.93	12.39	419	nm	nm	nm	Clear
G2-9B	G2-9B	18.9-21.9	26-May-14	21.740	44.52	44.681	15	nd	na	7.830	36.851	2.29	6.7	14.68	411	0.332	0.25	-41.4	Slight turbid; DUP-25
G2-9B	G2-9B	18.9-21.9	26-Aug-14	21.780	44.52	44.681	nm	nd	na	8.530	36.151	1.07	6.63	12.23	398	0.345	0.26	2.9	Clear
G2-9B	G2-9B	18.9-21.9	3-Mar-15	21.750	44.52	44.681	5	nd	na	7.790	36.891	3.63	6.74	12.74	396	0.335	0.25	-88	DUP-1
G2-9B	G2-9B	18.9-21.9	16-Sep-15	21.540	44.52	44.681	nd	nd	na	8.350	36.331	2.26	6.49	12.72	421	0.357	0.27	-28.1	Clear
G2-9B	G2-9B	18.9-21.9	9-Mar-16	21.780	44.52	44.681	5	nd	na	7.440	37.241	1.57	7.02	10.21	409	0.37	0.28	-5.6	Turbid
G2-9B	G2-9B	18.9-21.9	11-Aug-16	21.760	44.52	44.681	60	nd	na	8.310	36.371	2.54	5.72	13.1	401	0.337	0.25	37.2	---
G2-9B	G2-9B	18.9-21.9	28-Mar-17	21.750	44.52	44.681	nd	nd	na	7.450	37.231	0.38	6.99	11.78	391	0.338	0.25	-121.3	Clear
G2-9B	G2-9B	18.9-21.9	23-Aug-17	21.750	44.52	44.681	25	nd	na	8.560	36.121	2.8	7	14.22	426	0.348	0.26	14.4	Clear
G2-9B	G2-9B	18.9-21.9	2-May-18	21.746	44.52	44.681	nd	nd	na	7.733	36.948	3.96	6.49	13.37	479	0.4	0.3	41	Clear
G2-9B	G2-9B	18.9-21.9	27-Aug-18	21.946	44.52	44.681	20	nd	na	8.622	36.059	5.05	7.13	13.61	479	0.398	0.3	-3.8	Clear
G2-10	G2-10	4.9-6.4	26-Apr-04	6.120	45.16	45.349	150	nd	na	4.340	41.009	nm	5.72	11.6	191.1	nm	nm	nm	---
G2-10	G2-10	4.9-6.4	18-Oct-04	6.090	45.16	45.349	225	nd	na	4.130	41.219	nm	6.32	13.1	228	nm	nm	nm	---
G2-10	G2-10	4.9-6.4	12-Apr-05	6.090	45.16	45.349	nm	nd	na	3.510	41.839	nm	5.87	10.4	262	nm	nm	nm	---
G2-10	G2-10	4.9-6.4	12-Sep-05	6.140	45.16	45.349	nm	nd	na	5.950	39.399	nm	6.83	15.4	411	nm	nm	nm	Sample collected 13-Sept-05
G2-10	G2-10	4.9-6.4	20-Mar-06	6.140	45.16	45.349	130	nd	na	3.960	41.389	nm	5.65	10.2	137	nm	nm	nm	---
G2-10	G2-10	4.9-6.4	30-Aug-06	6.150	45.16	45.349	20	nd	na	6.140	39.209	nm	nm	nm	nm	nm	nm	nm	Trace groundwater; no sample
G2-10	G2-10	4.9-6.4	23-Apr-07	6.150	45.16	45.349	40	nd	na	3.755	41.594	NA	5.45	11.5	123	nm	nm	nm	---
G2-10	ns	4.9-6.4	11-Sep-07	6.150	45.16	45.349	60	nd	na	5.960	39.389	nm	nm	nm	nm	nm	nm	nm	Insufficient water to sample
G2-10	G2-10	4.9-6.4	1-Apr-08	6.150	45.16	45.349	75	nd	na	3.785	41.564	0.28	5.43	10.2	257	nm	nm	nm	---
G2-10	G2-10	4.9-6.4	2-Sep-08	6.300	45.16	45.349	25	nd	na	4.310	41.039	1	5.55	12.6	212	nm	nm	nm	Duplicate taken
G2-10	G2-10	4.9-6.4	28-Apr-09	6.137	45.16	45.349	125	nd	na	3.903	41.446	0.8	5.66	10.4	486	nm	nm	nm	Cloudy orange precipitate in first 2 L purged; Clear after
G2-10	ns	4.9-6.4	27-Aug-09	6.139	45.16	45.349	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No sample
G2-10	G2-10	4.9-6.4	14-Apr-10	6.150	45.16	45.349	nd	nd	na	3.636	41.713	0.71	5.76	11	306	nm	nm	nm	Orange sediment
G2-10	G2-10	4.9-6.4	9-Sep-10	6.135	45.16	45.349	60	nd	na	5.539	39.810	0.3	5.78	13.3	363	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	20-Apr-11	6.136	45.16	45.349	160	nd	na	3.447	41.902	0.47	5.83	10.7	249	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	13-Sep-11	6.140	45.16	45.349	40	nd	na	5.440	39.909	3.07	5.64	13.09	257	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	28-May-12	6.150	45.16	45.349	15	nd	na	4.380	40.969	0.58	5.04	10.39	174	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	20-Aug-12	6.135	45.16	45.349	10	nd	na	5.240	40.109	2.77	5.24	11.46	202	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	22-Apr-13	6.150	45.16	45.349	90	nd	na	3.290	42.059	2.5	5.51	10.3	197	nm	nm	nm	Orange biofoul in well - purged until Clear
G2-10	G2-10	4.9-6.4	22-Aug-13	6.120	45.16	45.349	75	nd	na	5.480	39.869	1.2	5.21	13.23	250	nm	nm	nm	Clear
G2-10	G2-10	4.9-6.4	15-May-14	6.130	45.16	45.349	10	nd	na	3.500	41.849	15.72	4.75	10.66	219	0.196	0.14	-281.3	Clear
G2-10	G2-10	4.9-6.4	20-Aug-14	6.140	45.16	45.349	25	nd	na	5.430	39.919	1.5	4.84	13.04	224	0.189	0.14	152.7	Clear
G2-10	G2-10	4.9-6.4	3-Mar-15	6.140	45.16	45.349	360	nd	na	3.790	41.559	0.27	5.41	11.09	236	0.209	0.15	177.7	---
G2-10	G2-10	4.9-6.4	16-Sep-15	6.160	45.16	45.349	75	nd	na	5.610	39.739	0.53	5.57	13.36	290	0.242	0.18	138.7	Clear
G2-10	G2-10	4.9-6.4	7-Mar-16	6.150	45.16	45.349	200	nd	na	3.055	42.294	1.43	4.27	10.75	231	0.206	0.15	276.4	Clear
G2-10	G2-10	4.9-6.4	10-Aug-16	6.140	45.16	45.349	35	nd	na	4.970	40.379	1.96	10.38	13.9	212	0.175	0.13	150.8	Clear
G2-10	G2-10	4.9-6.4	28-Mar-17	6.120	45.16	45.349	140	nd	na	2.830	42.519	0.18	5.87	9.46	228	0.211	0.16	-85.9	Clear
G2-10	G2-10	4.9-6.4	23-Aug-17	6.150	45.16	45.349	70	nd	na	5.080	40.269	2.8	7	14.22	426	0.348	0.26	14.4	Clear
G2-10	G2-10	4.9-6.4	1-May-18	6.127	45.16	45.349	30	nd	na	3.439	41.910	1.88	5.54	10.79	391	0.349	0.26	107.2	Bailed; silty and grey
G2-10	G2-10	4.9-6.4	27-Aug-18	6.121	45.16	45.349	80	nd	na	5.855	39.494	3.88	5.79	13.56	318	0.265	0.2	158.2	Clear
G2-11A	G2-11A	4.6-6.1	29-Apr-04	5.990	50.46	50.341	2750	nd	na	5.550	44.791	nm	6.08	12.2	424	nm	nm	nm	---
G2-11A	G2-11A	4.6-6.1	12-Oct-04	6.007	50.46	50.341	8250	nd	na	5.439	44.902	nm	6.01	14.1	2500	nm	nm	nm	---
G2-11A	G2-11A	4.6-6.1	11-Apr-05	6.007	50.46	50.341	nm	nd	na	5.450	44.891	nm	6.18	12.2	3400	nm	nm	nm	---
G2-11A	G2-11A	4.6-6.1	20-Sep-05	6.000	50.46	50.341	nm	nd	na	5.650	44.691	nm	6.17	16.2	4060	nm	nm	nm	Sample collected 21-Sept-05; Samples collected before parameters
G2-11A	G2-11A	4.6-6.1	27-Mar-06	5.950	50.46	50.341	550	nd	na	5.470	44.871	nm	5.95	12.1	103.2	nm	nm	nm	---
G2-11A	ns	4.6-6.1	30-Aug-06	5.950	50.46	50.341	nm	nd	na	5.780	44.561	nm	nm	nm	nm	nm	nm	nm	Insufficient water to sample
G2-11A	G2-11A	4.6-6.1	17-Apr-07	6.000	50.46	50.341	260	nd	na	5.500	44.841	0.14	nm	9.9	3480	nm	nm	nm	DUP (G2-11AX)
G2-11A	G2-11A	4.6-6.1	4-Sep-07	6.020	50.46	50.341	6600	nd	na	5.630	44.711	0.53	6.08	15.2	3590	nm	nm	nm	---
G2-11A	G2-11A	4.6-6.1	8-Apr-08	6.011	50.46	50.341	250	nd	na	5.055	45.286	0.62	6.04	11.5	2280	nm	nm	nm	---
G2-11A	G2-11A	4.6-6.1	8-Sep-08	6.010	50.46	50.341	500	nd	na	5.472	44.869	0.4	6.14	15.1	3360	nm	nm	nm	Slow recharge
G2-11A	ns	4.6-6.1	29-Apr-09	6.005	50.46	50.341	>11000	nd	na	5.519	44.822	0.6	nm	nm	nm	nm	nm	nm	Well dry during purging and didn't recharge in 24 hour period
G2-11A	ns	4.6-6.1	31-Aug-09	6.010	50.46	50.341	>11000	nd	na	5.608	44.733	0.2	nm	nm	nm	nm	nm	nm	No recharge; Dry; No sample
G2-11A	G2-11A	4.6-6.1	21-Apr-10	6.010	50.46	50.341	15	nd	na	5.515	44.826	0.99	6.19	11.3	4230	nm	nm	nm	Low turbid and low sediment
G2-11A	G2-11A	4.6-6.1	15-Sep-10	6.003	50.46	50.341	70	nd	na	5.474	44.867	0.17	6.27	14.8	3520	nm	nm	nm	Clear
G2-11A	G2-11A	4.6-6.1	5-May-11	6.000	50.46	50.341	100	nd	na	5.470	44.871	0.32	6.38	11.4	3510	nm	nm	nm	Clear
G2-11A	G2-11A	4.6-6.1	8-Sep-11	6.000	50.46	50.341	130	nd	na	5.620	44.721	3.35	5.38	16.69	2247	nm	nm	nm	Clear
G2-11A	G2-11A	4.6-6.1	24-May-12	6.020	50.46	50.341	130	nd	na	5.560	44.781	0.75	6.15	12.82	1601	nm	nm	nm	Clear
G2-11A	G2-11A	4.6-6.1	29-Aug-12	6.005	50.46	50.341	>11000	nd	na	5.630	44.711	0.33	5.94	13.19	1983	nm	nm	nm	Clear
G2-11A	G2-11A	4.6-6.1	17-Apr-13	6.000	50.46	50.341	75	nd	na	5.460	44.881	0.78	6.3	11.37	1625	nm	nm	nm	Sulfur odour; Clear; DUP-26
G2-11A	G2-11A	4.6-6.1	20-Aug-13	6.005	50.46	50.341	200	nd	na	5.675	44.666	2.15	6.15	13.4	1591	nm	nm	nm	Clear with some particulates; Ran dry during BTEX collection; DUP-10
G2-11A	G2-11A	4.6-6.1	12-May-14	6.000	50.46	50.341	35	nd	na	5.650	44.691	1.73	6.26	13.23	110	0.93	0.72	-92.8	Clear
G2-11A	G2-11A	4.6-6.1	18-Aug-14	6.010	50.46	50.341	95	nd	na	5.650	44.691	1.16	6.25	14.63	1267	1.027	0.8	-25.3	Clear
G2-11A	G2-11A	4.6-6.1	11-May-15	6.005	50.46	50.341	50	nd	na	5.600	44.741	2.49	6.17	13.39	1224	1.022	0.8	21.2	Clear
G2-11A	G2-11A	4.6-6.1	16-Sep-15	6.030	50.46	50.341	>11000	nd	na	5.510	44.831	0.54	6.15	14.74	1135	0.918	0.71	-7.4	Clear; Hydrocarbon odour; DUP-16
G2-11A	G2-11A	4.6-6.1	4-Apr-16	5.990	5.48	50.341	110	nd	na	5.480	44.861	0.37	6.41	12.52	1265	1.08	0.84	-19.8	Clear
G2-11A	G2-11A	4.6-6.1	1-Sep-16	6.010	5.48	50.341	180	nd	na	5.810	44.531	1.87	6.34	14.48	1110	0.903	0.7	21.2	Clear
G2-11A	G2-11A	4.6-6.1	12-Apr-17	6.020	5.48	50.341	690	nd	na	5.390	44.951	2.43	6.43	11.09	2610	2.04	1.63	-117.3	Dup-9
G2-11A	G2-11A	4.6-6.1	28-Aug-17	6.000	5.48	50.341	420	nd	na	5.630	44.711	0.29	6.11	15.65	950	0.79	0.49	16.4	Clear; Purged dry

TABLE B-1
AREA 2 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)[1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
G2-11A	G2-11A	4.6-6.1	30-Apr-18	6.011	5.48	50.341	140	nd	na	5.518	44.823	0.32	6.16	12.15	1977	1.715	1.37	6.1	Clear; DUP-12
G2-11A	G2-11A	4.6-6.1	28-Aug-18	6.008	5.48	50.341	220	nd	na	5.230	45.111	1.5	5.99	13.48	1492	1.243	0.98	55.9	clear
G2-11B	G2-11B	7.0-8.5	29-Apr-04	8.380	50.54	50.347	250	nd	na	5.660	44.687	nm	6.12	12.5	664	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	12-Oct-04	8.305	50.54	50.347	225	nd	na	5.570	44.777	nm	6.1	13.6	4560	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	11-Apr-05	8.305	50.54	50.347	nm	nd	na	5.578	44.769	nm	6.19	12.6	4990	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	20-Sep-05	8.350	50.54	50.347	nm	nd	na	5.770	44.577	nm	6.33	13.5	4680	nm	nm	nm	Sample collected 21-Sept-05
G2-11B	G2-11B	7.0-8.5	4-Apr-06	8.350	50.54	50.347	100	nd	na	5.620	44.727	1.67	6.23	14.7	37.7	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	30-Aug-06	8.300	50.54	50.347	nm	nd	na	5.790	44.557	1.48	6.22	13.95	3977	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	17-Apr-07	8.400	50.54	50.347	30	nd	na	5.620	44.727	3.05	nm	11	3250	nm	nm	nm	DUP (G2-11BX)
G2-11B	G2-11B	7.0-8.5	4-Sep-07	8.400	50.54	50.347	150	nd	na	5.800	44.547	0.29	6.18	40.4	4000	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	8-Apr-08	8.421	50.54	50.347	52	nd	na	5.653	44.694	0.97	5.97	10.4	2270	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	8-Sep-08	8.413	50.54	50.347	80	nd	na	5.625	44.722	0.4	6.17	14.2	2350	nm	nm	nm	---
G2-11B	G2-11B	7.0-8.5	30-Apr-09	8.401	50.54	50.347	50	nd	na	5.643	44.704	0.5	6.42	12	9850	nm	nm	nm	1st Bailer Clear mostly, second Cloudy; Duplicate taken
G2-11B	G2-11B	7.0-8.5	31-Aug-09	8.400	50.54	50.347	100	nd	na	6.780	43.567	0.9	6.01	14.1	4730	nm	nm	nm	Clear
G2-11B	G2-11B	7.0-8.5	21-Apr-10	8.400	50.54	50.347	nd	nd	na	5.665	44.682	0.26	6.42	11.3	3240	nm	nm	nm	Low turbid and low sediment
G2-11B	G2-11B	7.0-8.5	21-Sep-10	8.397	50.54	50.347	nd	nd	na	5.602	44.745	0.22	6.27	16.7	3290	nm	nm	nm	Clear; : DUP-17
G2-11B	G2-11B	7.0-8.5	5-May-11	8.395	50.54	50.347	65	nd	na	5.623	44.724	0.2	6.11	11.7	2590	nm	nm	nm	Clear; DUP-28
G2-11B	G2-11B	7.0-8.5	8-Sep-11	8.395	50.54	50.347	15	nd	na	5.760	44.587	2.22	4.77	14.51	53	nm	nm	nm	Clear (2 BTEX and 1 PAH collected)
G2-11B	G2-11B	7.0-8.5	24-May-12	8.410	50.54	50.347	15	nd	na	5.660	44.687	1.17	6.14	12.74	1614	nm	nm	nm	Clear, DUP-15
G2-11B	G2-11B	7.0-8.5	29-Aug-12	8.390	50.54	50.347	30	nd	na	5.740	44.607	0.87	6.01	12.77	1690	nm	nm	nm	Clear
G2-11B	G2-11B	7.0-8.5	17-Apr-13	8.390	50.54	50.347	15	nd	na	5.550	44.797	0.88	6.35	11.63	1309	nm	nm	nm	Sulfur odour; Clear
G2-11B	G2-11B	7.0-8.5	20-Aug-13	8.390	50.54	50.347	15	nd	na	5.800	44.547	1.32	6.13	13.18	1727	nm	nm	nm	Clear
G2-11B	G2-11B	7.0-8.5	12-May-14	8.380	50.54	50.347	5	nd	na	5.630	44.717	1.11	5.68	13.25	1400	1.173	0.92	-231	Clear; DUP-19
G2-11B	G2-11B	7.0-8.5	18-Aug-14	8.400	50.54	50.347	nd	nd	na	5.780	44.567	1.07	5.68	13.39	1613	1.347	1.07	-79.7	Clear
G2-11B	G2-11B	7.0-8.5	11-May-15	8.400	50.54	50.347	15	nd	na	5.720	44.627	1.42	6.13	12.93	990	0.86	0.68	20.4	Clear
G2-11B	G2-11B	7.0-8.5	16-Sep-15	8.425	50.54	50.347	nd	nd	na	5.620	44.727	0.13	6.32	15.48	15.72	1.248	0.98	-15.7	Clear
G2-11B	G2-11B	7.0-8.5	4-Apr-16	8.370	50.54	50.347	5	nd	na	5.620	44.727	0.81	6.44	12.83	1237	1.047	0.82	-55.9	Clear
G2-11B	G2-11B	7.0-8.5	1-Sep-16	8.370	50.54	50.347	50	nd	na	5.770	44.577	0.45	6.37	13.71	1337	1.108	0.87	-0.1	Clear
G2-11B	G2-11B	7.0-8.5	12-Apr-17	8.400	50.54	50.347	5	nd	na	5.550	44.797	1.22	6.25	11.82	1066	0.926	0.72	-39.5	Clear
G2-11B	G2-11B	7.0-8.5	28-Aug-17	8.390	50.54	50.347	nd	nd	na	5.780	44.567	0.45	6.11	14.17	1350	1.107	0.87	15.4	Clear
G2-11B	G2-11B	7.0-8.5	30-Apr-18	8.381	50.54	50.347	nd	nd	na	5.650	44.697	1.77	6.23	12.39	1977	1.694	1.36	23.4	Clear
G2-11B	G2-11B	7.0-8.5	28-Aug-18	8.411	50.54	50.347	20	nd	na	5.758	44.589	0.53	6.07	13.46	1680	1.401	1.11	59.2	Clear
PW03-1A	PW03-1A	2.4-4.0	22-Apr-04	4.030	38.27	38.159	10450	nd	na	1.660	36.499	nm	6.55	10.8	402	nm	nm	nm	---
PW03-1A	PW03-1A	2.4-4.0	15-Oct-04	4.050	38.27	38.159	10450	nd	na	1.757	36.402	nm	6.84	15	631	nm	nm	nm	---
PW03-1A	PW03-1A	2.4-4.0	15-Apr-05	4.050	38.27	38.159	460	nd	na	1.510	36.649	nm	6.72	10.4	559	nm	nm	nm	---
PW03-1A	A2-PW03-1A	2.4-4.0	13-Sep-05	4.050	38.27	38.159	nm	nd	na	3.030	35.129	nm	6.8	14.7	591	nm	nm	nm	Sample collected 13-Sept
PW03-1A	A2-PW03-1A	2.4-4.0	23-Mar-06	4.050	38.27	38.159	6600	nd	na	1.750	36.409	1.76	6.74	10.3	200	nm	nm	nm	---
PW03-1A	A2-PW03-1A	2.4-4.0	23-Aug-06	4.050	38.27	38.159	6050	nd	na	2.910	35.249	0.29	6.86	13.9	362	nm	nm	nm	Odour
PW03-1A	A2-PW03-1A	2.4-4.0	13-Apr-07	4.050	38.27	38.159	2750	nd	na	1.770	36.389	nm	6.71	7.7	453	nm	nm	nm	---
PW03-1A	A2-PW03-1A	2.4-4.0	6-Sep-07	4.050	38.27	38.159	7700	nd	na	3.190	34.969	0.13	6.79	13.8	573	nm	nm	nm	---
PW03-1A	PW03-1A	2.4-4.0	1-Apr-08	4.050	38.27	38.159	280	nd	na	1.805	36.354	0.15	6.81	9.9	251	nm	nm	nm	---
PW03-1A	PW03-1A	2.4-4.0	3-Sep-08	4.051	38.27	38.159	90	nd	na	3.489	34.670	0.2	6.89	13.1	167.4	nm	nm	nm	Slow recharge
PW03-1A	PW03-1A	2.4-4.0	4-May-09	4.044	38.27	38.159	nd	nd	na	3.139	35.020	0.7	7.36	11.7	569	nm	nm	nm	Cloudy; low sediment; Dry again
PW03-1A	ns	2.4-4.0	27-Aug-09	4.050	38.27	38.159	10	nd	na	3.520	34.639	0.2	6.52	14.5	268	nm	nm	nm	Very silty, no recharge, no Sample
PW03-1A	ns	2.4-4.0	14-Apr-10	4.050	38.27	38.159	nd	nd	na	2.080	36.079	0.1	6.91	11.3	300	nm	nm	nm	---
PW03-1A	PW03-1A	2.4-4.0	15-Sep-10	3.068	38.27	38.159	15	nd	na	2.782	35.377	0.15	7.07	16.1	270	nm	nm	nm	Clear, slow recharge
PW03-1A	PW03-1A	2.4-4.0	19-Apr-11	4.040	38.27	38.159	40	nd	na	1.565	36.594	0.36	6.92	9.9	275	nm	nm	nm	Clear
PW03-1A	PW03-1A	2.4-4.0	22-Aug-11	4.040	38.27	38.159	5	nd	na	2.810	35.349	0.19	7.1	12.62	205	nm	nm	nm	Clear
PW03-1A	PW03-1A	2.4-4.0	9-May-12	4.040	38.27	38.159	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	ns	2.4-4.0	13-Aug-12	4.040	38.27	38.159	90	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-1A	ns	2.4-4.0	3-Apr-13	4.050	38.27	38.159	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	ns	2.4-4.0	15-Aug-13	4.050	38.27	38.159	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	PW03-1A	2.4-4.0	29-Apr-14	4.030	38.27	38.159	15	nd	na	2.100	36.059	0.43	6.08	9.09	131	0.123	0.09	201.4	---
PW03-1A	ns	2.4-4.0	12-Aug-14	4.030	38.27	38.159	530	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	ns	2.4-4.0	6-May-15	4.040	38.27	38.159	170	nd	na	3.945	34.214	nm	nm	nm	nm	nm	nm	nm	Dry; Insufficient water to sample
PW03-1A	ns	2.4-4.0	24-Aug-15	4.040	38.27	38.159	140	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	PW03-1A	2.4-4.0	9-Mar-16	3.040	38.27	38.159	20	nd	na	2.060	36.099	0.78	5.68	10.37	88	0.079	0.06	235.4	Clear
PW03-1A	ns	2.4-4.0	16-Sep-16	4.040	38.27	38.159	85	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	PW03-1A	2.4-4.0	3-Apr-17	4.040	38.27	38.159	75	nd	na	1.910	36.249	0.26	5.6	8.73	71	0.067	0.05	-66	Clear
PW03-1A	ns	2.4-4.0	6-Sep-17	4.050	38.27	38.159	170	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1A	PW03-1A	2.4-4.0	30-Apr-18	4.045	38.27	38.159	135	nd	na	3.380	34.779	10.23	5.78	9.54	90	0.084	0.06	135.6	Grey silty, purged dry
PW03-1A	ns	2.4-4.0	21-Aug-18	4.080	38.27	38.159	120	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	22-Apr-04	nm	38.20	38.129	520	nd	na	1.930	36.199	nm	6.91	10.5	352	nm	nm	nm	---
PW03-1B	PW03-1B	1.1-3.7	15-Oct-04	3.082	38.20	38.129	175	nd	na	1.443	36.686	nm	7.24	14.8	358	nm	nm	nm	---
PW03-1B	PW03-1B	1.1-3.7	15-Apr-05	3.080	38.20	38.129	140	nd	na	1.380	36.749	nm	7.16	10.3	360	nm	nm	nm	---
PW03-1B	ns	1.1-3.7	13-Sep-05	3.075	38.20	38.129	nm	nd	na	2.995	35.134	nm	nm	nm	nm	nm	nm	nm	Not enough water to sample
PW03-1B	PW03-1B	1.1-3.7	21-Mar-06	3.080	38.20	38.129	130	nd	na	1.480	36.649	6.85	6.88	9.5	155	nm	nm	nm	---
PW03-1B	ns	1.1-3.7	23-Aug-06	3.060	38.20	38.129	40	nd	na	2.890	35.239	nm	nm	nm	nm	nm	nm	nm	Not enough water to sample
PW03-1B	PW03-1B	1.1-3.7	13-Apr-07	3.100	38.20	38.129	2750	nd	na	1.690	36.439	0.65	7.45	9.5	316	nm	nm	nm	---
PW03-1B	ns	1.1-3.7	6-Sep-07	3.070	38.20	38.129	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	1-Apr-08	3.080	38.20	38.129	50	nd	na	1.455	36.674	5.29	6.48	9.8	129.2	nm	nm	nm	---
PW03-1B	PW03-1B	1.1-3.7	3-Sep-08	3.080	38.20	38.129	450	nd	na	2.128	36.001	5.3	7.73	14.4	155.5	nm	nm	nm	Duplicate sample
PW03-1B	PW03-1B	1.1-3.7	22-Apr-09	3.065	38.20	38.129	0	nd	na	1.444	36.685	1.4	6.86	9	276	nm	nm	nm	High turbidity; medium sediment
PW03-1B	PW03-1B	1.1-3.7	31-Aug-09	3.180	38.20	38.129	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	14-Apr-10	3.090	38.20	38.129	nd	nd	na	1.610	36.519	nm	7.37	10.3	158	nm	nm	nm	white translucent
PW03-1B	PW03-1B	1.1-3.7	15-Sep-10	4.430	38.20	38.129	15	nd	na	3.232	34.897	0.15	7.35	15.1	291	nm	nm	nm	Clear to slightly turbid (1 jar for LEPH/HEPH only)
PW03-1B	PW03-1B	1.1-3.7	19-Apr-11	3.076	38.20	38.129	20	nd	na	1.484	36.645	2.46	7.32	9.2	183	nm	nm	nm	Slightly silty; Note: Did not shut down Air Sparge System before sampling PW wells. Next time, shut down to reduce silty samples.
PW03-1B	ns	1.1-3.7	13-Sep-11	3.070	38.20	38.129	0	nd	na	2.755	35.374	2.08	7.55	12.87	251	nm	nm	nm	Purged dry at 0.6 L
PW03-1B	PW03-1B	1.1-3.7	10-May-12	3.080	38.20	38.129	20	nd	na	1.410	36.719	8.43	6.69	9.93	106	nm	nm	nm	Clear; DUP-7
PW03-1B	ns	1.1-3.7	13-Aug-12	3.075	38.20	38.129	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-1B	PW03-1B	1.1-3.7	3-Apr-13	3.080	38.20	38.129	5	nd	na	2.340	35.789	10.37	7.42	9.94	113	nm	nm	nm	Silty
PW03-1B	ns	1.1-3.7	15-Aug-13	3.070	38.20	38.129	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	29-Apr-14	3.060	38.20	38.129	35	nd	na	1.620	36.509	9.15	5.55	8.75	88	0.083	0.06	212	Clear
PW03-1B	ns	1.1-3.7	12-Aug-14	3.060	38.20	38.129	120	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	ns	1.1-3.7	6-May-15	3.070	38.20	38.129	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on probe
PW03-1B	ns	1.1-3.7	24-Aug-15	3.060	38.20	38.129	60	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	9-Mar-16	3.080	38.20	38.129	30	nd	na	1.410	36.719	4.95	4.82	9.69	57	0.053	0.04	293.9	Bentonite on probe tip
PW03-1B	ns	1.1-3.7	16-Sep-16	3.090	38.20	38.129	65	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	3-Apr-17	3.080	38.20	38.129	50	nd	na	1.440	36.689	5.8	5.13	8.24	52	0.05	0.04	-19.7	Clear
PW03-1B	ns	1.1-3.7	6-Sep-17	3.070	38.20	38.129	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-1B	PW03-1B	1.1-3.7	30-Apr-18	3.080	38.20	38.129	nd	nd	na	2.740	35.389	0.72	5.38	9.56	72	0.066	0.05	125.3	Clear
PW03-1B	ns	1.1-3.7	21-Aug-18	3.088	38.20	38.129	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	PW03-2A	1.8-4.6	22-Apr-04	4.510	37.82	37.644	550	nd	na	2.060	35.584	nm	6.57	11.4	403	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	14-Oct-04	4.533	37.82	37.644	225	nd	na	1.833	35.811	nm	6.59	15	1504	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	15-Apr-05	4.530	37.82	37.644	160	nd	na	1.570	36.074	nm	6.32	10.7	243	nm	nm	nm	---
PW03-2A	A2-PW03-2A	1.8-4.6	13-Sep-05	4.530	37.82	37.644	nm	nd	na	2.670	34.974	nm	6.64	14.3	1126	nm	nm	nm	Sample collected 13-Sept-05.
PW03-2A	PW03-2A	1.8-4.6	21-Mar-06	4.550	37.82	37.644	220	nd	na	1.960	35.684	1.88	6.2	10.4	126	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	23-Aug-06	4.520	37.82	37.644	10	nd	na	2.540	35.104	0.77	6.64	14.2	777	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	13-Apr-07	3.450	37.82	37.644	60	nd	na	1.950	35.694	0.18	6.64	12.7	228	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	6-Sep-07	4.550	37.82	37.644	175	nd	na	2.790	34.854	0.29	6.6	13.7	977	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	1-Apr-08	4.520	37.82	37.644	10	nd	na	1.930	35.714	0.2	7.06	11	250	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	3-Sep-08	4.530	37.82	37.644	10	nd	na	2.665	34.979	8.1	7.04	13.9	594	nm	nm	nm	---
PW03-2A	PW03-2A	1.8-4.6	22-Apr-09	4.428	37.82	37.644	nd	nd	na	1.875	35.769	7	7.04	10	363	nm	nm	nm	High turbidity; medium sediment; could hear air sparging
PW03-2A	PW03-2A	1.8-4.6	27-Aug-09	4.430	37.82	37.644	nm	nd	na	2.868	34.776	0.9	7.19	14.2	908	nm	nm	nm	Clear
PW03-2A	PW03-2A	1.8-4.6	14-Apr-10	4.470	37.82	37.644	nm	nd	na	2.415	35.229	6	6.57	11.4	142.8	nm	nm	nm	J-plug open; Clear
PW03-2A	PW03-2A	1.8-4.6	15-Sep-10	4.375	37.82	37.644	10	nd	na	2.852	34.792	0.09	7.54	14.5	782	nm	nm	nm	Clear
PW03-2A	PW03-2A	1.8-4.6	19-Apr-11	4.330	37.82	37.644	60	nd	na	2.230	35.414	11.27	6.56	10.1	103	nm	nm	nm	Clear; Note: Did not shut down Air Sparge System while sampling PW wells (Lower Ponds). Next time, shut down to reduce silty samples.
PW03-2A	PW03-2A	1.8-4.6	22-Aug-11	4.335	37.82	37.644	nd	nd	na	3.000	34.644	10.35	8.09	15.08	2	nm	nm	nm	Clear; DUP-8
PW03-2A	PW03-2A	1.8-4.6	10-May-12	4.410	37.82	37.644	nd	nd	na	3.320	34.324	nm	nm	nm	nm	nm	nm	nm	Purged dry at 1.0 L, very silty on bottom
PW03-2A	ns	1.8-4.6	13-Aug-12	4.470	37.82	37.644	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-2A	ns	1.8-4.6	3-Apr-13	4.480	37.82	37.644	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	ns	1.8-4.6	15-Aug-13	4.440	37.82	37.644	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	PW03-2A	1.8-4.6	29-Apr-14	4.440	37.82	37.644	100	nd	na	2.630	35.014	1.35	5.05	9.07	94	0.088	0.06	183.6	Clear
PW03-2A	ns	1.8-4.6	12-Aug-14	4.440	37.82	37.644	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	ns	1.8-4.6	6-May-15	4.435	37.82	37.644	180	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on probe
PW03-2A	ns	1.8-4.6	24-Aug-15	4.440	37.82	37.644	65	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	PW03-2A	1.8-4.6	9-Mar-16	4.450	37.82	37.644	25	nd	na	3.120	34.524	3.46	5.45	9.45	85	0.078	0.06	-4.1	Clear
PW03-2A	ns	1.8-4.6	16-Sep-16	4.450	37.82	37.644	110	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	PW03-2A	1.8-4.6	3-Apr-17	4.460	37.82	37.644	130	nd	na	2.180	35.464	4.9	5.26	8.6	77	0.073	0.05	-10.4	Clear
PW03-2A	ns	1.8-4.6	6-Sep-17	4.460	37.82	37.644	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2A	ns	1.8-4.6	30-Apr-18	4.475	37.82	37.644	5	nd	na	4.420	33.224	nm	nm	nm	nm	nm	nm	nm	Dry; brownish silty bottom
PW03-2A	ns	1.8-4.6	21-Aug-18	4.463	37.82	37.644	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	PW03-2B	1.1-3.7	22-Apr-04	3.130	37.88	37.809	660	nd	na	2.210	35.599	nm	6.72	11	456	nm	nm	nm	---
PW03-2B	PW03-2B	1.1-3.7	14-Oct-04	3.141	37.88	37.809	100	nd	na	1.982	35.827	nm	6.73	15.3	914	nm	nm	nm	---
PW03-2B	PW03-2B	1.1-3.7	15-Apr-05	3.140	37.88	37.809	175	nd	na	1.670	36.139	nm	6.88	10.8	564	nm	nm	nm	---
PW03-2B	ns	1.1-3.7	13-Sep-05	3.130	37.88	37.809	nm	nd	na	2.900	34.909	nm	nm	nm	nm	nm	nm	nm	Not enough water to sample
PW03-2B	PW03-2B	1.1-3.7	21-Mar-06	3.150	37.88	37.809	110	nd	na	2.055	35.754	1.82	6.9	10.2	254	nm	nm	nm	---
PW03-2B	PW03-2B	1.1-3.7	23-Aug-06	3.150	37.88	37.809	130	nd	na	2.670	35.139	1.68	6.92	15.8	575	nm	nm	nm	---
PW03-2B	PW03-2B	1.1-3.7	13-Apr-07	3.150	37.88	37.809	175	nd	na	2.750	35.059	0.24	6.83	11.4	636	nm	nm	nm	---
PW03-2B	ns	1.1-3.7	6-Sep-07	3.150	37.88	37.809	180	nd	na	2.940	34.869	nm	nm	nm	nm	nm	nm	nm	Not enough water to sample
PW03-2B	PW03-2B	1.1-3.7	1-Apr-08	3.150	37.88	37.809	75	nd	na	1.830	35.979	4.47	6.82	10.7	271	nm	nm	nm	---
PW03-2B	PW03-2B	1.1-3.7	3-Sep-08	3.150	37.88	37.809	90	nd	na	2.819	34.990	3.2	7.32	14.2	428	nm	nm	nm	Slow recharge
PW03-2B	PW03-2B	1.1-3.7	22-Apr-09	3.325	37.88	37.809	5	nd	na	1.800	36.009	10.2	7.06	9.9	795	nm	nm	nm	Clear
PW03-2B	PW03-2B	1.1-3.7	27-Aug-09	3.147	37.88	37.809	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	PW03-2B	1.1-3.7	14-Apr-10	3.150	37.88	37.809	nd	nd	na	2.210	35.599	8.08	7.97	11.2	259	nm	nm	nm	Clear
PW03-2B	ns	1.1-3.7	15-Sep-10	3.135	37.88	37.809	10	nd	na	3.025	34.784	1.32	nm	nm	nm	nm	nm	nm	Not enough water to sample
PW03-2B	PW03-2B	1.1-3.7	19-Apr-11	3.140	37.88	37.809	5	nd	na	1.446	36.363	7.85	7.22	10	254	nm	nm	nm	Clear; Note: Did not shut down Air Sparge System while sampling PW wells. Next time, shut down to reduce silty samples.
PW03-2B	PW03-2B	1.1-3.7	22-Aug-11	3.135	37.88	37.809	nd	nd	na	2.680	35.129	5.46	7.76	13.23	227	nm	nm	nm	Clear
PW03-2B	PW03-2B	1.1-3.7	10-May-12	3.140	37.88	37.809	5	nd	na	2.320	35.489	9.84	7.65	10.39	205	nm	nm	nm	Clear
PW03-2B	ns	1.1-3.7	13-Aug-12	3.130	37.88	37.809	55	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-2B	PW03-2B	1.1-3.7	3-Apr-13	3.140	37.88	37.809	nd	nd	na	2.565	35.244	8.9	7.87	10.97	185	nm	nm	nm	Silty; Apr.3 collected BTEX and ambers; Apr.4 - Dry; Metals sample not collected
PW03-2B	ns	1.1-3.7	15-Aug-13	3.140	37.88	37.809	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	PW03-2B	1.1-3.7	29-Apr-14	3.110	37.88	37.809	45	nd	na	2.550	35.259	9.4	6.09	9.31	303	0.282	0.21	222.9	Clear
PW03-2B	ns	1.1-3.7	12-Aug-14	3.130	37.88	37.809	120	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	ns	1.1-3.7	6-May-15	3.135	37.88	37.809	85	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on probe
PW03-2B	ns	1.1-3.7	24-Aug-15	3.130	37.88	37.809	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	PW03-2B	1.1-3.7	9-Mar-16	3.140	37.88	37.809	70	nd	na	1.260	36.549	5.35	6.23	9.12	151	0.141	0.1	-41.9	Clear
PW03-2B	ns	1.1-3.7	16-Sep-16	3.110	37.88	37.809	115	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	PW03-2B	1.1-3.7	3-Apr-17	3.120	37.88	37.809	55	nd	na	1.360	36.449	4.6	6.3	8.38	167	0.16	0.12	-29.8	Clear
PW03-2B	ns	1.1-3.7	6-Sep-17	3.130	37.88	37.809	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-2B	ns	1.1-3.7	30-Apr-18	3.141	37.88	37.809	95	nd	na	3.083	34.726	nm	nm	nm	nm	nm	nm	nm	Dry; brownish silty bottom
PW03-2B	ns	1.1-3.7	21-Aug-18	3.141	37.88	37.809	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	22-Apr-04	4.170	39.21	39.162	770	nd	na	2.520	36.642	nm	6.82	11.8	639	nm	nm	nm	---
PW03-3	PW03-3	1.2-4.1	15-Oct-04	4.195	39.21	39.162	200	nd	na	2.270	36.892	nm	7.02	15.4	1181	nm	nm	nm	---
PW03-3	PW03-3	1.2-4.1	15-Apr-05	4.200	39.21	39.162	170	nd	na	1.960	37.202	nm	6.71	11.2	592	nm	nm	nm	---
PW03-3	A2-PW03-3	1.2-4.1	13-Sep-05	4.200	39.21	39.162	nm	nd	na	3.520	35.642	nm	6.9	14.3	1210	nm	nm	nm	Sample collected 13-Sept-05.
PW03-3	PW03-3	1.2-4.1	23-Mar-06	4.200	39.21	39.162	105	nd	na	2.110	37.052	1.55	6.7	11	205	nm	nm	nm	---
PW03-3	PW03-3	1.2-4.1	23-Aug-06	4.200	39.21	39.162	100	nd	na	3.490	35.672	2.07	6.94	14.8	815	nm	nm	nm	---
PW03-3	PW03-3	1.2-4.1	13-Apr-07	4.200	39.21	39.162	150	nd	na	3.360	35.802	0.16	6.29	10.8	405	nm	nm	nm	---
PW03-3	ns	1.2-4.1	6-Sep-07	4.200	39.21	39.162	100	nd	na	4.000	35.162	nm	nm	nm	nm	nm	nm	nm	Not enough water to collect sample
PW03-3	PW03-3	1.2-4.1	1-Apr-08	4.200	39.21	39.162	100	nd	na	2.160	37.002	0.22	6.14	10.3	242	nm	nm	nm	DUP-4
PW03-3	PW03-3	1.2-4.1	3-Sep-08	4.195	39.21	39.162	125	nd	na	3.743	35.419	0.6	6.56	12.9	656	nm	nm	nm	---
PW03-3	PW03-3	1.2-4.1	22-Apr-09	4.198	39.21	39.162	100	nd	na	2.062	37.100	0.8	6.64	10.3	492	nm	nm	nm	Clear
PW03-3	PW03-3	1.2-4.1	27-Aug-09	4.194	39.21	39.162	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	14-Apr-10	4.200	39.21	39.162	nd	nd	na	1.880	37.282	0.44	5.89	9.4	135.8	nm	nm	nm	Clear
PW03-3	ns	1.2-4.1	15-Sep-10	4.188	39.21	39.162	15	nd	na	4.052	35.110	0.16	nm	nm	nm	nm	nm	nm	Not enough water to collect sample
PW03-3	PW03-3	1.2-4.1	19-Apr-11	4.195	39.21	39.162	65	nd	na	1.905	37.257	0.33	5.64	9.9	127	nm	nm	nm	Clear
PW03-3	PW03-3	1.2-4.1	22-Aug-11	4.190	39.21	39.162	95	nd	na	3.150	36.012	4.19	6.42	13.27	3	nm	nm	nm	Clear
PW03-3	PW03-3	1.2-4.1	10-May-12	4.165	39.21	39.162	15	nd	na	3.810	35.352	3.02	6.450	10.78	195	nm	nm	nm	Dry/limited LEPH/HEPH
PW03-3	ns	1.2-4.1	13-Aug-12	4.190	39.21	39.162	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-3	ns	1.2-4.1	3-Apr-13	4.190	39.21	39.162	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	ns	1.2-4.1	15-Aug-13	4.180	39.21	39.162	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	29-Apr-14	4.160	39.21	39.162	5	nd	na	3.110	36.052	4.37	5.05	9.58	78	0.072	0.05	48.9	Clear

TABLE B-1
AREA 2 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL) [1]	Top of Casing Elevation (TOC, mASL) [1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL) [1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
PW03-3	ns	1.2-4.1	12-Aug-14	4.170	39.21	39.162	40	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	ns	1.2-4.1	6-May-15	4.175	39.21	39.162	40	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
PW03-3	ns	1.2-4.1	24-Aug-15	4.180	39.21	39.162	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	9-Mar-16	4.180	39.21	39.162	55	nd	na	2.800	36.362	3.67	5.67	10.14	65	0.058	0.04	-79.7	Bentonite on probe tip
PW03-3	ns	1.2-4.1	16-Sep-16	4.120	39.21	39.162	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	31-Mar-17	4.170	39.21	39.162	15	nd	na	1.880	37.282	7.3	5.49	9.25	38	0.036	0.02	-32.4	Clear
PW03-3	ns	1.2-4.1	6-Sep-17	4.180	39.21	39.162	45	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-3	PW03-3	1.2-4.1	30-Apr-18	4.197	39.21	39.162	20	nd	na	3.423	35.739	0.52	4.71	9.88	69	0.062	0.04	166	Low turbidity and sediment
PW03-3	ns	1.2-4.1	21-Aug-18	4.151	39.21	39.162	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	PW03-4	1.8-4.0	22-Apr-04	3.900	37.17	37.028	485	nd	na	1.940	35.088	nm	7.05	10.8	410	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	14-Oct-04	3.919	37.17	37.028	120	nd	na	1.338	35.690	nm	7.22	14.4	496	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	14-Apr-05	3.920	37.17	37.028	150	nd	na	1.820	35.208	nm	6.89	10.3	560	nm	nm	nm	---
PW03-4	A2-PW03-4	1.8-4.0	13-Sep-05	3.925	37.17	37.028	nm	nd	na	2.230	34.798	nm	7.08	14.1	703	nm	nm	nm	Sample collected 13-Sept-05.
PW03-4	PW03-4	1.8-4.0	21-Mar-06	3.900	37.17	37.028	20	nd	na	1.295	35.733	3.11	6.85	10.4	474	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	23-Aug-06	3.920	37.17	37.028	110	nd	na	2.190	34.838	1.1	7.08	13.5	531	nm	nm	nm	DUP-4
PW03-4	PW03-4	1.8-4.0	13-Apr-07	3.950	37.17	37.028	30	nd	na	1.310	35.718	0.3	6.5	10.5	507	nm	nm	nm	DUP (PW03-4X)
PW03-4	PW03-4	1.8-4.0	6-Sep-07	3.920	37.17	37.028	50	nd	na	2.190	34.838	0.23	7.15	13.6	518	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	1-Apr-08	3.920	37.17	37.028	50	nd	na	1.195	35.833	0.91	6.94	9.5	444	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	3-Sep-08	3.895	37.17	37.028	10	nd	na	1.872	35.156	1.7	6.94	13.4	329	nm	nm	nm	---
PW03-4	PW03-4	1.8-4.0	22-Apr-09	3.905	37.17	37.028	nd	nd	na	1.365	35.663	11.6	7.15	9.5	357	nm	nm	nm	Sample Cloudy
PW03-4	PW03-4	1.8-4.0	27-Aug-09	3.900	37.17	37.028	nd	nd	na	2.353	34.675	0.3	7.82	13.7	406	nm	nm	nm	Low turbidity, minor sediment
PW03-4	PW03-4	1.8-4.0	14-Apr-10	3.920	37.17	37.028	5	nd	na	1.260	35.768	11	7.25	10.2	390	nm	nm	nm	Clear
PW03-4	PW03-4	1.8-4.0	15-Sep-10	3.885	37.17	37.028	45	nd	na	1.950	35.078	8.57	7.69	14.1	699	nm	nm	nm	Clear
PW03-4	PW03-4	1.8-4.0	19-Apr-11	3.887	37.17	37.028	5	nd	na	0.995	36.033	2.23	6	9.5	210	nm	nm	nm	Slightly silty (1 LEPH only)
PW03-4	PW03-4	1.8-4.0	22-Aug-11	3.880	37.17	37.028	5	nd	na	1.600	35.428	10.21	7.98	15.68	1	nm	nm	nm	Silty (BTEX only) (DUP-7)
PW03-4	PW03-4	1.8-4.0	13-Sep-11	3.880	37.17	37.028	60	nd	na	1.775	35.253	9.59	7.67	13.88	220	nm	nm	nm	Clear (PAH's only) (DUP-7)
PW03-4	ns	1.8-4.0	10-May-12	3.900	37.17	37.028	60	nd	na	2.520	34.508	10.19	8.12	10.17	172	nm	nm	nm	Dropped BTEX vial in well, too silty for ambers
PW03-4	ns	1.8-4.0	13-Aug-12	3.860	37.17	37.028	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-4	ns	1.8-4.0	3-Apr-13	3.900	37.17	37.028	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	ns	1.8-4.0	15-Aug-13	3.850	37.17	37.028	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	PW03-4	1.8-4.0	29-Apr-14	3.890	37.17	37.028	55	nd	na	1.700	35.328	3.93	7.07	8.78	111	0.111	0.08	140.6	Slightly turbid
PW03-4	ns	1.8-4.0	12-Aug-14	3.870	37.17	37.028	50	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	ns	1.8-4.0	6-May-15	3.795	37.17	37.028	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on probe
PW03-4	ns	1.8-4.0	24-Aug-15	3.800	37.17	37.028	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	PW03-4	1.8-4.0	9-Mar-16	3.810	37.17	37.028	30	nd	na	2.590	34.438	6.72	7.29	9.69	182	0.167	0.12	-34.9	Clear
PW03-4	ns	1.8-4.0	16-Sep-16	3.800	37.17	37.028	120	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	PW03-4	1.8-4.0	3-Apr-17	3.790	37.17	37.028	10	nd	na	2.660	34.368	8.06	7.11	9.19	190	0.176	0.13	36.2	Clear
PW03-4	ns	1.8-4.0	6-Sep-17	3.840	37.17	37.028	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	ns	1.8-4.0	30-Apr-18	3.842	37.17	37.028	nd	nd	na	3.710	33.318	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-4	ns	1.8-4.0	21-Aug-18	3.852	37.17	37.028	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	22-Apr-04	8.480	37.79	37.647	370	nd	na	2.050	35.597	nm	6.46	12.9	809	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	14-Oct-04	8.509	37.79	37.647	170	nd	na	1.855	35.792	nm	6.68	14.7	962	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	15-Apr-05	8.510	37.79	37.647	175	nd	na	1.590	36.057	nm	6.58	12.6	1113	nm	nm	nm	---
PW03-5	A2-PW03-5	7.6-8.5	13-Sep-05	8.520	37.79	37.647	nm	nd	na	2.580	35.067	nm	6.82	14	1090	nm	nm	nm	Sample collected 13-Sept-05.
PW03-5	PW03-5	7.6-8.5	21-Mar-06	8.500	37.79	37.647	100	nd	na	2.000	35.647	1.7	6.61	12.2	271	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	23-Aug-06	8.500	37.79	37.647	5	nd	na	2.540	35.107	1.83	6.76	14.1	798	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	13-Apr-07	8.500	37.79	37.647	110	nd	na	1.980	35.667	0.16	6.63	13.2	1402	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	6-Sep-07	8.500	37.79	37.647	170	nd	na	2.790	34.857	0.27	6.63	13.5	1496	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	1-Apr-08	8.500	37.79	37.647	60	nd	na	1.960	35.687	0.27	6.2	11.7	158.2	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	3-Sep-08	8.489	37.79	37.647	25	nd	na	2.605	35.042	0.9	6.53	13.1	1207	nm	nm	nm	---
PW03-5	PW03-5	7.6-8.5	22-Apr-09	8.500	37.79	37.647	25	nd	na	1.965	35.682	0.5	6.48	12.4	1614	nm	nm	nm	Sample cloudy
PW03-5	PW03-5	7.6-8.5	27-Aug-09	8.490	37.79	37.647	nd	nd	na	2.880	34.767	0.2	6.42	13.8	1872	nm	nm	nm	Clear
PW03-5	PW03-5	7.6-8.5	14-Apr-10	8.500	37.79	37.647	nd	nd	na	2.430	35.217	0.08	6.41	12.3	1904	nm	nm	nm	Clear
PW03-5	PW03-5	7.6-8.5	15-Sep-10	8.485	37.79	37.647	10	nd	na	2.842	34.805	0.21	6.32	14.9	1972	nm	nm	nm	Clear; DUP-16
PW03-5	PW03-5	7.6-8.5	19-Apr-11	8.494	37.79	37.647	nd	nd	na	1.959	35.688	0.29	6.38	11.5	1522	nm	nm	nm	Clear; Note: Did not shut down Air Sparge System while sampling PW wells. Next time, shut down to reduce silty samples.
PW03-5	PW03-5	7.6-8.5	22-Aug-11	8.480	37.79	37.647	5	nd	na	3.110	34.537	10.47	7.31	14.02	1000	nm	nm	nm	Clear
PW03-5	PW03-5	7.6-8.5	10-May-12	8.480	37.79	37.647	nd	nd	na	6.560	31.087	0.5	6.67	11.97	734	nm	nm	nm	Clear
PW03-5	ns	7.6-8.5	13-Aug-12	8.475	37.79	37.647	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-5	PW03-5	7.6-8.5	4-Apr-13	8.460	37.79	37.647	5	nd	na	7.230	30.417	1.43	6.42	12.12	1112	nm	nm	nm	Clear
PW03-5	ns	7.6-8.5	19-Aug-13	8.470	37.79	37.647	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	29-Apr-14	6.450	37.79	37.647	55	nd	na	2.870	34.777	1.54	5.95	10.27	190	0.172	0.13	114.2	Slightly turbid
PW03-5	ns	7.6-8.5	12-Aug-14	8.450	37.79	37.647	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	6-May-15	8.470	37.79	37.647	25	nd	na	7.420	30.227	2.48	6.18	11.69	501	0.437	0.33	224.7	---
PW03-5	ns	7.6-8.5	24-Aug-15	8.460	37.79	37.647	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	9-Mar-16	8.460	37.79	37.647	15	nd	na	4.500	33.147	0.58	6.01	11.6	143	0.125	0.09	184.1	Biofoul on the probe; DUP-3
PW03-5	ns	7.6-8.5	16-Sep-16	8.470	37.79	37.647	200	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	3-Apr-17	8.450	37.79	37.647	10	nd	na	4.100	33.547	0.77	5.93	10.22	100	0.091	0.07	-36	Clear
PW03-5	ns	7.6-8.5	6-Sep-17	8.430	37.79	37.647	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-5	PW03-5	7.6-8.5	30-Apr-18	8.472	37.79	37.647	15	nd	na	5.831	31.816	1.49	6.09	10.83	158	0.14	0.1	124.5	Silty; DUP-11
PW03-5	ns	7.6-8.5	21-Aug-18	8.482	37.79	37.647	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	22-Apr-04	2.890	38.31	38.141	475	nd	na	2.080	36.061	nm	6.34	10.3	119	nm	nm	nm	---
PW03-6	PW03-06	1.1-3.0	15-Oct-04	2.918	38.31	38.141	190	nd	na	1.045	37.096	nm	7.32	14.9	248	nm	nm	nm	---
PW03-6	PW03-06	1.1-3.0	15-Apr-05	2.910	38.31	38.141	130	nd	na	1.130	37.011	nm	6.57	9.9	166	nm	nm	nm	---
PW03-6	ns	1.1-3.0	13-Sep-05	2.920	38.31	38.141	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	21-Mar-06	2.920	38.31	38.141	75	nd	na	1.520	36.621	8.68	6.61	9.3	97	nm	nm	nm	---
PW03-6	ns	1.1-3.0	23-Aug-06	2.910	38.31	38.141	170	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	13-Apr-07	2.900	38.31	38.141	60	nd	na	1.900	36.241	4.56	6.51	9.8	150.2	nm	nm	nm	---
PW03-6	ns	1.1-3.0	6-Sep-07	2.900	38.31	38.141	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	1-Apr-08	2.900	38.31	38.141	10	nd	na	1.500	36.641	9.23	6.87	9	85.3	nm	nm	nm	---
PW03-6	ns	1.1-3.0	3-Sep-08	2.903	38.31	38.141	nd	nd	na	nd	na	12.3	nm	nm	nm	nm	nm	nm	No sample
PW03-6	PW03-06	1.1-3.0	22-Apr-09	2.799	38.31	38.141	25	nd	na	1.327	36.814	12.2	6.9	8.9	161	nm	nm	nm	Smokey colour; Reduced flow to clear up sample.
PW03-6	ns	1.1-3.0	25-Aug-09	2.788	38.31	38.141	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	14-Apr-10	2.810	38.31	38.141	nd	nd	na	1.300	36.841	9.55	7.24	9.8	73.5	nm	nm	nm	Clear
PW03-6	ns	1.1-3.0	15-Sep-10	2.785	38.31	38.141	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-06	1.1-3.0	19-Apr-11	2.784	38.31	38.141	30	nd	na	1.271	36.870	4.57	6.61	9.5	84	nm	nm	nm	Clear
PW03-6	ns	1.1-3.0	22-Aug-11	2.780	38.31	38.141	nd	nd	na	2.625	35.516	7.01	6.57	12.24	94	nm	nm	nm	Dry - No sample
PW03-6	PW03-06	1.1-3.15	10-May-12	2.785	38.31	38.141	5	nd	na	2.160	35.981	7.33	7.02	9.76	73	nm	nm	nm	1 silty BTEX vial; Dry at 1.5 L on May.10
PW03-6	ns	1.1-3.15	13-Aug-12	2.810	38.31	38.141	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
PW03-6	ns	1.1-3.15	3-Apr-13	2.780	38.31	38.141	nd	nd	na	2.760	35.381	nm	nm	nm	nm	nm	nm	nm	Too shallow to sample
PW03-6	ns	1.1-3.15	15-Aug-13	2.830	38.31	38.141	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-6	1.1-3.15	23-Apr-14	2.830	38.31	38.141	100	nd	na	1.810	36.331	0.43	5.46	8.69	95	0.083	0.06	201.4	Clear
PW03-6	ns	1.1-3.15	12-Aug-14	2.830	38.31	38.141	70	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	ns	1.1-3.15	6-May-15	2.840	38.31	38.141	70	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
PW03-6	ns	1.1-3.15	24-Aug-15	2.820	38.31	38.141	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-6	1.1-3.15	9-Mar-16	2.840	38.31	38.141	20	nd	na	1.860	36.281	5.55	5.9	9.63	100	0.092	0.07	259.2	Clear
PW03-6	ns	1.1-3.15	16-Sep-16	2.820	38.31	38.141	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	PW03-6	1.1-3.15	31-Mar-17	2.880	38.31	38.141	5	nd	na	1.190	36.951	9.24	5.59	7.85	45	0.044	0.03	-27.5	Clear; DUP-5
PW03-6	ns	1.1-3.15	6-Sep-17	2.830	38.31	38.141	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
PW03-6	ns	1.1-3.15	30-Apr-18	2.843	38.31	38.141	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry, brownish silty bottom
PW03-6	ns	1.1-3.15	21-Aug-18	2.854	38.31	38.141	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	U8	3.22-6.22	12-Jul-05	6.220	38.49	39.205	400	nd	na	3.920	35.285	nm	6.55	12.4	607	nm	nm	nm	Cloudy, silty
U8	A2-U8	3.22-6.22	13-Sep-05	6.220	38.49	39.205	nm	nd	na	4.580	34.625	nm	6.6	12.8	506	nm	nm	nm	Sample collected 13-Sept-05.
U8	U8	3.22-6.22	22-Mar-06	6.220	38.49	39.205	660	nd	na	3.260	35.945	1.75	6.46	10.6	125.5	nm	nm	nm	---
U8	U8	3.22-6.22	21-Aug-06	6.220	38.49	39.205	330	nd	na	4.615	34.590	1.28	7.66	13.2	566	nm	nm	nm	---
U8	U8	3.22-6.22	13-Apr-07	6.220	38.49	39.205	125	nd	na	3.470	35.735	0.42	nm	9.8	221	nm	nm	nm	DUP (U8X)
U8	U8	3.22-6.22	6-Sep-07	6.180	38.49	39.205	80	nd	na	4.930	34.275	0.27	6.56	13.5	1496	nm	nm	nm	---
U8	U8	3.22-6.22	2-Apr-08	6.220	38.49	39.205	110	nd	na	3.220	35.985	0.22	6.32	11	201	nm	nm	nm	---
U8	U8	3.22-6.22	4-Sep-08	6.241	38.49	39.205	100	nd	na	4.612	34.593	0.5	6.37	11.9	427	nm	nm	nm	Clear
U8	U8	3.22-6.22	22-Apr-09	6.219	38.49	39.205	nd	nd	na	3.197	36.008	0.6	6.45	11.4	270	nm	nm	nm	Clear
U8	U8	3.22-6.22	31-Aug-09	6.220	38.49	39.205	75	nd	na	4.955	34.250	0.3	6.72	16.4	600	nm	nm	nm	Clear
U8	U8	3.22-6.22	2-Feb-10	6.230	38.49	39.205	nm	nd	na	3.410	35.795	nm	6.23	10.2	185.9	nm	nm	nm	Trace sediment (minimal turbidity)
U8	U8	3.22-6.22	21-Apr-10	6.225	38.49	39.205	nd	nd	na	3.435	35.770	1.24	6.08	10..3	100.7	nm	nm	nm	Clear
U8	U8	3.22-6.22	14-Sep-10	6.205	38.49	39.205	10	nd	na	4.738	34.467	0.2	6.43	13.2	314	nm	nm	nm	Clear
U8	U8	3.22-6.22	5-Apr-11	6.220	38.49	39.205	10	nd	na	2.036	37.169	4.45	6.45	10.3	114	nm	nm	nm	Clear
U8		3.22-6.22	13-Jul-11	nm	38.49	39.205	nm	nd	na	4.140	35.065	nm	nm	nm	nm	nm	nm	nm	BC: No sheen
U8	U8	3.22-6.22	1-Sep-11	6.250	38.49	39.205	65	nd	na	4.650	34.555	0.93	6.13	11.5	241	nm	nm	nm	Clear (DUP-18)
U8	U8	3.22-6.22	9-May-12	6.245	38.49	39.205	35	nd	na	4.890	34.315	0.82	5.64	10.12	96	nm	nm	nm	Turbid
U8	ns	3.22-6.22	13-Aug-12	6.220	38.49	39.205	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
U8	U8	3.22-6.22	25-Mar-13	6.220	38.49	39.205	55	nd	na	4.030	35.175	3.7	4.77	10.18	44	nm	nm	nm	Clear
U8	U8	3.22-6.22	15-Aug-13	6.230	38.49	39.205	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	U8	3.22-6.22	29-Apr-14	6.210	38.49	39.205	45	nd	na	4.080	35.125	1.76	5.38	11	78	0.048	0.03	111.1	Clear
U8	ns	3.22-6.22	12-Aug-14	6.230	38.49	39.205	50	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	ns	3.22-6.22	6-May-15	6.215	38.49	39.205	60	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
U8	ns	3.22-6.22	24-Aug-15	6.220	38.49	39.205	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	U8	3.22-6.22	22-Mar-16	6.220	38.49	39.205	nd	nd	na	4.320	34.885	0.3	5.44	10.96	51	0.046	0.03	82.9	Clear
U8	ns	3.22-6.22	16-Sep-16	6.220	38.49	39.205	100	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	U8	3.22-6.22	11-Apr-17	6.220	38.49	39.205	55	nd	na	3.730	35.475	2.41	7.41	9.82	38	0.034	0.02	-62.4	Clear
U8	ns	3.22-6.22	6-Sep-17	6.230	38.49	39.205	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U8	U8	3.22-6.22	30-Apr-18	6.230	38.49	39.205	20	nd	na	5.223	33.982	0.65	5.52	10.23	61	0.055	0.04	90.6	Clear; sampled on the following day
U8	ns	3.22-6.22	21-Aug-18	6.238	38.49	39.205	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	U9	3.3-6.3	12-Jul-05	6.300	38.59	39.424	550	nd	na	4.230	35.194	nm	6.41	12	651	nm	nm	nm	Low turbidity and sediment
U9	A2-U9	3.3-6.3	13-Sep-05	6.300	38.59	39.424	nm	nd	na	4.560	34.864	nm	6.61	12.3	691	nm	nm	nm	Sample collected 13-Sept-05.
U9	U9	3.3-6.3	22-Mar-06	6.300	38.59	39.424	1760	nd	na	3.700	35.724	1.16	6.44	10.6	168	nm	nm	nm	---
U9	U9	3.3-6.3	21-Aug-06	6.300	38.59	39.424	660	nd	na	4.550	34.874	1.7	7.47	13.5	540	nm	nm	nm	---
U9	U9	3.3-6.3	13-Apr-07	6.300	38.59	39.424	85	nd	na	3.920	35.504	0.62	nm	9.6	277	nm	nm	nm	---
U9	U9	3.3-6.3	6-Sep-07	6.320	38.59	39.424	60	nd	na	5.780	33.644	0.18	6.64	12.9	686	nm	nm	nm	---
U9	U9	3.3-6.3	2-Apr-08	6.300	38.59	39.424	60	nd	na	3.660	35.764	0.23	6.1	12	246	nm	nm	nm	---
U9	U9	3.3-6.3	4-Sep-08	6.312	38.59	39.424	50	nd	na	4.498	34.926	0.4	6.27	12.2	217	nm	nm	nm	---
U9	U9	3.3-6.3	22-Apr-09	6.308	38.59	39.424	10	nd	na	3.662	35.762	0.7	6.28	10.5	230	nm	nm	nm	Clear
U9	U9	3.3-6.3	31-Aug-09	6.310	38.59	39.424	100	nd	na	4.965	34.459	0.4	6.38	12.3	683	nm	nm	nm	Clear
U9	U9	3.3-6.3	21-Apr-10	6.250	38.59	39.424	nd	nd	na	3.750	35.674	0.37	5.86	9.8	154.3	nm	nm	nm	Clear
U9	U9	3.3-6.3	14-Sep-10	6.270	38.59	39.424	nd	nd	na	4.880	34.544	0.24	5.85	13	483	nm	nm	nm	Clear; : DUP-13
U9	U9	3.3-6.3	31-Mar-11	6.270	38.59	39.424	nd	nd	na	2.293	37.131	1.03	5.64	10.2	101.3	nm	nm	nm	pm - Clear; DUP-8
U9	U9	3.3-6.3	1-Sep-11	6.290	38.59	39.424	nd	nd	na	4.930	34.494	0.8	6.06	11.11	246	nm	nm	nm	am - Clear
U9	U9	3.3-6.3	9-May-12	6.270	38.59	39.424	40	nd	na	4.810	34.614	0.9	5.62	10.22	63	nm	nm	nm	Slightly turbid
U9	U9	3.3-6.3	13-Aug-12	6.280	38.59	39.424	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
U9	U9	3.3-6.3	25-Mar-13	6.270	38.59	39.424	60	nd	na	4.265	35.159	0.79	4.75	9.9	46	nm	nm	nm	Clear
U9	U9	3.3-6.3	15-Aug-13	6.300	38.59	39.424	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	U9	3.3-6.3	29-Apr-14	6.290	38.59	39.424	45	nd	na	4.120	35.304	1.1	5.46	9.36	53	0.05	0.04	147.3	Clear
U9	ns	3.3-6.3	12-Aug-14	6.290	38.59	39.424	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	ns	3.3-6.3	6-May-15	6.290	38.59	39.424	55	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Silt on the probe
U9	ns	3.3-6.3	24-Aug-15	6.280	38.59	39.424	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	U9	3.3-6.3	22-Mar-16	6.280	38.59	39.424	nd	nd	na	4.680	34.744	1.1	5.23	10.42	41	0.037	0.03	128.3	Clear
U9	ns	3.3-6.3	16-Sep-16	6.290	38.59	39.424	110	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	U9	3.3-6.3	11-Apr-17	6.280	38.59	39.424	35	nd	na	3.690	35.734	1.68	4.55	9.67	33	0.05	0.02	103.5	Clear
U9	ns	3.3-6.3	6-Sep-17	6.295	38.59	39.424	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
U9	U9	3.3-6.3	30-Apr-18	6.294	38.59	39.424	nd	nd	na	5.894	33.530	2.81	4.84	9.79	43	0.039	0.03	192.8	purged dry; sampled on recharge; cloudy orange
U9	ns	3.3-6.3	21-Aug-18	6.293	38.59	39.424	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	MW02-02	1.2-4.3	7-May-04	5.200	41.24	42.258	150	nd	na	3.510	38.748	nm	7.84	10.9	206	nm	nm	nm	---
MW02-02	MW02-02	1.2-4.3	14-Oct-04	5.213	41.24	42.258	175	nd	na	3.329	38.929	nm	7.39	13.3	962	nm	nm	nm	---
MW02-02	MW02-02	1.2-4.3	21-Apr-05	5.200	41.24	42.258	nm	nd	na	3.266	38.992	nm	6.35	12.9	192	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	20-Sep-05	5.200	41.24	42.258	nm	nd	na	3.470	38.788	nm	7.98	13	1196	nm	nm	nm	Sample collected 20-Sept-05.
MW02-02	A2-MW02-02	1.2-4.3	27-Mar-06	5.220	41.24	42.258	10	nd	na	3.260	38.998	nm	7.65	10.3	493	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	28-Aug-06	5.200	41.24	42.258	nm	nd	na	3.490	38.768	0.75	7.46	12.09	930	nm	nm	nm	---
MW02-02	MW02-02	1.2-4.3	16-Apr-07	5.200	41.24	42.258	10	nd	na	3.350	38.908	0.2	nm	12.7	415	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	4-Sep-07	5.200	41.24	42.258	20	nd	na	3.440	38.818	0.11	7.6	13.7	7.52	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	8-Apr-08	5.117	41.24	42.258	35	nd	na	3.285	38.973	0.31	6.95	8.7	401	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	8-Sep-08	5.223	41.24	42.258	25	nd	na	3.985	38.273	0.2	7.43	12.1	996	nm	nm	nm	Missing J-plug
MW02-02	A2-MW02-02	1.2-4.3	30-Apr-09	5.218	41.24	42.258	15	nd	na	3.348	38.910	0.6	7.69	11.2	200	nm	nm	nm	---
MW02-02	A2-MW02-02	1.2-4.3	8-Sep-09	5.213	41.24	42.258	nd	nd	na	2.395	39.863	0.3	7.43	13.7	162	nm	nm	nm	Clear
MW02-02	A2-MW02-02	1.2-4.3	11-May-10	5.210	41.24	42.258	100	nd	na	3.370	38.888	0.18	7.55	11.2	756	nm	nm	nm	Clear with trace organic particles - slow recharge
MW02-02	MW02-02	1.2-4.3	13-Sep-10	5.205	41.24	42.258	nd	nd	na	3.235	39.023	0.17	7.82	12.9	848	nm	nm	nm	Purged dry at 3.5L, brown, low turbidity
MW02-02	A2-MW02-02	1.2-4.3	11-Apr-11	5.210	41.24	42.258	40	nd	na	3.233	39.025	0.24	7.53	10.2	790	nm	nm	nm	Clear and yellowish; Purged dry at 3 L at 12:00
MW02-02	MW02-02	1.2-4.3	1-Sep-11	5.215	41.24	42.258	10	nd	na	4.420	37.838	3.62	6.96	12.46	516	nm	nm	nm	Silty; Collected BTEX and 1 PAH only
MW02-02	MW02-02	1.2-4.3	23-May-12	5.220	41.24	42.258	10	nd	na	4.500	37.758	0.86	7.33	9.93	767	nm	nm	nm	Clear

TABLE B-1
AREA 2 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)[1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
MW02-02	ns	1.2-4.3	13-Aug-12	5.210	41.24	42.258	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
MW02-02	MW02-02	1.2-4.3	26-Mar-13	5.205	41.24	42.258	5	nd	na	4.190	38.068	0.76	6.62	10.5	962	nm	nm	nm	Clear
MW02-02	MW02-02	1.2-4.3	8-Aug-13	5.210	41.24	42.258	nm	nd	na	5.010	37.248	nm	nm	nm	nm	nm	nm	nm	Purged dry on Aug.12, tried Aug.13, no recovery
MW02-02	MW02-02	1.2-4.3	1-May-14	5.200	41.24	42.258	25	nd	na	4.450	37.808	2.42	6.52	11.1	907	0.796	0.62	50.9	Clear
MW02-02	ns	1.2-4.3	7-Aug-14	5.210	41.24	42.258	60	nd	na	5.190	37.068	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	MW02-02	1.2-4.3	11-May-15	5.200	41.24	42.258	25	nd	na	4.870	37.388	7.8	6.82	12.07	881	0.76	0.59	-60.2	Clear
MW02-02	ns	1.2-4.3	22-Sep-15	5.220	41.24	42.258	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	MW02-02	1.2-4.3	31-Mar-16	5.220	41.24	42.258	5	nd	na	4.470	37.788	0.9	7.05	12.34	671	0.575	0.44	-1.9	Clear
MW02-02	ns	1.2-4.3	9-Sep-16	5.220	41.24	42.258	95	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	MW02-02	1.2-4.3	5-Apr-17	5.220	41.24	42.258	45	nd	na	4.400	37.858	nm	6.12	10.15	149	0.152	0.11	179.9	Clear
MW02-02	ns	1.2-4.3	6-Sep-17	5.100	41.24	42.258	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	ns	1.2-4.3	26-Apr-18	4.680	41.24	42.258	45	nd	na	4.600	37.658	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-02	ns	1.2-4.3	21-Aug-18	5.221	41.24	42.258	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-03	MW02-03	1.5-4.6	29-Apr-04	6.000	41.43	41.387	175	nd	na	3.510	37.877	nm	6.55	11.2	62.8	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	13-Oct-04	5.984	41.43	41.387	175	nd	na	3.480	37.907	nm	6.51	13.6	353	nm	nm	nm	Purged dry
MW02-03	MW02-03	1.5-4.6	21-Apr-05	6.000	41.43	41.387	nm	nd	na	3.336	38.051	nm	6.51	11.7	274	nm	nm	nm	Purged dry
MW02-03	A2-MW02-03	1.5-4.6	19-Sep-05	6.060	41.43	41.387	nm	nd	na	3.340	38.047	nm	6.67	13.4	319	nm	nm	nm	Purged dry; Sample collected 20-Sept-05.
MW02-03	MW02-03	1.5-4.6	27-Mar-06	6.030	41.43	41.387	100	nd	na	2.790	38.597	nm	6.56	11	169.7	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	28-Aug-06	6.040	41.43	41.387	nm	nd	na	3.120	38.267	0.11	6.65	16.2	88.1	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	16-Apr-07	6.050	41.43	41.387	10	nd	na	2.910	38.477	0.18	nm	10	223	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	4-Sep-07	6.050	41.43	41.387	90	nd	na	3.010	38.377	0.15	6.5	12.9	204	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	8-Apr-08	6.018	41.43	41.387	50	nd	na	2.730	38.657	0.22	6.36	8.9	251	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	8-Sep-08	6.043	41.43	41.387	60	nd	na	2.955	38.432	0.4	7.03	12.3	230	nm	nm	nm	---
MW02-03	MW02-03	1.5-4.6	30-Apr-09	6.025	41.43	41.387	20	nd	na	2.917	38.470	0.6	6.55	10.4	60	nm	nm	nm	Clear
MW02-03	MW02-03	1.5-4.6	8-Sep-09	6.030	41.43	41.387	nd	nd	na	2.990	38.397	0.4	6.81	12.7	512	nm	nm	nm	Clear
MW02-03	MW02-03	1.5-4.6	11-May-10	6.040	41.43	41.387	140	nd	na	2.950	38.437	0.12	6.45	11.5	210	nm	nm	nm	Clear - collected Duplicate MW02-03X
MW02-03	MW02-03	1.5-4.6	13-Sep-10	6.040	41.43	41.387	nd	nd	na	2.660	38.727	0.14	6.45	13	222	nm	nm	nm	Clear
MW02-03	MW02-03	1.5-4.6	7-Apr-11	6.045	41.43	41.387	70	nd	na	2.605	38.782	0.33	6.35	12.1	227	nm	nm	nm	Clear
MW02-03	MW02-03	1.5-4.6	1-Sep-11	6.025	41.43	41.387	30	nd	na	4.880	36.507	3.73	6.33	12.86	210	nm	nm	nm	Silty; BTEX and 1 amber only collected; DUP-19
MW02-03	MW02-03	1.5-4.6	23-May-12	6.040	41.43	41.387	nm	nd	na	4.800	36.587	0.5	6.53	12.71	373	nm	nm	nm	Clear
MW02-03	ns	1.5-4.6	13-Aug-12	6.020	41.43	41.387	170	nd	na	6.020	35.367	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
MW02-03	MW02-03	1.5-4.6	26-Mar-13	6.030	41.43	41.387	35	nd	na	4.085	37.302	0.19	5.54	11.27	701	nm	nm	nm	Clear
MW02-03	MW02-03	1.5-4.6	8-Aug-13	6.050	41.43	41.387	25	nd	na	4.970	36.417	0.54	5.77	13.92	509	nm	nm	nm	DUP-5
MW02-03	MW02-03	1.5-4.6	1-May-14	6.040	41.43	41.387	20	nd	na	3.780	37.607	0.36	5.91	10.88	317	0.282	0.21	18.9	Clear; DUP-13
MW02-03	MW02-03	1.5-4.6	7-Aug-14	6.040	41.43	41.387	110	nd	na	4.370	37.017	0.72	5.83	12.79	157	0.133	0.10	-4.2	Clear; DUP-4
MW02-03	MW02-03	1.5-4.6	11-May-15	6.040	41.43	41.387	220	nd	na	5.075	36.312	0.59	5.39	11.89	146	0.127	0.09	82.7	Clear; DUP-13
MW02-03	ns	1.5-4.6	22-Sep-15	6.055	41.43	41.387	250	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Sediment on probe
MW02-03	MW02-03	1.5-4.6	31-Mar-16	6.040	41.43	41.387	75	nd	na	4.430	36.957	0.59	5.74	12.52	315	0.268	0.2	126.1	Clear
MW02-03	ns	1.5-4.6	9-Sep-16	6.030	41.43	41.387	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-03	MW02-03	1.5-4.6	5-Apr-17	6.030	41.43	41.387	85	nd	na	4.150	37.237	0.32	5.37	10.1	217.4	0.196	0.15	124.2	Clear
MW02-03	ns	1.5-4.6	6-Sep-17	5.980	41.43	41.387	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-03	MW02-03	1.5-4.6	26-Apr-18	6.050	41.43	41.387	10	nd	na	4.704	36.683	0.46	4.82	11.98	379	0.328	0.25	199.6	Clear
MW02-03	ns	1.5-4.6	21-Aug-18	6.051	41.43	41.387	30	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-04	MW02-04	1.5-4.6	29-Apr-04	5.960	41.71	41.685	100	nd	na	3.190	38.495	nm	6.66	11.7	211	nm	nm	nm	---
MW02-04	MW02-04	1.5-4.6	13-Oct-04	6.955	41.71	41.685	175	nd	na	3.162	38.523	nm	6.96	13.6	777	nm	nm	nm	Purged dry
MW02-04	MW02-04	1.5-4.6	21-Apr-05	6.650	41.71	41.685	nm	nd	na	2.939	38.746	nm	6.61	12.9	1136	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	19-Sep-05	6.000	41.71	41.685	nm	nd	na	3.620	38.065	nm	6.96	12.9	1054	nm	nm	nm	Sample collected 20-Sept-05.
MW02-04	A2-MW02-04	1.5-4.6	27-Mar-06	5.950	41.71	41.685	5	nd	na	2.850	38.835	nm	6.76	11.1	258	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	28-Aug-06	6.010	41.71	41.685	nm	nd	na	3.390	38.295	0.8	6.53	12.19	1407	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	16-Apr-07	6.020	41.71	41.685	10	nd	na	2.950	38.735	0.2	nm	12.4	1350	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	4-Sep-07	6.040	41.71	41.685	170	nd	na	3.280	38.405	0.14	6.95	12.7	1495	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	8-Apr-08	6.038	41.71	41.685	75	nd	na	2.697	38.988	0.26	6.23	8.5	873	nm	nm	nm	---
MW02-04	A2-MW02-04	1.5-4.6	8-Sep-08	6.039	41.71	41.685	120	nd	na	3.298	38.387	0.4	6.72	12.6	1542	nm	nm	nm	Duplicate
MW02-04	A2-MW02-04	1.5-4.6	30-Apr-09	6.039	41.71	41.685	50	nd	na	3.192	38.493	0.5	6.44	10.9	290	nm	nm	nm	Clear minor sediment
MW02-04	A2-MW02-04	1.5-4.6	8-Sep-09	6.038	41.71	41.685	nd	nd	na	3.530	38.155	0.3	6.46	12.3	1871	nm	nm	nm	Clear
MW02-04	A2-MW02-04	1.5-4.6	11-May-10	6.030	41.71	41.685	160	nd	na	3.260	38.425	0.13	6.35	11.8	1268	nm	nm	nm	Clear
MW02-04	MW02-04	1.5-4.6	13-Sep-10	6.015	41.71	41.685	130	nd	na	3.795	37.890	0.15	6.5	13.7	2040	nm	nm	nm	Clear, QA/QC; DUP-10
MW02-04	MW02-04	1.5-4.6	7-Apr-11	6.030	41.71	41.685	120	nd	na	3.755	37.930	0.52	6.33	11.5	1485	nm	nm	nm	pm - Clear
MW02-04	ns	1.5-4.6	1-Sep-11	6.030	41.71	41.685	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No sample
MW02-04	ns	1.5-4.6	23-May-12	6.030	41.71	41.685	100	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-04	ns	1.5-4.6	13-Aug-12	6.010	41.71	41.685	120	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
MW02-04	MW02-04	1.5-4.6	26-Mar-13	6.000	41.71	41.685	70	nd	na	3.240	38.445	0.43	6.04	10.91	387	nm	nm	nm	Clear
MW02-04	MW02-04	1.5-4.6	8-Aug-13	6.030	41.71	41.685	30	nd	na	5.530	36.155	1.22	5.9	13.38	444	nm	nm	nm	Dry at 0.8 L; Sampled BTEX on Aug.8; Purged dry on Aug.12; No recovery
MW02-04	MW02-04	1.5-4.6	1-May-14	6.010	41.71	41.685	50	nd	na	3.070	38.615	2.38	6.41	10.87	371	0.33	0.25	27.6	Clear
MW02-04	MW02-04	1.5-4.6	7-Aug-14	6.020	41.71	41.685	nm	nd	na	3.845	37.840	0.83	6.3	11.54	420	0.368	0.28	72.7	Clear
MW02-04	ns	1.5-4.6	11-May-15	6.010	41.71	41.685	65	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-04	ns	1.5-4.6	22-Sep-15	6.025	41.71	41.685	95	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Sediment on probe
MW02-04	MW02-04	1.5-4.6	31-Mar-16	6.010	41.71	41.685	40	nd	na	4.250	37.435	0.93	6.09	11.96	217	0.187	0.14	153.3	Clear
MW02-04	ns	1.5-4.6	7-Sep-16	nm	41.71	41.685	85	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-04	MW02-04	1.5-4.6	5-Apr-17	6.000	41.71	41.685	45	nd	na	3.000	38.685	0.32	6.29	9.5	427.3	0.3939	0.3	25.5	Clear
MW02-04	ns	1.5-4.6	6-Sep-17	6.000	41.71	41.685	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW02-04	MW02-04	1.5-4.6	19-Apr-18	6.002	41.71	41.685	85	nd	na	3.915	37.770	2.47	5.87	10.23	371	0.336	0.25	171	Silty
MW02-04	ns	1.5-4.6	21-Aug-18	6.015	41.71	41.685	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-02	MW03-02	3.7-7.6	28-Apr-04	8.590	40.79	41.756	nm	nd	na	3.160	38.596	nm	6.09	10.9	129	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	13-Oct-04	8.621	40.79	41.756	200	nd	na	3.144	38.612	nm	6.48	12.4	562	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	12-Apr-05	8.621	40.79	41.756	100	nd	na	2.502	39.254	nm	6.29	10.7	470	nm	nm	nm	---
MW03-02	A2-MW03-02	3.7-7.6	13-Sep-05	8.600	40.79	41.756	nm	nd	na	4.570	37.186	nm	6.56	12	422	nm	nm	nm	Sample collected 13-Sept-05.
MW03-02	MW03-02	3.7-7.6	22-Mar-06	8.450	40.79	41.756	110	nd	na	2.612	39.144	1.61	6.59	10.1	275	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	28-Aug-06	8.550	40.79	41.756	nm	nd	na	5.500	36.256	1.3	6.12	12.8	452	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	16-Apr-07	8.500	40.79	41.756	140	nd	na	3.000	38.756	NA	nm	12.6	590	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	4-Sep-07	8.480	40.79	41.756	125	nd	na	3.950	37.806	0.21	6.3	12.4	707	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	2-Apr-08	8.520	40.79	41.756	55	nd	na	2.761	38.995	0.87	6.13	12.7	541	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	8-Sep-08	8.838	40.79	41.756	100	nd	na	2.982	38.774	0.4	6.32	11.3	440	nm	nm	nm	---
MW03-02	MW03-02	3.7-7.6	30-Apr-09	8.620	40.79	41.756	50	nd	na	2.880	38.876	0.5	6.29	10.5	1175	nm	nm	nm	Clear
MW03-02	MW03-02	3.7-7.6	31-Aug-09	8.630	40.79	41.756	30	nd	na	4.630	37.126	0.2	6.45	11.8	430	nm	nm	nm	Clear
MW03-02	MW03-02	3.7-7.6	20-Apr-10	8.638	40.79	41.756	nd	nd	na	2.930	38.826	0.08	4.63	9.9	312	nm	nm	nm	Clear
MW03-02	MW03-02	3.7-7.6	14-Sep-10	8.620	40.79	41.756	50	nd	na	4.565	37.191	0.15	6.04	11.9	437	nm	nm	nm	Clear
MW03-02	MW03-02	3.7-7.6	31-Mar-11	8.467	40.79	41.756	75	nd	na	2.795	38.961	3.78	5.98	11.6	217	nm	nm	nm	Clear; DUP-7
MW03-02	MW03-02	3.7-7.6	1-Sep-11	8.625	40.79	41.756	nd	nd	na	6.870	34.886	1.17	6.32	10.57	627	nm	nm	nm	Clear
MW03-02	MW03-02	3.7-7.6	9-May-12	8.560	40.79	41.756	50	nd	na	4.530	37.226	1.04	6.07	10.12	189	nm	nm	nm	Clear
MW03-02	ns	3.7-7.6	13-Aug-12	8.570	40.79	41.756	50	nd	na	8.530	33.226	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
MW03-02	MW03-02	3.7-7.6	26-Mar-13	8.620	40.79	41.756	15	nd	na	4.820	36.936	1.45	5.28	10.08	159	nm	nm	nm	Clear; DUP-3
MW03-02	MW03-02	3.7-7.6	19-Aug-13	8.630	40.79	41.756	nd	nd	na	8.140	33.616	1.64	5.87	13.31	247	nm	nm	nm	Sample collected Aug.20; Clear
MW03-02	MW03-02	3.7-7.6	30-Apr-14	8.620	40.79	41.756	nm	nd	na	4.740	37.016	1.82	5.89	10.05	198	0.18	0.13	163.4	Clear
MW03-02	MW03-02	3.7-7.6	12-Aug-14	8.630	40.79	41.756	nd	nd	na	7.675	34.081	1.55	4.54	12.25	200	0.171	0.13	116.5	Clear
MW03-02	MW03-02	3.7-7.6	7-May-15	8.620	40.79	41.756	45	nd	na	6.060	35.696	3.28	5.91	10.8	216	0.193	0.14	149.8	Clear
MW03-02	MW03-02	3.7-7.6	25-Aug-15	8.625	40.79	41.756	50	nd	na	8.200	33.556	0.55	6.01	13.6	186	0.155	0.11	71	DUP-5
MW03-02	MW03-02	3.7-7.6	22-Mar-16	8.610	40.79	41.756	120	nd	na	5.435	36.321	1.51	6.77	10.65	173	0.155	0.11	13.2	Clear
MW03-02	ns	3.7-7.6	16-Sep-16	8.560	40.79	41.756	95	nd	na	8.460	33.296	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-02	MW03-02	3.7-7.6	10-Apr-17	8.580	40.79	41.756	120	nd	na	4.530	37.226	2.56	5.45	9.92	1.7	0.107	0.08	162.5	Clear
MW03-02	ns	3.7-7.6	6-Sep-17	8.590	40.79	41.756	10	nd	na	8.540	33.216	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-02	MW03-02	3.7-7.6	26-Apr-18	8.630	40.79	41.756	65	nd	na	6.420	35.336	4.95	5.78	10.95	175	0.155	0.11	181.4	Clear
MW03-02	ns	3.7-7.6	21-Aug-18	8.631	40.79	41.756	50	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-03	MW03-03	6.1-13.7	29-Apr-04	13.910	44.65	45.392	200	nd	na	8.970	36.422	nm	6.59	13.2	68.9	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	12-Oct-04	13.846	44.65	45.392	175	nd	na	9.168	36.224	nm	6.58	13.8	260	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	21-Apr-05	13.910	44.65	45.392	nm	nd	na	7.614	37.778	nm	6.41	12.9	327	nm	nm	nm	---
MW03-03	A2-MW03-03	6.1-13.7	19-Sep-05	14.000	44.65	45.392	nm	nd	na	9.710	35.682	nm	6.6	13.2	350	nm	nm	nm	Sample collected 20-Sept-05.
MW03-03	MW03-03	6.1-13.7	27-Mar-06	13.900	44.65	45.392	90	nd	na	8.020	37.372	nm	6.25	12.6	159.2	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	28-Aug-06	13.840	44.65	45.392	nm	nd	na	9.290	36.102	1.8	6.27	13.2	370	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	16-Apr-07	13.900	44.65	45.392	125	nd	na	8.340	37.052	0.2	nm	12	232	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	4-Sep-07	13.900	44.65	45.392	175	nd	na	9.160	36.232	0.32	6.41	13.6	265	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	8-Apr-08	13.888	44.65	45.392	100	nd	na	8.250	37.142	0.37	6.09	10.3	287	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	8-Sep-08	13.908	44.65	45.392	60	nd	na	8.489	36.903	0.3	6.46	13	369	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	30-Apr-09	13.875	44.65	45.392	50	nd	na	8.275	37.117	0.4	6.43	12.6	629	nm	nm	nm	---
MW03-03	MW03-03	6.1-13.7	8-Sep-09	13.900	44.65	45.392	nd	nd	na	8.990	36.402	0.2	7.31	12.6	13900	nm	nm	nm	Clear first bailer, second cloudy
MW03-03	MW03-03	6.1-13.7	11-May-10	13.880	44.65	45.392	35	nd	na	8.340	37.052	0.19	6.29	15.1	307	nm	nm	nm	Clear with trace silt (Bailer ball jammed - tried twice before obtaining sample)
MW03-03	MW03-03	6.1-13.7	14-Sep-10	14.860	44.65	45.392	5	nd	na	8.560	36.832	0.15	6.8	14	289	nm	nm	nm	Silty
MW03-03	MW03-03	6.1-13.7	7-Apr-11	13.863	44.65	45.392	70	nd	na	7.145	38.247	0.53	6.09	14.4	205	nm	nm	nm	Clear
MW03-03	MW03-03	6.1-13.7	17-Aug-11	13.900	44.65	45.392	nd	nd	na	10.235	35.157	3.42	6.55	17.58	2	nm	nm	nm	Clear
MW03-03	ns	6.1-13.7	23-May-12	13.910	44.65	45.392	20	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry at 13.910 m
MW03-03	ns	6.1-13.7	14-Aug-12	13.880	44.65	45.392	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
MW03-03	MW03-03	6.1-13.7	18-Apr-13	13.900	44.65	45.392	75	nd	na	11.650	33.742	1.79	6.39	11.69	301	nm	nm	nm	Silty/cloudy
MW03-03	MW03-03	6.1-13.7	7-Aug-13	13.920	44.65	45.392	nm	nd	na	13.450	31.942	nm	nm	nm	nm	nm	nm	nm	Too shallow to sample on Aug.8
MW03-03	MW03-03	6.1-13.7	1-May-14	13.920	44.65	45.392	10	nd	na	5.980	39.412	1.22	6.05	12.91	260	0.22	0.16	-26.8	Clear
MW03-03	MW03-03	6.1-13.7	13-Aug-14	13.915	44.65	45.392	25	nd	na	9.775	35.617	1.48	6.26	13.61	262	0.217	0.16	-65.4	Clear
MW03-03	ns	6.1-13.7	11-May-15	13.910	44.65	45.392	65	nd	na	13.890	31.502	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-03	ns	6.1-13.7	22-Sep-15	13.955	44.65	45.392	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-03	MW03-03	6.1-13.7	31-Mar-16	13.900	44.65	45.392	5	nd	na	9.240	36.152	8.77	6.72	13.76	251	0.21	0.16	-20	Clear
MW03-03	ns	6.1-13.7	7-Sep-16	13.930	44.65	45.392	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW03-03	MW03-03	6.1-13.7	5-Apr-17	13.910	44.65	45.392	40	nd	na	9.560	35.832	1.37	6.35	12	261	0.227	0.17	-43.3	Clear
MW03-03	ns	6.1-13.7	15-Aug-17	13.920	44.65	45.392	10	nd	na	13.530	31.862	nm	nm	nm	nm	nm	nm	nm	Purged 2L dry on Aug 15
MW03-03	MW03-03	6.1-13.7	19-Apr-18	13.910	44.65	45.392	nd	nd	na	9.520	35.872	1.65	6.19	13.57	293	0.244	0.18	-11.3	Clear; Bailed
MW03-03	ns	6.1-13.7	21-Aug-18	13.918	44.65	45.392	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-05I	MW09-05I	9.18-10.68	20-Apr-10	11.410	38.67	39.32	25	nd	na	3.820	35.500	0.07	6.88	10.4	715	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	14-Sep-10	11.390	38.67	39.32	5	nd	na	4.837	34.483	0.09	6.62	13.2	658	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	31-Mar-11	11.408	38.67	39.32	10	nd	na	2.818	36.502	0.29	6.73	11.7	653	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	1-Sep-11	11.420	38.67	39.32	nd	nd	na	5.010	34.310	3.95	6.62	11.72	442	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	9-May-12	11.430	38.67	39.32	30	nd	na	5.300	34.020	0.52	6.59	10.97	331	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	13-Aug-12	11.420	38.67	39.32	70	nd	na	8.280	31.040	0.61	6.95	13.21	434	nm	nm	nm	Clear; DUP-6
A2MW09-05I	MW09-05I	9.18-10.68	25-Mar-13	11.420	38.67	39.32	5	nd	na	4.895	34.425	0.33	6.23	11.17	284	nm	nm	nm	Clear; DUP-2
A2MW09-05I	MW09-05I	9.18-10.68	23-Oct-13	11.400	38.67	39.32	35	nd	na	8.590	30.730	0.36	6.36	11.32	577	nm	nm	nm	Clear
A2MW09-05I	MW09-05I	9.18-10.68	30-Apr-14	11.380	38.67	39.32	nd	nd	na	4.760	34.560	0.62	6.19	10.37	321	0.29	0.22	-18.6	Clear
A2MW09-05I	MW09-05I	9.18-10.68	12-Aug-14	11.410	38.67	39.32	nd	nd	na	8.180	31.140	2.42	6.85	13.69	426	0.353	0.26	-117.7	DUP-6
A2MW09-05I	MW09-05I	9.18-10.68	6-May-15	11.400	38.67	39.32	5	nd	na	6.990	32.330	2.70	6.63	11.33	317	0.279	0.21	75	DUP-12; Slightly turbid; Sampled May.7
A2MW09-05I	MW09-05I	9.18-10.68	24-Aug-15	11.390	38.67	39.32	nd	nd	na	9.140	30.180	2.57	6.85	12.49	364	0.313	0.23	12.1	Turbid; Purged 15 L
A2MW09-05I	MW09-05I	9.18-10.68	22-Mar-16	11.390	38.67	39.32	nd	nd	na	5.145	34.175	0.23	6.44	11.45	189	0.175	0.13	18.3	Clear
A2MW09-05I	MW09-05I	9.18-10.68	25-Aug-16	11.410	38.67	39.32	5	nd	na	8.450	30.870	1.10	6.9	11.92	381	0.33	0.25	-51.1	Clear
A2MW09-05I	A2MW09-05I	9.18-10.68	12-Apr-17	11.380	38.67	39.32	nd	nd	na	4.480	34.840	0.39	7.2	10.69	200	0.179	0.13	-149.7	Clear
A2MW09-05I	A2MW09-05I	9.18-10.68	6-Sep-17	11.410	38.67	39.32	nd	nd	na	10.110	29.210	3.15	7.29	12.27	317	0.272	0.2	4.4	Clear; DUP-6
A2MW09-05I	MW09-05I	9.18-10.68	26-Apr-18	11.407	38.67	39.32	nd	nd	na	5.561	33.759	0.22	6.46	11.45	234	0.205	0.15	-29.2	Clear; DUP-10
A2MW09-05I	MW09-05I	9.18-10.68	30-May-18	11.411	38.67	39.32	nd	nd	na	8.434	30.886	0.22	6.22	12.21	227	0.195	0.14	-20.3	Clear; DUP-14
A2MW09-05I	MW09-05I	9.18-10.68	21-Aug-18	11.492	38.67	39.32	5	nd	na	9.518	29.802	2.38	6.75	12.31	276	0.229	0.17	44.6	Clear
A2MW09-06S	MW09-06S	2.44-5.44	21-Apr-10	6.120	38.36	39.049	25	nd	na	2.715	36.334	0.45	5.83	10.1	919	nm	nm	nm	Clear
A2MW09-06S	MW09-06S	2.44-5.44	14-Sep-10	6.125	38.36	39.049	10	nd	na	3.883	35.166	0.22	6.93	13.1	1007	nm	nm	nm	Clear
A2MW09-06S	MW09-06S	2.44-5.44	6-Apr-11	6.127	38.36	39.049	60	nd	na	1.678	37.371	7.53	5.83	8.8	57.6	nm	nm	nm	Clear
A2MW09-06S	MW09-06S	2.44-5.44	1-Sep-11	6.120	38.36	39.049	60	nd	na	3.227	35.822	1.5	6.76	12.66	656	nm	nm	nm	Clear; DUP-17
A2MW09-06S	ns	2.44-5.44	9-May-12	6.125	38.36	39.049	45	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-06S	ns	2.44-5.44	13-Aug-12	6.125	38.36	39.049	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-06S	ns	2.44-5.44	25-Mar-13	6.120	38.36	39.049	85	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	ns	2.44-5.44	15-Aug-13	6.030	38.36	39.049	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	A2MW09-06S	2.44-5.44	30-Apr-14	6.120	38.36	39.049	nd	nd	na	4.260	34.789	3.63	5.52	9.34	89	0.086	0.06	92.4	Clear
A2MW09-06S	ns	2.44-5.44	12-Aug-14	6.130	38.36	39.049	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	ns	2.44-5.44	6-May-15	6.120	38.36	39.049	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	ns	2.44-5.44	24-Aug-15	6.120	38.36	39.049	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	ns	2.44-5.44	22-Mar-16	6.130	38.36	39.049	nd	nd	na	6.070	32.979	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	ns	2.44-5.44	23-Aug-16	6.100	38.36	39.049	nm	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	A2MW09-06S	2.44-5.44	11-Apr-17	6.120	38.36	39.049	40	nd	na	5.060	33.989	5.61	4.39	9.04	63	0.059	0.04	116.7	Clear
A2MW09-06S	ns	2.44-5.44	6-Sep-17	6.350	38.36	39.049	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06S	A2MW09-06S	2.44-5.44	26-Apr-18	6.160	38.36	39.049	nd	nd	na	5.934	33.115	7.48	6.08	11.84	77	0.066	0.05	288.6	Dry after parameter; no recharge water
A2MW09-06S	ns	2.44-5.44	21-Aug-18	6.137	38.36	39.049	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-06I	MW09-06D	9.33-10.83	21-Apr-10	11.620	38.59	39.366	nd	nd	na	3.040	36.326	0.08	6.94	10.7	919	nm	nm	nm	Clear
A2MW09-06I	MW09-06I	9.33-10.83	14-Sep-10	11.613	38.59	39.366	5	nd	na	4.168	35.198	0.09	6.73	12.9	816	nm	nm	nm	Clear
A2MW09-06I	MW09-06I	9.33-10.83	6-Apr-11	11.578	38.59	39.366	90	nd	na	2.145	37.221	0.7	6.47	10.2	536	nm	nm	nm	Clear
A2MW09-06I	MW09-06I	9.33-10.83	1-Sep-11	11.568	38.59	39.366	15	nd	na	3.529	35.837	2.62	6.63	12.01	444	nm	nm	nm	Clear

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)[1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
A2MW09-06I	A2MW09-06I	9.33-10.83	9-May-12	11.570	38.59	39.366	110	nd	na	8.310	31.056	7.12	6.83	11.38	353	nm	nm	nm	Clear
A2MW09-06I	A2MW09-06I	9.33-10.83	13-Aug-12	11.570	38.59	39.366	nm	nd	na	9.575	29.791	0.57	7.02	13.38	475	nm	nm	nm	Clear
A2MW09-06I	MW09-06I	9.33-10.83	25-Mar-13	11.590	38.59	39.366	620	nd	na	7.130	32.236	0.34	6.07	10.44	195	nm	nm	nm	Clear; DUP-1
A2MW09-06I	MW09-06I	9.33-10.83	19-Aug-13	11.565	38.59	39.366	1430	nd	na	10.380	28.986	1.58	6.8	12.57	476	nm	nm	nm	Silty; odour, BTEX and metals on Aug.19, ambers on Aug.20
A2MW09-06I	MW09-06I	9.33-10.83	30-Apr-14	11.560	38.59	39.366	nd	nd	na	5.660	33.706	2.1	6.53	10.15	188	0.17	0.13	-123.5	Clear; DUP-12
A2MW09-06I	MW09-06I	9.33-10.83	12-Aug-14	11.580	38.59	39.366	35	nd	na	8.970	30.396	1.71	6.86	13.67	380	0.315	0.24	-100	Clear
A2MW09-06I	MW09-06I	9.33-10.83	6-May-15	11.570	38.59	39.366	nd	nd	na	8.820	30.546	1.82	6.66	11.51	290	0.254	0.19	39.8	Clear
A2MW09-06I	MW09-06I	9.33-10.83	24-Aug-15	11.570	38.59	39.366	650	nd	na	10.220	29.146	1.58	6.86	12.51	384	0.328	0.25	-2.1	DUP-4; Turbid; Purged 8 L
A2MW09-06I	MW09-06I	9.33-10.83	22-Mar-16	11.580	38.59	39.366	nd	nd	na	6.775	32.591	0.17	6.44	11.06	168	0.148	0.11	-42.2	Clear
A2MW09-06I	MW09-06I	9.33-10.83	25-Aug-16	11.580	38.59	39.366	75	nd	na	9.950	29.416	0.64	6.87	13.9	321	0.264	0.2	-65	Clear
A2MW09-06I	MW09-06I	9.33-10.83	11-Apr-17	11.570	38.59	39.366	20	nd	na	5.980	33.386	0.34	7.12	10.51	134	0.12	0.09	-151.3	Clear
A2MW09-06I	MW09-06I	9.33-10.83	6-Sep-17	11.590	38.59	39.366	nd	nd	na	10.110	29.256	3.1	5.86	12.62	269	0.229	0.17	13.6	Clear
A2MW09-06I	MW09-06I	9.33-10.83	26-Apr-18	11.580	38.59	39.366	10	nd	na	6.876	32.490	0.36	6.5	11.23	161	0.142	0.1	-108	Clear, went dry, sampled after recharged
A2MW09-06I	MW09-06I	9.33-10.83	21-Aug-18	11.657	38.59	39.366	5	nd	na	10.186	29.180	1.85	5.2	11.7	277	0.242	0.18	71.9	Clear
A2MW09-10	MW09-10	2.22-5.22	20-Apr-10	6.080	38.98	39.835	>11000	nd	na	4.010	35.825	0.2	6.29	10.3	878	nm	nm	nm	Clear
A2MW09-10	MW09-10	2.22-5.22	14-Sep-10	6.650	38.98	39.835	320	nd	na	5.200	34.635	0.29	5.87	12.9	858	nm	nm	nm	Clear
A2MW09-10	MW09-10	2.22-5.22	31-Mar-11	6.072	38.98	39.835	>11000	nd	na	3.284	36.551	0.45	6.32	11.4	769	nm	nm	nm	Clear
A2MW09-10	A2MW09-10	2.22-5.22	9-May-12	6.070	38.98	39.835	1210	nd	na	4.800	35.035	1.54	6.24	10.23	458	nm	nm	nm	Clear; DUP-6
A2MW09-10	ns	2.22-5.22	13-Aug-12	6.070	38.98	39.835	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-10	MW09-10	2.22-5.22	25-Mar-13	6.070	38.98	39.835	300	nd	na	5.100	34.735	0.37	5.81	10.4	701	nm	nm	nm	Clear
A2MW09-10	ns	2.22-5.22	15-Aug-13	6.070	38.98	39.835	200	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	A2MW09-10	2.22-5.22	30-Apr-14	6.070	38.98	39.835	400	nd	na	4.970	34.865	0.42	6.1	10.32	516	0.467	0.35	-33.2	---
A2MW09-10	ns	2.22-5.22	12-Aug-14	6.070	38.98	39.835	>11000	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	ns	2.22-5.22	6-May-15	6.070	38.98	39.835	45	nd	na	5.890	33.945	nm	nm	nm	nm	nm	nm	nm	Dry; Purged 150 mL; No recovery
A2MW09-10	ns	2.22-5.22	25-Aug-15	6.070	38.98	39.835	75	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	A2MW09-10	2.22-5.22	22-Mar-16	6.070	38.98	39.835	40	nd	na	5.280	34.555	1.6	6.68	10.78	434	0.387	0.29	-23.2	Clear
A2MW09-10	ns	2.22-5.22	9-Sep-16	6.080	38.98	39.835	100	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	A2MW09-10	2.22-5.22	18-Apr-17	6.080	38.98	39.835	100	nd	na	4.960	34.875	0.31	5.98	10.57	385	0.345	0.26	-79.3	Clear; Strong hydrocarbon odour
A2MW09-10	ns	2.22-5.22	6-Sep-17	6.080	38.98	39.835	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	ns	2.22-5.22	26-Apr-18	6.007	38.98	39.835	15	nd	na	5.918	33.917	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-10	ns	2.22-5.22	21-Aug-18	6.083	38.98	39.835	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-11	MW09-11	2.05-5.05	20-Apr-10	6.070	39.13	40.162	>11000	nd	na	2.120	38.042	0.09	5.01	10.5	1021	nm	nm	nm	Clear
A2MW09-11	ns	2.05-5.05	14-Sep-10	nm	39.13	40.162	9240	3.500	450	3.950	36.212	nm	nm	nm	nm	nm	nm	nm	NAPL, not sampled
A2MW09-11	ns	2.05-5.05	31-Mar-11	nm	39.13	40.162	2970	1.924	13	1.937	38.225	nm	nm	nm	nm	nm	nm	nm	Product; Not sampled
A2MW09-11	A2MW09-11	2.05-5.05	9-May-12	5.150	39.13	40.162	1100	nd	na	2.510	37.652	1.17	6.64	10.36	610	nm	nm	nm	Clear
A2MW09-11	ns	2.05-5.05	13-Aug-12	5.170	39.13	40.162	4950	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-11	MW09-11	2.05-5.05	26-Mar-13	nm	39.13	40.162	5	nd	na	2.830	37.332	0.54	6.04	9.61	435	nm	nm	nm	BC: Globules; Potentially "HOT" Sample
A2MW09-11	MW09-11	2.05-5.05	15-Aug-13	6.060	39.13	40.162	1100	nd	na	6.010	34.152	nm	nm	nm	nm	nm	nm	nm	Too shallow to purge
A2MW09-11	A2MW09-11	2.05-5.05	30-Apr-14	6.050	39.13	40.162	870	nd	na	3.140	37.022	1.97	6.33	9.39	399	0.37	0.28	-97.2	Sheen; Clear
A2MW09-11	ns	2.05-5.05	12-Aug-14	6.060	39.13	40.162	1050	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-11	MW09-11	2.05-5.05	6-May-15	6.060	39.13	40.162	900	nd	na	4.870	35.292	0.93	6.04	10.98	466	0.413	0.31	-234.4	Clear; Hydrocarbon odour. Sampled May.7
A2MW09-11	ns	2.05-5.05	25-Aug-15	6.055	39.13	40.162	1320	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-11	MW09-11	2.05-5.05	22-Mar-16	6.060	39.13	40.162	1210	nd	na	3.395	36.767	0.09	6.68	10.46	307	0.276	0.21	-417	Sheen in the sample; DUP-11
A2MW09-11	ns	2.05-5.05	9-Sep-16	6.060	39.13	40.162	200	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-11	A2MW09-11	2.05-5.05	18-Apr-17	6.050	39.13	40.162	70	nd	na	2.760	37.402	0.23	6.23	9.62	188	0.173	0.13	-242.8	Clear; DUP-11; Hydrocarbon odour
A2MW09-11	ns	2.05-5.05	6-Sep-17	6.065	39.13	40.162	4070	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-11	A2MW09-11	2.05-5.05	26-Apr-18	6.060	39.13	40.162	140	nd	na	3.050	37.112	0.2	6.2	10.07	262	0.238	0.18	-38.7	Clear; historical depth of the well is wrong
A2MW09-11	ns	2.05-5.05	21-Aug-18	6.064	39.13	40.162	4510	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-12	MW09-12	2.14-5.14	20-Apr-10	6.080	39.62	40.561	200	nd	na	3.150	37.411	0.19	4.77	9.9	484	nm	nm	nm	Clear
A2MW09-12	MW09-12	2.14-5.14	14-Sep-10	6.035	39.62	40.561	280	nd	na	4.960	35.601	0.3	5.99	12.4	500	nm	nm	nm	Clear, trace fine sediment, LEPH/HEPH one jar only
A2MW09-12	MW09-12	2.14-5.14	31-Mar-11	6.067	39.62	40.561	nd	nd	na	2.428	38.133	4.55	6.12	11.6	111.4	nm	nm	nm	Turbid
A2MW09-12	ns	2.14-5.14	8-Sep-11	6.067	39.62	40.561	45	nd	na	5.710	34.851	nm	nm	nm	nm	nm	nm	nm	Purged dry at 0.6 L; Insufficient water to collect sample
A2MW09-12	MW09-12	2.14-5.14	9-May-12	6.060	39.62	40.561	5	nd	na	3.570	36.991	5.14	5.74	9.75	125	nm	nm	nm	Turbid
A2MW09-12	ns	2.14-5.14	13-Aug-12	6.065	39.62	40.561	35	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-12	MW09-12	2.14-5.14	25-Mar-13	6.060	39.62	40.561	>11000	nd	na	2.770	37.791	2.13	4.92	9.6	70	nm	nm	nm	Clear
A2MW09-12	ns	2.14-5.14	6-Aug-13	6.060	39.62	40.561	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-12	A2MW09-12	2.14-5.14	30-Apr-14	6.060	39.62	40.561	nd	nd	na	2.980	37.581	1.95	5.54	9.39	74	0.068	0.05	111.2	Clear
A2MW09-12	ns	2.14-5.14	12-Aug-14	6.060	39.62	40.561	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-12	MW09-12	2.14-5.14	7-May-15	6.060	39.62	40.561	30	nd	na	4.590	35.971	5.73	5.55	11.26	62	0.055	0.04	-75.6	Clear
A2MW09-12	ns	2.14-5.14	25-Aug-15	6.050	39.62	40.561	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Sediment on probe
A2MW09-12	MW09-12	2.14-5.14	22-Mar-16	6.075	39.62	40.561	10	nd	na	2.810	37.751	2.29	5.39	10.63	66	0.059	0.041	201.8	Clear
A2MW09-12	ns	2.14-5.14	9-Sep-16	6.070	39.62	40.561	90	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-12	A2MW09-12	2.14-5.14	18-Apr-17	6.080	39.62	40.561	nd	nd	na	2.750	37.811	1.7	4.99	9.7	60	0.055	0.04	134.2	---
A2MW09-12	ns	2.14-5.14	6-Sep-17	6.050	39.62	40.561	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-12	A2MW09-12	2.14-5.14	26-Apr-18	6.080	39.62	40.561	nd	nd	na	3.010	37.551	3.42	5.46	10.7	69	0.061	0.04	168.6	Clear
A2MW09-12	ns	2.14-5.14	21-Aug-18	6.068	39.62	40.561	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	MW09-13	2.02-5.02	20-Apr-10	6.150	41.54	42.575	45	nd	na	3.815	38.760	0.22	4.79	10.6	537	nm	nm	nm	Slight turbidity
A2MW09-13	MW09-13	2.02-5.02	14-Sep-10	6.040	41.54	42.575	40	nd	na	3.660	38.915	0.4	5.4	13.3	699	nm	nm	nm	Clear
A2MW09-13	ns	2.02-5.02	5-May-11	6.020	41.54	42.575	55	nd	na	3.085	39.490	0.23	6.02	11.8	189	nm	nm	nm	Very silty; MFG indicated should be sampled again tomorrow due too silt. Did not submit sample.
A2MW09-13	ns	2.02-5.02	1-Sep-11	6.005	41.54	42.575	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No sample
A2MW09-13	ns	2.02-5.02	23-May-12	6.010	41.54	42.575	10	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	ns	2.02-5.02	13-Aug-12	6.010	41.54	42.575	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-13	MW09-13	2.02-5.02	26-Mar-13	6.005	41.54	42.575	20	nd	na	3.335	39.240	6.31	4.92	9.44	51	nm	nm	nm	Clear
A2MW09-13	ns	2.02-5.02	8-Aug-13	6.010	41.54	42.575	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	A2MW09-13	2.02-5.02	1-May-14	6.010	41.54	42.575	nd	nd	na	2.630	39.945	2.62	5.13	8.41	63	0.06	0.04	159.1	Clear
A2MW09-13	ns	2.02-5.02	7-Aug-14	6.015	41.54	42.575	140	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	MW09-13	2.02-5.02	11-May-15	6.000	41.54	42.575	65	nd	na	4.000	38.575	2.52	4.54	10.58	74	0.066	0.05	157.7	Clear
A2MW09-13	ns	2.02-5.02	25-Aug-15	6.010	41.54	42.575	25	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Sediment on probe
A2MW09-13	MW09-13	2.02-5.02	22-Mar-16	6.030	41.54	42.575	5	nd	na	2.835	39.740	0.93	5.47	9.58	49	0.045	0.03	166.9	Clear
A2MW09-13	ns	2.02-5.02	9-Sep-16	6.030	41.54	42.575	80	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	A2MW09-13	2.02-5.02	10-Apr-17	6.020	41.54	42.575	5	nd	na	2.730	39.845	1.11	5.12	8.31	91	0.087	0.06	159.1	Clear
A2MW09-13	ns	2.02-5.02	6-Sep-17	6.020	41.54	42.575	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-13	A2MW09-13	2.02-5.02	26-Apr-18	6.040	41.54	42.575	5	nd	na	2.810	39.765	1.33	5.22	10.43	124	0.112	0.08	210.1	Clear
A2MW09-13	ns	2.02-5.02	21-Aug-18	6.021	41.54	42.575	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	MW09-14	2.03-5.03	20-Apr-10	6.110	41.07	42.164	nd	nd	na	3.643	38.521	0.08	5.05	11.2	370	nm	nm	nm	Clear
A2MW09-14	MW09-14	2.03-5.03	14-Sep-10	6.110	41.07	42.164	50	nd	na	3.030	39.134	0.17	6	14.9	508	nm	nm	nm	Clear
A2MW09-14	MW09-14	2.03-5.03	5-May-11	6.110	41.07	42.164	65	nd	na	3.297	38.867	0.27	6.21	10.8	455	nm	nm	nm	Clear; DUP-29
A2MW09-14	ns	2.03-5.03	1-Sep-11	6.105	41.07	42.164	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No sample
A2MW09-14	ns	2.03-5.03	23-May-12	6.120	41.07	42.164	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	ns	2.03-5.03	13-Aug-12	6.105	41.07	42.164	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-14	MW09-14	2.03-5.03	26-Mar-13	6.100	41.07	42.164	60	nd	na	4.225	37.939	1.69	4.78	11.36	407	nm	nm	nm	Biofoul in the beginning of purge water - purged Clear
A2MW09-14	ns	2.03-5.03	8-Aug-13	6.110	41.07	42.164	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	A2MW09-14	2.03-5.03	1-May-14	6.180	41.07	42.164	5	nd	na	3.180	38.984	0.2	5.84	9.9	231	0.21	0.16	33.2	Clear; Biofoul
A2MW09-14	A2MW09-14	2.03-5.03	7-Aug-14	6.110	41.07	42.164	40	nd	na	5.680	36.484	1.28	6.00	15.09	250	0.20	0.08	-13.5	Biofoul
A2MW09-14	MW09-14	2.03-5.03	11-May-15	6.105	41.07	42.164	90	nd	na	4.105	38.059	0.57	5.81	11.04	186	0.17	0.12	-14.3	Clear
A2MW09-14	ns	2.03-5.03	25-Aug-15	6.095	41.07	42.164	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	MW09-14	2.03-5.03	31-Mar-16	6.110	41.07	42.164	10	nd	na	3.940	38.224	0.78	5.79	10.3	236	0.21	0.16	131.7	Clear
A2MW09-14	ns	2.03-5.03	9-Sep-16	6.110	41.07	42.164	85	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	A2MW09-14	2.03-5.03	10-Apr-17	6.110	41.07	42.164	nd	nd	na	3.970	38.194	1	5.15	8.61	171	0.16	0.12	63	Clear
A2MW09-14	ns	2.03-5.03	6-Sep-17	6.120	41.07	42.164	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-14	A2MW09-14	2.03-5.03	26-Apr-18	6.110	41.07	42.164	10	nd	na	3.950	38.214	0.13	5.51	10.41	361	0.32	0.24	87.5	Clear
A2MW09-14	ns	2.03-5.03	21-Aug-18	6.113	41.07	42.164	nd	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-15	MW09-15	1.35-4.35	20-Apr-10	5.570	40.23	41.448	nd	nd	na	3.000	38.448	0.09	nm	12.4	718	nm	nm	nm	Clear
A2MW09-15	MW09-15	1.35-4.35	14-Sep-10	5.560	40.23	41.448	15	nd	na	2.715	38.733	0.25	7.04	13	758	nm	nm	nm	Clear
A2MW09-15	A2MW09-15	1.35-4.35	11-Apr-11	5.565	40.23	41.448	75	nd	na	2.820	38.628	0.2	7.28	10.6	695	nm	nm	nm	Clear; Purged dry at 6 L at 11:55
A2MW09-15	MW09-15	1.35-4.35	1-Sep-11	5.560	40.23	41.448	15	nd	na	5.235	36.213	6.52	6.87	12.79	597	nm	nm	nm	Silty; BTEX only - Dry
A2MW09-15	MW09-15	1.35-4.35	23-May-12	5.550	40.23	41.448	10	nd	na	5.030	36.418	5.24	7.06	11.64	466	nm	nm	nm	Purged dry; muddy, May.24 - 2 BTEX collected
A2MW09-15	ns	1.35-4.35	13-Aug-12	5.495	40.23	41.448	450	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; Not sampled
A2MW09-15	MW09-15	1.35-4.35	26-Mar-13	5.520	40.23	41.448	25	nd	na	2.720	38.728	0.31	6.65	11.26	945	nm	nm	nm	Clear
A2MW09-15	MW09-15	1.35-4.35	8-Aug-13	5.400	40.23	41.448	10	nd	na	3.400	38.048	0.26	7.28	15.72	584	nm	nm	nm	Clear
A2MW09-15	MW09-15	1.35-4.35	1-May-14	5.510	40.23	41.448	10	nd	na	2.300	39.148	1.4	7.39	10.97	578	0.513	0.39	-174.6	Clear
A2MW09-15	MW09-15	1.35-4.35	7-Aug-14	5.525	40.23	41.448	45	nd	na	2.560	38.888	0.58	7.38	12.33	480	0.412	0.31	-144.1	Clear
A2MW09-15	MW09-15	1.35-4.35	11-May-15	5.552	40.23	41.448	100	nd	na	2.650	38.798	0.37	7.21	12.37	410	0.35	0.26	-117.6	Clear
A2MW09-15	ns	1.35-4.35	25-Aug-15	5.490	40.23	41.448	15	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-15	A2MW09-15	1.35-4.35	10-May-16	5.500	40.23	41.448	65	nd	na	2.570	38.878	5.89	7.61	14.45	419	0.341	0.26	26.3	Discussed safety concerns with Gary Cheung (AECOM) and Chris Boys (CCL) to devise a critical procedure for sampling; Clear
A2MW09-15	A2MW09-15	1.35-4.35	1-Sep-16	5.500	40.23	41.448	90	nd	na	2.880	38.568	0.35	7.32	13.63	375	0.311	0.23	-32.2	Clear
A2MW09-15	A2MW09-15	1.35-4.35	10-Apr-17	5.490	40.23	41.448	10	nd	na	4.220	37.228	1.63	5.64	10.71	201	0.18	0.13	99.7	Clear
A2MW09-15	ns	1.35-4.35	6-Sep-17	5.490	40.23	41.448	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
A2MW09-15	A2MW09-15	1.35-4.35	26-Apr-18	5.490	40.23	41.448	45	nd	na	4.020	37.428	3.9	4.39	13.22	299	0.251	0.19	225.8	From orange to clear; purged dry
A2MW09-15	ns	1.35-4.35	21-Aug-18	5.499	40.23	41.448	5	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
MW11-3S	MW11-3S	5.0-8.0	21-Jul-11	8.116	42.68	42.59	100	nd	na	5.230	37.360	0.23	5.63	9.35	616	nm	nm	nm	Clear
MW11-3S	MW11-3S	5.0-8.0	22-May-12	8.110	42.68	42.59	60	nd	na	5.230	37.360	4.14	5.99	11.79	708	nm	nm	nm	Clear
MW11-3S	MW11-3S	5.0-8.0	14-Aug-12	8.100	42.68	42.59	25	nd	na	5.850	36.740	1.79	4.85	12.79	577	nm	nm	nm	Clear
MW11-3S	MW11-3S	5.0-8.0	11-Apr-13	8.100	42.68	42.59	15	nd	na	3.820	38.770	2.51	5.55	10.83	419	nm	nm	nm	Clear
MW11-3S	MW11-3S	5.0-8.0	7-Aug-13	8.100	42.68	42.59	50	nd	na	6.060	36.530	1.11	5.08	15.09	496	nm	nm	nm	Monitored on Aug.6
MW11-3S	MW11-3S	5.0-8.0	7-May-14	6.200	42.68	42.59	50	nd	na	4.280	38.310	2.46	5.01	11.84	375	0.325	0.24	-139	Clear
MW11-3S	MW11-3S	5.0-8.0	13-Aug-14	8.120	42.68	42.59	120	nd	na	5.800	36.790	0.92	5.38	12.79	431	0.365	0.27	93.2	Clear
MW11-3S	MW11-3S	5.0-8.0	11-May-15	8.110	42.68	42.59	190	nd	na	5.430	37.160	1.62	5.28	12.52	346	0.296	0.22	108.1	Clear
MW11-3S	MW11-3S	5.0-8.0	25-Aug-15	8.110	42.68	42.59	110	nd	na	6.800	35.790	1.17	5.31	13.51	464	0.386	0.29	231.6	Clear
MW11-3S	MW11-3S	5.0-8.0	21-Sep-15	8.130	42.68	42.59	25	nd	na	5.571	37.019	2.29	5.18	12.19	498	0.428	0.32	148.4	Clear; PHCs obtained earlier in Fall PMP
MW11-3S	MW11-3S	5.0-8.0	22-Mar-16	8.110	42.68	42.59	110	nd	na	3.570	39.020	2.14	5.66	11.79	308	0.255	0.16	147.3	Clear
MW11-3S	MW11-3S	5.0-8.0	22-Aug-16	8.120	42.68	42.59	45	nd	na	5.750	36.840	0.92	5.34	13.02	434	0.366	0.27	210.7	Clear; DUP-5
MW11-3S	MW11-3S	5.0-8.0	4-Apr-17	8.110	42.68	42.59	55	nd	na	3.300	39.290	8.23	5.93	11.66	339	0.296	0.22	-39.1	Clear; DUP-6
MW11-3S	MW11-3S	5.0-8.0	15-Aug-17	8.140	42.68	42.59	55	nd	na	6.140	36.450	1.76	5.42	13.66	455	0.377	0.28	97.7	Clear
MW11-3S	MW11-3S	5.0-8.0	19-Apr-18	8.120	42.68	42.59	45	nd	na	3.295	39.295	3.25	5.25	10.65	257	0.23	0.17	227.3	Clear
MW11-3S	ns	5.0-8.0	21-Aug-18	8.129	42.68	42.59	130	nd	na	6.748	35.842	1.92	5.13	12.45	429	0.366	0.27	212.1	Dup-1
MW11-3I	MW11-3I	11.0-12.5	21-Jul-11	12.230	42.68	42.58	35	nd	na	5.383	37.197	0.54	5.96	10.04	778	nm	nm	nm	Clear
MW11-3I	MW11-3I	11.0-12.5	22-May-12	12.230	42.68	42.58	90	nd	na	5.580	37.000	2.27	6.04	11.18	395	nm	nm	nm	Clear
MW11-3I	MW11-3I	11.0-12.5	14-Aug-12	12.225	42.68	42.58	10	nd	na	6.000	36.580	0.88	5.51	13.01	667	nm	nm	nm	Clear
MW11-3I	ns	11.0-12.5	11-Apr-13	12.220	42.68	42.58	45	nd	na	4.440	38.140	0.51	5.85	11.34	616	nm	nm	nm	Clear
MW11-3I	MW11-3I	11.0-12.5	7-Aug-13	12.230	42.68	42.58	15	nd	na	6.260	36.320	0.45	5.63	14.31	614	nm	nm	nm	Monitored on Aug.6; headspace Aug.7
MW11-3I	MW11-3I	11.0-12.5	7-May-14	12.210	42.68	42.58	55	nd	na	4.510	38.070	0.42	5.43	12.34	562	0.482	0.36	-160.9	Clear
MW11-3I	MW11-3I	11.0-12.5	13-Aug-14	12.220	42.68	42.58	45	nd	na	5.900	36.680	5.19	5.59	13.35	566	0.473	0.36	99.6	---
MW11-3I	MW11-3I	11.0-12.5	11-May-15	12.210	42.68	42.58	110	nd	na	5.575	37.005	1.12	5.63	12.64	455	0.388	0.29	85.9	Clear
MW11-3I	MW11-3I	11.0-12.5	26-Aug-15	12.230	42.68	42.58	5	nd	na	7.055	35.525	0.33	5.86	13.80	516	0.427	0.32	225.9	Clear
MW11-3I	MW11-3I	11.0-12.5	21-Sep-15	12.280	42.68	42.58	5	nd	na	6.220	36.360	0.23	6.08	13.01	544	0.459	0.35	70.3	Clear; PHCs obtained earlier in Fall PMP
MW11-3I	MW11-3I	11.0-12.5	22-Mar-16	12.210	42.68	42.58	nd	nd	na	3.820	38.760	1.9	5.89	12.29	349	0.299	0.22	121.2	Clear
MW11-3I	MW11-3I	11.0-12.5	22-Aug-16	12.150	42.68	42.58	15	nd	na	5.810	36.770	0.68	5.78	13.1	482	0.405	0.31	161.8	Clear
MW11-3I	MW11-3I	11.0-12.5	4-Apr-17	12.210	42.68	42.58	nd	nd	na	3.600	38.980	1.67	5.85	12.54	458	0.391	0.29	-51.4	Clear
MW11-3I	MW11-3I	11.0-12.5	15-Aug-17	12.250	42.68	42.58	nd	nd	na	6.270	36.310	0.33	5.79	13.25	473	0.396	0.3	69.3	Clear
MW11-3I	MW11-3I	11.0-12.5	19-Apr-18	12.223	42.68	42.58	95	nd	na	3.684	38.896	0.82	5.6	12.03	536	0.463	0.35	230	Clear
MW11-3I	ns	11.0-12.5	21-Aug-18	12.348	42.68	42.58	10	nd	na	7.057	35.523	0.73	5.41	12.89	506	0.428	0.32	222	Clear
MW11-3D	MW11-3D	18.5-20	21-Jul-11	20.570	42.68	42.59	200	nd	na	5.925	36.665	0.08	6.24	9.78	555	nm	nm	nm	Clear
MW11-3D	MW11-3D	18.5-20	22-May-12	20.560	42.68	42.59	45	nd	na	7.110	35.480	0.43	6.87	12.37	638	nm	nm	nm	Clear
MW11-3D	MW11-3D	18.5-20	14-Aug-12	20.530	42.68	42.59	5	nd	na	7.075	35.515	0.24	6.1	13.31	659	nm	nm	nm	Clear
MW11-3D	MW11-3D	18.5-20	11-Apr-13	20.520	42.68	42.59	30	nd	na	5.780	36.810	2.28	6.58	11.68	730	nm	nm	nm	Clear
MW11-3D	MW11-3D	18.5-20	7-Aug-13	20.570	42.68	42.59	nd	nd	na	8.550	34.040	4.1	5.44	13.02	764	nm	nm	nm	Monitored on Aug.6; headspace Aug.7
MW11-3D	MW11-3D	18.5-20	7-May-14	20.520	42.68	42.59	40	nd	na	5.550	37.040	1.65	6.2	12.43	815	0.697	0.54	18.9	Retrieved/pulled out tubing and bailer from the well
MW11-3D	MW11-3D	18.5-20	13-Aug-14	20.550	42.68	42.59	40	nd	na	6.540	36.050	0.39	6.24	13.06	834	0.702	0.56	37	---
MW11-3D	MW11-3D	18.5-20	12-May-15	20.480	42.68	42.59	75	nd	na	6.570	36.020	0.43	6.38	13.97	806	0.665	0.51	37.5	Clear
MW11-3D	MW11-3D	18.5-20	26-Aug-15	20.800	42.68	42.59	5	nd	na	7.815	34.775	0.43	6.44	14.09	862	0.708	0.54	85.1	Clear
MW11-3D	MW11-3D	18.5-20	21-Sep-15	20.590	42.68	42.59	30	nd	na	6.970	35.620	0.99	6.61	13.05	845	0.711	0.55	21.5	Clear; PHCs obtained earlier in Fall PMP
MW11-3D	MW11-3D	18.5-20	22-Mar-16	20.780	42.68	42.59	40	nd	na	5.180	37.410	0.3	6.65	12	784	0.678	0.52	2.7	Clear
MW11-3D	MW11-3D	18.5-20	22-Aug-16	20.540	42.68	42.59	20	nd	na	6.820	35.770	0.13	6.55	13.07	802	0.691	0.52	3.5	Clear
MW11-3D	MW11-3D	18.5-20	4-Apr-17	20.530	42.68	42.59	30	nd	na	9.990	32.600	0.23	6.47	12.52	794	0.677	0.52	-80	Clear
MW11-3D	MW11-3D	18.5-20	15-Aug-17	20.560	42.68	42.59	5	nd	na	6.870	35.720	1.09	6.41	14.27	787	0.644	0.49	24.5	Clear
MW11-3D	MW11-3D	18.5-20	19-Apr-18	20.543	42.68	42.59	50	nd	na	5.110	37.480	0.29	6.36	12.41	846	0.724	0.56	47	Clear
MW11-3D	ns	18.5-20	21-Aug-18	20.583	42.68	42.59	nd	nd	na	7.927	34.663	2.71	6.34	12.96	795	0.672	0.51	83.8	---
MW11-4S	MW11-4S	5 - 8.0	21-Jul-11	7.905	41.89	41.89	10	nd	na	5.805	36.085	1.87	5.36	7.79	1926	nm	nm	nm	Clear
MW11-4S	MW11-4S	5 - 8.0	22-May-12	7.900	41.89	41.89	10	nd	na	5.570	36.320	1.12	5.93	10.35	1106	nm	nm	nm	Clear
MW11-4S	MW11-4S	5 - 8.0	14-Aug-12	7.900	41.89	41.89	20	nd	na	5.970	35.920	0.87	5.55	11.43	1169	nm	nm	nm	Clear

TABLE B-1
AREA 2 GROUNDWATER MONITORING DATA
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY

Well ID	Sample ID	Screened Interval (mbgs)	Date Monitored	Total Depth of Well (m from TOC)	Ground Elevation (mASL)[1]	Top of Casing Elevation (TOC, mASL)[1]	Headspace Vapour Concentration (ppmv)	Depth to Product (m from TOC)	Apparent Product Thickness (mm)	Depth to Water (DTW, m from TOC)	Groundwater Elevation (mASL)[1]	Dissolved Oxygen (mg/L)	pH	Temperature (°C)	Electrical Conductivity (µS/cm)	TDS (g/L)	Salinity (ppt)	ORP (mV)	Observations
MW11-4S	MW11-4S	5 - 8.0	11-Apr-13	7.880	41.89	41.89	nd	nd	na	4.750	37.140	0.34	5.6	10.08	969	nm	nm	nm	Clear
MW11-4S	MW11-4S	5 - 8.0	7-Aug-13	7.900	41.89	41.89	15	nd	na	6.250	35.640	0.66	4.8	11.43	927	nm	nm	nm	Monitored Aug.6; headspace Aug.7; DUP-1
MW11-4S	MW11-4S	5 - 8.0	7-May-14	7.900	41.89	41.89	10	nd	na	5.400	36.490	1.68	5.44	10.57	798	0.691	0.53	196.4	Clear
MW11-4S	MW11-4S	5 - 8.0	13-Aug-14	7.890	41.89	41.89	50	nd	na	6.180	35.710	4.35	5.63	13.48	875	0.729	0.56	121	---
MW11-4S	MW11-4S	5 - 8.0	12-May-15	7.810	41.89	41.89	35	nd	na	5.820	36.070	4.92	5.38	11.26	754	0.664	0.51	109.3	Clear
MW11-4S	MW11-4S	5 - 8.0	26-Aug-15	7.900	41.89	41.89	30	nd	na	6.510	35.380	1.76	5.50	12.16	832	0.717	0.55	193.9	Clear
MW11-4S	MW11-4S	5 - 8.0	21-Sep-15	7.930	41.89	41.89	45	nd	na	5.540	36.350	2.30	5.43	10.91	788	0.701	0.54	128.1	Clear; PHCs obtained earlier in Fall PMP
MW11-4S	MW11-4S	5 - 8.0	22-Mar-16	7.910	41.89	41.89	10	nd	na	4.900	36.990	0.18	6.69	10.84	729	0.649	0.5	39.4	Clear
MW11-4S	MW11-4S	5 - 8.0	22-Aug-16	7.850	41.89	41.89	15	nd	na	5.890	36.000	1.95	5.67	11.69	821	0.716	0.55	105.2	Clear
MW11-4S	MW11-4S	5 - 8.0	4-Apr-17	7.900	41.89	41.89	nd	nd	na	4.540	37.350	0.42	5.75	10.59	645	0.624	0.48	-89.4	Clear
MW11-4S	MW11-4S	5 - 8.0	15-Aug-17	7.910	41.89	41.89	nd	nd	na	6.190	35.700	0.77	5.62	12.46	864	0.74	0.57	38.7	Clear; some grey silt
MW11-4S	MW11-4S	5 - 8.0	19-Apr-18	7.837	41.89	41.89	10	nd	na	4.293	37.597	0.25	5.52	11.05	966	0.856	0.66	151.1	Clear
MW11-4S	ns	5 - 8.0	20-Aug-18	7.823	41.89	41.89	60	nd	na	6.429	35.461	2.30	5.46	12.18	1035	0.891	0.69	135.7	Clear
MW11-4I	MW11-4I	11.0-12.5	21-Jul-11	12.301	41.89	41.82	25	nd	na	6.618	35.202	3.5	5.84	8.35	1273	nm	nm	nm	Clear
MW11-4I	MW11-4I	11.0-12.5	22-May-12	12.310	41.89	41.82	5	nd	na	6.480	35.340	0.23	6.07	11.16	1200	nm	nm	nm	Clear
MW11-4I	MW11-4I	11.0-12.5	14-Aug-12	12.285	41.89	41.82	nd	nd	na	6.825	34.995	0.79	5.6	12.66	1219	nm	nm	nm	Clear; DUP-8
MW11-4I	MW11-4I	11.0-12.5	11-Apr-13	12.290	41.89	41.82	nd	nd	na	5.670	36.150	0.32	5.48	10.12	1050	nm	nm	nm	Clear; DUP-20
MW11-4I	MW11-4I	11.0-12.5	7-Aug-13	12.300	41.89	41.82	5	nd	na	6.910	34.910	1.22	5.37	11.78	1025	nm	nm	nm	Monitored Aug.6; headspace Aug.7; DUP-2
MW11-4I	MW11-4I	11.0-12.5	7-May-14	12.290	41.89	41.82	nd	nd	na	6.210	35.610	1.2	5.49	11.19	948	0.837	0.65	138.1	Clear; DUP-16
MW11-4I	MW11-4I	11.0-12.5	13-Aug-14	12.300	41.89	41.82	10	nd	na	7.000	34.820	2.93	5.39	12.3	948	0.813	0.63	107.9	Slightly turbid; DUP-8
MW11-4I	MW11-4I	11.0-12.5	12-May-15	12.220	41.89	41.82	10	nd	na	6.600	35.220	0.25	5.43	11.59	789	0.69	0.53	110.7	---
MW11-4I	MW11-4I	11.0-12.5	26-Aug-15	12.290	41.89	41.82	5	nd	na	7.520	34.300	0.24	5.59	13.39	899	0.751	0.58	153.8	Clear; DUP-6
MW11-4I	MW11-4I	11.0-12.5	21-Sep-15	12.335	41.89	41.82	nd	nd	na	6.720	35.100	0.34	5.76	12.06	856	0.739	0.57	168.2	Clear; PHCs obtained earlier in Fall PMP
MW11-4I	MW11-4I	11.0-12.5	22-Mar-16	12.410	41.89	41.82	5	nd	na	5.850	35.970	0.52	6.69	11.08	793	0.702	0.54	38.9	Clear
MW11-4I	MW11-4I	11.0-12.5	22-Aug-16	12.250	41.89	41.82	nd	nd	na	6.750	35.070	0.25	5.65	11.63	837	0.731	0.56	41.9	Clear
MW11-4I	MW11-4I	11.0-12.5	4-Apr-17	12.280	41.89	41.82	nd	nd	na	5.450	36.370	0.51	5.66	11.3	767	0.676	0.52	-108.5	Clear
MW11-4I	MW11-4I	11.0-12.5	15-Aug-17	12.300	41.89	41.82	nd	nd	na	7.080	34.740	0.45	5.55	12.54	809	0.69	0.53	89.7	Clear
MW11-4I	MW11-4I	11.0-12.5	19-Apr-18	12.233	41.89	41.82	nd	nd	na	5.327	36.493	1.38	5.09	11.13	964	0.852	0.66	173.4	Clear; DUP-9
MW11-4I	ns	11.0-12.5	20-Aug-18	12.368	41.89	41.82	35	nd	na	7.247	34.573	3.43	5.63	12.6	976	0.831	0.64	50	Clear
MW11-4D	MW11-4D	18.5-20	21-Jul-11	20.470	41.89	41.9	nd	nd	na	7.360	34.540	2.37	5.6	8.73	1283	nm	nm	nm	Clear
MW11-4D	MW11-4D	18.5-20	22-May-12	20.470	41.89	41.9	35	nd	na	7.740	34.160	0.39	5.7	11.18	1179	nm	nm	nm	Clear; DUP-13
MW11-4D	MW11-4D	18.5-20	14-Aug-12	20.450	41.89	41.9	5	nd	na	8.035	33.865	0.37	5.78	14.66	1251	nm	nm	nm	Clear
MW11-4D	MW11-4D	18.5-20	11-Apr-13	20.450	41.89	41.9	110	nd	na	6.930	34.970	2.94	6.12	10.67	1216	nm	nm	nm	Clear; Silty ambers
MW11-4D	MW11-4D	18.5-20	7-Aug-13	20.460	41.89	41.9	60	nd	na	8.170	33.730	3.76	5.71	14.32	1179	nm	nm	nm	Monitored on Aug.6; headspace Aug.7
MW11-4D	MW11-4D	18.5-20	7-May-14	20.430	41.89	41.9	40	nd	na	6.650	35.250	2.21	5.55	11.82	1002	nm	nm	nm	Clear
MW11-4D	MW11-4D	18.5-20	13-Aug-14	20.480	41.89	41.9	50	nd	na	7.460	34.440	0.48	5.54	13.01	974	0.822	0.64	101.2	---
MW11-4D	MW11-4D	18.5-20	12-May-15	20.360	41.89	41.9	100	nd	na	7.050	34.850	0.38	5.47	11.93	783	0.678	0.52	107.3	Clear
MW11-4D	MW11-4D	18.5-20	26-Aug-15	20.455	41.89	41.9	25	nd	na	7.990	33.910	0.14	5.55	12.56	871	0.742	0.57	180.7	Clear
MW11-4D	MW11-4D	18.5-20	22-Mar-16	20.720	41.89	41.9	120	nd	na	6.430	35.470	0.24	6.64	11.13	791	0.7	0.54	42.5	Clear, DUP-12
MW11-4D	MW11-4D	18.5-20	22-Aug-16	20.530	41.89	41.9	nd	nd	na	7.220	34.680	0.32	5.37	12.15	882	0.76	0.59	92.7	Clear
MW11-4D	MW11-4D	18.5-20	4-Apr-17	20.520	41.89	41.9	10	nd	na	6.060	35.840	0.35	5.8	11.63	780	0.681	0.52	-83.5	Clear
MW11-4D	MW11-4D	18.5-20	15-Aug-17	20.440	41.89	41.9	5	nd	na	7.540	34.360	1.96	5.8	13.26	897	0.752	0.58	68.1	Clear; DUP-1
MW11-4D	MW11-4D	18.5-20	19-Apr-18	20.393	41.89	41.9	nd	nd	na	6.004	35.896	0.14	5.77	11.6	913	0.798	0.62	118.1	Clear
MW11-4D	ns	18.5-20	20-Aug-18	20.698	41.89	41.9	nd	nd	na	7.670	34.230	6.7	5.92	12.1	986	0.85	0.66	92.7	Clear
WS2-D	WS2-D	4.6-7.6	21-Apr-04	7.710	40.34	40.256	125	nd	na	5.215	35.041	nm	6.27	10.6	266	nm	nm	nm	---
WS2-D	WS-2D	4.6-7.6	18-Oct-04	7.710	40.34	40.256	140	nd	na	6.108	34.148	nm	6.76	12.3	409	nm	nm	nm	---
WS2-D	WS-2D	4.6-7.6	14-Apr-05	7.710	40.34	40.256	75	nd	na	4.140	36.116	nm	6.63	10.7	375	nm	nm	nm	---
WS2-D	A2-WS-2D	4.6-7.6	14-Sep-05	7.714	40.34	40.256	nm	nd	na	6.560	33.696	nm	7.31	12.6	350	nm	nm	nm	---
WS2-D	WS2-D	4.6-7.6	20-Mar-06	7.700	40.34	40.256	75	nd	na	5.200	35.056	1.86	6.86	10.7	230	nm	nm	nm	---
WS2-D	WS2-D	4.6-7.6	21-Aug-06	7.700	40.34	40.256	15	nd	na	7.015	33.241	1.83	6.92	12.9	388	nm	nm	nm	---
WS2-D	WS2-D	4.6-7.6	10-Apr-07	7.710	40.34	40.256	100	nd	na	5.380	34.876	0.11	6.63	10.1	377	nm	nm	nm	---
WS2-D	WS2-D	4.6-7.6	29-Aug-07	7.700	40.34	40.256	250	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry
WS2-D	WS2-D	4.6-7.6	1-Apr-08	7.632	40.34	40.256	55	nd	na	6.081	34.175	0.72	6.52	10.3	188	nm	nm	nm	---
WS2-D	ns	4.6-7.6	27-Aug-08	nm	40.34	40.256	100	nd	na	nd	na	0.4	nm	nm	nm	nm	nm	nm	Dry no sample
WS2-D	WS2-D	4.6-7.6	29-Apr-09	7.708	40.34	40.256	100	nd	na	7.282	32.974	0.9	nm	nm	nm	nm	nm	nm	Silty; one jar very little water could not take parameters
WS2-D	WS2-D	4.6-7.6	26-Aug-09	7.710	40.34	40.256	150	nd	na	7.238	40.338	0.2	6.23	11.6	259	nm	nm	nm	Low turbidity and sediment
WS2-D	WS2-D	4.6-7.6	12-Apr-10	7.715	40.34	40.256	nd	nd	na	4.342	35.914	0.89	6.55	10	180.9	nm	nm	nm	Translucent pale yellow; Some brown sediment
WS2-D	ns	4.6-7.6	8-Sep-10	7.700	40.34	40.256	100	nd	na	nd	na	nm	nm	nm	nm	nm	nm	nm	Dry; No samples
WS2-D	WS2-D	4.6-7.6	12-Apr-11	7.705	40.34	40.256	110	nd	na	4.331	35.925	0.54	7.37	10.8	199	nm	nm	nm	Clear; DUP-13
WS2-D	WS2-D	4.6-7.6	24-Aug-11	7.695	40.34	40.256	120	nd	na	7.090	33.166	0.58	6.54	10.37	152	nm	nm	nm	Clear
WS2-D	WS2-D	4.6-7.6	29-May-12	7.710	40.34	40.256	20	nd	na	6.370	33.886	0.29	6.28	10.51	101	nm	nm	nm	Clear
WS2-D	WS2-D	4.6-7.6	21-Aug-12	7.705	40.34	40.256	10	nd	na	7.060	33.196	0.55	5.67	13.75	161	nm	nm	nm	Clear
WS2-D	WS2-D	4.6-7.6	23-Apr-13	7.700	40.34	40.256	35	nd	na	4.130	36.126	2.25	6.21	10.78	126	nm	nm	nm	Clear; DUP-27
WS2-D	WS2-D	4.6-7.6	20-Aug-13	7.700	40.34	40.256	95	nd	na	7.050	33.206	0.95	6.32	11.65	158	nm	nm	nm	Clear
WS2-D	WS2-D	4.6-7.6	22-May-14	7.695	40.34	40.256	nd	nd	na	5.555	34.701	0.94	6.04	10.21	110	0.1	0.07	54.1	Clear
WS2-D	WS2-D	4.6-7.6	22-Aug-14	7.700	40.34	40.256	170	nd	na	7.060	33.196	1.02	5.73	12.09	134	0.116	0.08	103.7	Clear
WS2-D	WS2-D	4.6-7.6	5-Mar-15	7.700	40.34	40.256	nd	nd	na	5.095	35.161	6.61	6.22	11.27	105	0.093	0.07	126.3	Purged dry at 12 L
WS2-D	WS2-D	4.6-7.6	18-Aug-15	7.695	40.34	40.256	90	nd	na	6.745	33.511	0.25	6.29	12.85	111	0.094	0.07	265.7	Clear
WS2-D	WS2-D	4.6-7.6	8-Mar-16	7.710	40.34	40.256	25	nd	na	3.440	36.816	1.34	6.56	10.72	147	0.131	0.1	212.2	Clear
WS2-D	WS2-D	4.6-7.6	8-Aug-16	7.700	40.34	40.256	25	nd	na	6.370	33.886	0.72	5.85	12.27	118	0.101	0.07	138.2	Clear
WS2-D	WS2-D	4.6-7.6	8-Mar-17	7.700	40.34	40.256	5	nd	na	3.160	37.096	6.59	6.18	10.05	98	0.089	0.07	-149.6	Clear
WS2-D	WS2-D	4.6-7.6	23-Aug-17	7.710	40.34	40.256	30	nd	na	6.540	33.716	1.07	6.06	12.17	95	0.082	0.06	95.6	Clear
WS2-D	WS2-D	4.6-7.6	2-May-18	7.715	40.34	40.256	10	nd	na	4.346	33.511	2.51	5.31	10.51	83	0.075	0.05	204.6	Clear
WS2-D	WS2-D	4.6-7.6	27-Aug-18	8.710	40.34	40.256	75	nd	na	6.788	36.816	1.79	5.13	11.75	92	0.08	0.06	236.4	---
WS2-D2	WS-2D2	10.7-12.2	18-Oct-04	12.050	40.34	40.317	125	nd	na	6.340	33.977	nm	7.32	12.2	591	nm	nm	nm	---
WS2-D2	WS-2D2	10.7-12.2	14-Apr-05	12.000	40.34	40.317	80	nd	na	4.870	35.447	nm	6.71	11.1	308	nm	nm	nm	---
WS2-D2	A2-WS-2D2	10.7-12.2	14-Sep-05	12.010	40.34	40.317	nm	nd	na	7.096	33.221	nm	7.27	12.7	381	nm	nm	nm	Sample collected Sept.14
WS2-D2	WS2-D2	10.7-12.2	20-Mar-06	11.820	40.34	40.317	75	nd	na	5.200	35.117	1.58	6.35	10.4	252	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	21-Aug-06	11.690	40.34	40.317	70	nd	na	7.330	32.987	1.38	7.51	12.7	332	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	10-Apr-07	11.750	40.34	40.317	105	nd	na	6.090	34.227	0.11	7.99	10.8	280	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	29-Aug-07	11.850	40.34	40.317	20	nd	na	10.090	30.227	0.15	8.11	14.2	410	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	1-Apr-08	11.754	40.34	40.317	50	nd	na	7.023	33.294	0.2	7.05	10	393	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	27-Aug-08	11.762	40.34	40.317	50	nd	na	9.795	30.522	0.1	7.79	11.1	424	nm	nm	nm	---
WS2-D2	WS2-D2	10.7-12.2	29-Apr-09	11.882	40.34	40.317	10	nd	na	8.699	31.618	0.4	8.79	11.6	810	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	26-Aug-09	11.900	40.34	40.317	nd	nd	na	7.850	32.467	0.3	6.7	11	358	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	12-Apr-10	11.910	40.34	40.317	nd	nd	na	5.300	35.017	2.19	7.32	10.2	292.9	nm	nm	nm	Clear; Pale yellow; trace sediment
WS2-D2	WS2-D2	10.7-12.2	9-Sep-10	11.880	40.34	40.317	40	nd	na	9.110	31.207	0.1	7.33	11.4	391	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	13-Apr-11	11.900	40.34	40.317	75	nd	na	6.480	33.837	7.17	6.92	10.7	270	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	24-Aug-11	11.900	40.34	40.317	10	nd	na	7.620	32.697	5.34	7.	10.32	204	nm	nm	nm	Dry; No sample
WS2-D2	WS2-D2	10.7-12.2	30-May-12	11.780	40.34	40.317	nd	nd	na	7.050	33.267	0.23	7.14	10.81	186	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	21-Aug-12	11.730	40.34	40.317	5	nd	na	7.635	32.682	0.86	6.52	11.79	226	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	23-Apr-13	11.760	40.34	40.317	90	nd	na	5.465	34.852	1.11	7.14	11.32	170	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	21-Aug-13	11.720	40.34	40.317	nd	nd	na	7.670	32.647	0.8	7.08	12.64	231	nm	nm	nm	Clear
WS2-D2	WS2-D2	10.7-12.2	22-May-14	11.730	40.34	40.317	5	nd	na	6.400	33.917	0.73	6.79	10.86	189	0.168	0.12	51.3	Clear
WS2-D2	WS2-D2	10.7-12.2	22-Aug-14	11.740	40.34	40.317	nd	nd	na	8.100	32.217	0.61	7.23	12.89	229	0.194	0.14	-54.7	Clear
WS2-D2	WS2-D2	10.7-12.2	5-Mar-15	11.760	40.34	40.317	nd	nd	na	5.955	34.362	8.44	7.07	12.36	198	0.17	0.12	50	Clear
WS2-D2	WS2-D2	10.7-12.2	17-Aug-15	11.810	40.34	40.317	nd	nd	na	7.190	33.127	0.15	7.20	13.41	201	0.168	0.12	68.7	Clear
WS2-D2	WS2-D2	10.7-12.2	10-Mar-16	11.920	40.34	40.317	15	nd	na	4.500	35.817	1.16	7.01	10.11	140	0.128	0.09	-111.3	Clear
WS2-D2	WS2-D2	10.7-12.2	8-Aug-16	11.820	40.34	40.317	10	nd	na	6.900	33.417	0.51	6.85	13.15	200	0.168	0.12	76.3	Clear
WS2-D2	WS2-D2	10.7-12.2	8-Mar-17	11.870	40.34	40.317	10	nd	na	4.700	35.617	1	7.02	10.86	158	0.141	0.1	-226.7	---
WS2-D2	WS2-D2	10.7-12.2	23-Aug-17	11.810	40.34	40.317	20	nd	na	7.120	33.197	0.45	7.10	12.11	203	0.175	0.13	90.7	Clear
WS2-D2	WS2-D2	10.7-12.2	2-May-18	11.831	40.34	40.317	15	nd	na	5.410	34.362	4.9	7.19	11.32	213	0.188	0.14	141	Bailed; cloudy grey; DUP-13
WS2-D2	WS2-D2	10.7-12.2	27-Aug-18	11.834	40.34	40.317	25	nd	na	7.356	33.127	0.42	7.01	12.4	231	0.197	0.15	222.4	---

Abbreviations:

BC	Bailer confirmed
°C	Degree Celsius
DUP	Duplicate
g/L	Grams per litre
L	Litre
m	Metres
mASL	Metres above sea level
mbgs	Metres below ground surface
mg/L	Milligrams per litre
mm	Millimetres
mV	Millivolts
µS/cm	Microsiemens per centimetre
na	Not available/applicable
nd	Not detected
nm	Not monitored
ns	Not sampled
ORP	Oxidation reduction potential
ppmv	Parts per million by volume
ppt	Parts per thousand
TDS	Total dissolved solids
TOC	Top of casing
---	No observations noted

Notes:

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

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G2-3B	G2-3B	10.1-13.1		28-Apr-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		15-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		12-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		13-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		23-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		24-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		12-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		10-Sep-07	270.	<250.	270.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		01-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		02-Sep-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		28-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		01-Sep-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		14-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-3B	G2-3B	10.1-13.1		09-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-3B	G2-3B	10.1-13.1		18-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-3B	G2-3B	10.1-13.1		09-Aug-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1		18-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	1.46	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1		22-Aug-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1299117-2	8-May-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1367083-1	23-Sep-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1461112-1	27-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1508365-3	26-Aug-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1583423-1	3-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	11.7	AW-
G2-3B	G2-3B	10.1-13.1	L1674072-3	16-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3B	G2-3B	10.1-13.1	L1743509-2	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	15.8	AW-
G2-3B	G2-3B	10.1-13.1	L1812426-5	11-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	19.	AW-
G2-3B	G2-3B	10.1-13.1	L1904760-5	23-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	16.6	AW-
G2-3B	G2-3B	10.1-13.1	L2153915-6	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	41.5	AW-
G2-3C	G2-3C	18.3-22.9		28-Apr-04	<300.	<1000.	<300.	<1000.	140.	<100.	91.1	<1.	0.72	1.1	---	---	AW-
G2-3C	G2-3C	18.3-22.9		15-Oct-04	<300.	<1000.	<300.	<1000.	130.	<100.	84.7	<1.	<0.5	1.6	---	---	AW-
G2-3C	G2-3C	18.3-22.9		12-Apr-05	300.	<1000.	300.	<1000.	150.	<100.	96.6	1.7	0.82	2.7	---	---	AW-
G2-3C	G2-3C	18.3-22.9		13-Sep-05	<300.	<1000.	<300.	<1000.	200.	<100.	141.	1.3	<0.5	2.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		23-Mar-06	---	---	<250.	<250.	160.	<100.	129.	1.1	<0.5	2.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		22-Aug-06	---	---	<250.	<250.	100.	<100.	82.8	<1.	<0.5	1.1	---	---	AW-
G2-3C	G2-3C	18.3-22.9		12-Apr-07	---	---	<250.	<250.	<100.	<100.	46.6	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		10-Sep-07	---	---	<250.	<250.	<100.	<100.	29.9	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		01-Apr-08	---	---	<250.	<250.	<100.	<100.	21.7	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		02-Sep-08	---	---	250.	270.	<100.	<100.	16.1	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		28-Apr-09	---	---	<250.	<250.	<100.	<100.	8.91	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		01-Sep-09	---	---	<250.	<250.	<100.	<100.	7.73	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		14-Apr-10	---	---	<250.	<250.	<100.	<100.	4.77	<1.	<0.5	<1.	---	---	AW-
G2-3C	G2-3C	18.3-22.9		09-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-3C	G2-3C	18.3-22.9		18-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-3C	G2-3C	18.3-22.9		09-Aug-11	---	---	<250.	<250.	<100.	<100.	0.51	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9		18-May-12	---	---	<250.	280.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9		22-Aug-12	---	---	<250.	<250.	<100.	<100.	0.59	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1299117-3	8-May-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1367083-2	23-Sep-13	---	---	<250.	<250.	<100.	<100.	1.17	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1461112-2	27-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1508365-4	26-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1583423-2	3-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	0.69	<0.5	<0.5	<0.75	---	22.2	AW-
G2-3C	G2-3C	18.3-22.9	L1675019-2	17-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-3C	G2-3C	18.3-22.9	L1743509-1	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	21.4	AW-
G2-3C	G2-3C	18.3-22.9	L1812426-6	11-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	19.7	AW-
G2-3C	G2-3C	18.3-22.9	L1904760-6	23-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	11.2	AW-
G2-3C	G2-3C	18.3-22.9	L1906194-3	28-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	13.7	AW-
G2-3C	G2-3C	18.3-22.9	L2153915-7	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	13.70	AW-
G2-3C	DUP-2	18.3-22.9	L2153915-8	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	13.80	AW-
QA/QC RPD				27-Aug-18	---	---	---	---	---	---	---	---	---	---	---	0.7%	
G2-9A	G2-9A	6.1-9.1		07-May-04	---	---	<300.	<1000.	<100.	<100.	1.09	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		15-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		12-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		13-Sep-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		22-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		24-Aug-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		18-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		10-Sep-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		01-Apr-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		02-Sep-08	---	---	<250.	<250.	<100.	<100.	1.86	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		28-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		27-Aug-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		14-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9A	G2-9A	6.1-9.1		09-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-9A	G2-9A	6.1-9.1		19-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-9A	G2-9A	6.1-9.1		09-Aug-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1		28-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1		22-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1301575-1	14-May-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1367083-3	23-Sep-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1460380-1	26-May-14	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1461112-3	27-May-14	---	---	<250.	<250.	---	---	---	---	---	---	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1508365-1	26-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1583423-3	3-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	3.43	AW-
G2-9A	G2-9A	6.1-9.1	L1674072-2	16-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9A	G2-9A	6.1-9.1	L1743509-3	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	1.31	AW-
G2-9A	G2-9A	6.1-9.1	L1812426-3	11-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	2.55	AW-
G2-9A	G2-9A	6.1-9.1	L1906194-1	28-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	1.33	AW-
G2-9A	G2-9A	6.1-9.1	L1980058-5	23-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	2.68	AW-
G2-9A	G2-9A	6.1-9.1	L2087549-2	1-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	2.25	AW-
G2-9A	G2-9A	6.1-9.1	L2153915-4	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	2.26	AW-
G2-9B	G2-9B	18.9-21.9		07-May-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		15-Oct-04	---	---	<300.	<1000.	<100.	<100.	3.53	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		12-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G2-9B	G2-9B	18.9-21.9		13-Sep-05	---	---	<300.	<1000.	<100.	<100.	4.56	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		22-Mar-06	---	---	<250.	<250.	<100.	<100.	0.8	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		24-Aug-06	---	---	<250.	<250.	<100.	<100.	3.54	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		18-Apr-07	---	---	<250.	<250.	<100.	<100.	0.94	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		10-Sep-07	---	---	<250.	<250.	<100.	<100.	4.86	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		01-Apr-08	---	---	<250.	<250.	<100.	<100.	1.1	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		02-Sep-08	---	---	<250.	<250.	<100.	<100.	4.03	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		28-Apr-09	---	---	<250.	<250.	<100.	<100.	1.48	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		27-Aug-09	---	---	<250.	<250.	<100.	<100.	3.71	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		14-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-9B	G2-9B	18.9-21.9		09-Sep-10	---	---	<250.	<250.	<100.	<100.	2.67	<1.	<0.5	<0.71	---	---	AW-
G2-9B	G2-9B	18.9-21.9		19-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-9B	G2-9B	18.9-21.9		09-Aug-11	---	---	<250.	<250.	<100.	<100.	0.75	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9		18-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9		20-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1299117-1	8-May-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1367083-4	23-Sep-13	---	---	<250.	<250.	<100.	<100.	0.86	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1460380-2	26-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1508365-2	26-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1583423-6	3-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	0.68	AW-
G2-9B	G2-9B	18.9-21.9	L1675019-1	17-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-9B	G2-9B	18.9-21.9	L1743813-9	10-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	1.03	AW-
G2-9B	G2-9B	18.9-21.9	L1812426-4	11-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-9B	G2-9B	18.9-21.9	L1906194-2	28-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	0.83	AW-
G2-9B	G2-9B	18.9-21.9	L1980058-3	23-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	0.58	AW-
G2-9B	G2-9B	18.9-21.9	L2088139-3	2-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	0.88	AW-
G2-9B	G2-9B	18.9-21.9	L2153915-5	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	1.31	AW-
G2-10	G2-10	4.9-6.4		26-Apr-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		18-Oct-04	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		12-Apr-05	---	---	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		13-Sep-05	---	---	<300.	<1000.	<100.	<100.	0.53	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		21-Mar-06	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		23-Apr-07	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		01-Apr-08	---	---	<250.	270.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		02-Sep-08	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		28-Apr-09	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		14-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
G2-10	G2-10	4.9-6.4		09-Sep-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-10	G2-10	4.9-6.4		20-Apr-11	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
G2-10	G2-10	4.9-6.4		13-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4		28-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4		20-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4	L1292853-1	22-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4	L1352072-1	22-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4	L1456248-1	15-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-10	G2-10	4.9-6.4	L1505541-1	20-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4	L1583423-4	3-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-10	G2-10	4.9-6.4	L1674072-1	16-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
G2-10	G2-10	4.9-6.4	L1742176-1	7-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-10	G2-10	4.9-6.4	L1811986-4	10-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-10	G2-10	4.9-6.4	L1906194-4	28-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
G2-10	G2-10	4.9-6.4	L1980058-6	23-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
G2-10	G2-10	4.9-6.4	L2087549-1	1-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
G2-10	G2-10	4.9-6.4	L2153915-3	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
G2-11A	G2-11A	4.6-6.1		29-Apr-04	460.	<1000.	460.	<1000.	<100.	<100.	0.7	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		12-Oct-04	480.	<1000.	480.	<1000.	<100.	<100.	1.03	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		11-Apr-05	460.	<1000.	460.	<1000.	<100.	<100.	1.37	<1.	<0.5	<1.	---	---	AW-
G2-11A	A2-G2-11A	4.6-6.1		20-Sep-05	**530.**	<1000.	530.	<1000.	<100.	<100.	0.94	<1.	<0.5	<1.	---	---	**AW+**
G2-11A	G2-11A	4.6-6.1		28-Mar-06	380.	<250.	380.	<250.	<100.	<100.	1.3	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		17-Apr-07	340.	<250.	340.	<250.	<100.	<100.	1.19	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		05-Sep-07	400.	<250.	400.	<250.	<100.	<100.	2.71	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		08-Apr-08	330.	<250.	330.	<250.	<100.	<100.	1.59	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		08-Sep-08	320.	<250.	320.	<250.	<100.	<100.	1.67	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		21-Apr-10	380.	<250.	380.	<250.	<100.	<100.	1.47	<1.	<0.5	<1.	---	---	AW-
G2-11A	G2-11A	4.6-6.1		15-Sep-10	460.	<250.	460.	<250.	<100.	<100.	1.86	<1.	<0.5	<0.71	---	---	AW-
G2-11A	G2-11A	4.6-6.1		05-May-11	410.	<250.	410.	<250.	<100.	<100.	1.67	<1.	<0.5	<0.71	---	---	AW-
G2-11A	G2-11A	4.6-6.1		08-Sep-11	360.	<250.	360.	<250.	<100.	<100.	1.39	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1		24-May-12	**740.**	<250.	760.	<250.	120.	110.	1.34	<0.5	0.77	2.38	---	---	**AW+**
G2-11A	G2-11A	4.6-6.1		29-Aug-12	460.	<250.	460.	<250.	<100.	<100.	1.58	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1290904-1	17-Apr-13	420.	<250.	420.	<250.	<100.	<100.	1.76	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1350566-1	20-Aug-13	330.	<250.	330.	<250.	<100.	<100.	1.32	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1454047-1	12-May-14	260.	<250.	260.	<250.	<100.	<100.	1.85	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1503989-1	18-Aug-14	370.	<250.	370.	<250.	<100.	<100.	1.92	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1610763-1	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	1.54	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1674072-4	16-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	1.88	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1752248-1	4-Apr-16	<250.	<250.	<250.	<250.	<100.	<100.	1.52	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1822946-2	1-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	2.11	<0.5	<0.5	<0.75	---	---	AW-
G2-11A	G2-11A	4.6-6.1	L1912573-1	12-Apr-17	340.	<250.	350.	<250.	<100.	<100.	2.16	<0.5	0.55	1.1	<0.5	---	AW-
G2-11A	G2-11A	4.6-6.1	L1982266-1	28-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	1.98	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11A	G2-11A	4.6-6.1	L2086842-1	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	1.23	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11A	DUP-12	4.6-6.1	L2086842-3	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	1.25	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				30-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	
G2-11A	G2-11A	4.6-6.1	L2154663-1	28-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	1.6	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11B	G2-11B	7.0-8.5		29-Apr-04	470.	<1000.	470.	<1000.	<100.	<100.	1.02	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		12-Oct-04	390.	<1000.	390.	<1000.	<100.	<100.	1.03	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		11-Apr-05	400.	<1000.	400.	<1000.	<100.	<100.	1.19	<1.	<0.5	<1.	---	---	AW-
G2-11B	A2-G2-11B	7.0-8.5		20-Sep-05	400.	<1000.	400.	<1000.	<100.	<100.	1.27	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		04-Apr-06	340.	<250.	340.	<250.	<100.	<100.	1.24	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		29-Aug-06	270.	<250.	270.	<250.	<100.	<100.	0.89	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		17-Apr-07	330.	<250.	330.	<250.	<100.	<100.	1.37	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		05-Sep-07	330.	<250.	330.	<250.	<100.	<100.	2.31	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		08-Apr-08	330.	<250.	330.	<250.	<100.	<100.	2.28	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		08-Sep-08	300.	<250.	300.	<250.	<100.	<100.	1.84	<1.	<0.5	<1.	---	---	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
G2-11B	G2-11B	7.0-8.5		30-Apr-09	310.	<250.	310.	<250.	<100.	<100.	1.87	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		01-Sep-09	---	---	310.	<250.	<100.	<100.	1.74	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		21-Apr-10	---	---	320.	<250.	<100.	<100.	1.62	<1.	<0.5	<1.	---	---	AW-
G2-11B	G2-11B	7.0-8.5		21-Sep-10	---	---	370.	<250.	<100.	<100.	1.34	<1.	<0.5	<0.71	---	---	AW-
G2-11B	G2-11B	7.0-8.5		05-May-11	---	---	360.	<250.	<100.	<100.	1.36	<1.	<0.5	<0.71	---	---	AW-
G2-11B	G2-11B	7.0-8.5		08-Sep-11	---	---	310.	<250.	<100.	<100.	1.21	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5		24-May-12	---	---	390.	<250.	<100.	<100.	0.93	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5		29-Aug-12	---	---	270.	<250.	<100.	<100.	1.15	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1290904-2	17-Apr-13	---	---	<250.	<250.	<100.	<100.	1.13	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1350566-2	20-Aug-13	---	---	<250.	<250.	<100.	<100.	1.08	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1454047-2	12-May-14	---	---	<250.	<250.	<100.	<100.	1.01	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1503989-2	18-Aug-14	---	---	<250.	<250.	<100.	<100.	1.	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1610763-2	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	1.11	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1674072-5	16-Sep-15	<250.	<250.	<250.	<250.	<100.	<100.	1.03	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1752248-2	4-Apr-16	<250.	<250.	<250.	<250.	<100.	<100.	1.01	<0.5	<0.5	<0.75	---	---	AW-
G2-11B	G2-11B	7.0-8.5	L1822946-3	1-Sep-16	<250.	<250.	<250.	<250.	<100.	<100.	1.06	<0.5	<0.5	<0.75	---	<0.5	AW-
G2-11B	G2-11B	7.0-8.5	L1912573-2	12-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	1.05	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11B	G2-11B	7.0-8.5	L1982266-2	28-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	1.06	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11B	G2-11B	7.0-8.5	L2086842-2	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	0.99	<0.5	<0.5	<0.75	<0.5	---	AW-
G2-11B	G2-11B	7.0-8.5	L2154663-2	28-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	1.03	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-1A	PW03-1A	2.4-4.0		22-Apr-04	**4870.**	<1000.	**5140.**	<1000.	2480.	**1800.**	6.51	<1.	344.	**326.**	---	---	**AW+**
PW03-1A	PW03-1A (sg)	2.4-4.0		22-Apr-04	---	---	1770.	<1000.	---	---	---	---	---	---	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		15-Oct-04	**4950.**	<1000.	**5230.**	<1000.	2660.	**1950.**	2.4	<2.	391.	**320.**	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		15-Apr-05	**5580.**	<1000.	**5980.**	<1000.	2320.	**1630.**	2.4	5.8	354.	**329.**	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		13-Sep-05	**4020.**	<1000.	4240.	<1000.	2130.	**1700.**	1.66	<1.	267.	164.	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		23-Mar-06	**3910.**	410.	4250.	410.	2300.	**1630.**	<2.5	<5.	376.	292.	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		23-Aug-06	**3870.**	540.	4030.	540.	1230.	1000.	<1.	<1.	188.	41.5	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		13-Apr-07	**5130.**	430.	**5510.**	430.	1900.	1400.	<5.	<10.	387.	93.	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		06-Sep-07	**4760.**	540.	4980.	540.	2060.	**1740.**	<4.	<6.	309.	15.4	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		14-Nov-07	**5510.**	470.	**5800.**	470.	1890.	**1580.**	<2.5	<5.	296.	21.6	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		01-Apr-08	<250.	<250.	<250.	<250.	1690.	1450.	<2.5	<5.	231.	12.5	---	---	AW-
PW03-1A	PW03-1A	2.4-4.0		04-Sep-08	**8130.**	610.	**8130.**	610.	680.	360.	<2.	<3.	274.	51.5	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		04-May-09	**3610.**	470.	3610.	470.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		14-Apr-10	**7940.**	1420.	**7940.**	1420.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		15-Sep-10	**7010.**	1390.	**7010.**	1390.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		19-Apr-11	**3280.**	700.	3280.	700.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0		22-Aug-11	**2670.**	590.	2670.	590.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
PW03-1A	PW03-1A	2.4-4.0	L1448683-1	29-Apr-14	420.	340.	420.	340.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1A	PW03-1A	2.4-4.0	L1743508-2	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1A	PW03-1A	2.4-4.0	L1908948-1	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-1A	PW03-1A	2.4-4.0	L2086841-5	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-1B	PW03-1B	1.1-3.7		22-Apr-04	<300.	<1000.	<300.	<1000.	<100.	<100.	3.01	<1.	1.16	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	3.23	3.2	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		21-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		13-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		01-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		03-Sep-08	**1710.**	440.	1710.	440.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-1B	PW03-1B	1.1-3.7		04-May-09	**570.**	<250.	570.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-1B	PW03-1B	1.1-3.7		14-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Sep-10	340.	380.	340.	380.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		19-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7		10-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7	L1285748-1	3-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7	L1448683-2	29-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7	L1743508-1	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-1B	PW03-1B	1.1-3.7	L1908948-2	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-1B	PW03-1B	1.1-3.7	L2086841-7	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Apr-04	**3320.**	<1000.	3340.	<1000.	690.	500.	112.	54.8	6.64	12.3	---	---	**AW+**
PW03-2A	PW03-2A (sg)	1.8-4.6		22-Apr-04	---	---	780.	<1000.	---	---	---	---	---	---	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		14-Oct-04	**4050.**	<1000.	4120.	<1000.	740.	690.	32.8	6.4	6.41	1.7	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		15-Apr-05	**2050.**	<1000.	2080.	<1000.	400.	380.	5.44	4.2	6.82	5.2	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		13-Sep-05	**1070.**	<1000.	1070.	<1000.	840.	670.	163.	3.	4.18	1.8	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		21-Mar-06	**770.**	410.	770.	410.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		23-Aug-06	**1210.**	300.	1210.	300.	220.	200.	22.9	<2.	1.1	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		13-Apr-07	**1120.**	380.	1130.	380.	130.	130.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		06-Sep-07	**1390.**	300.	1390.	300.	<100.	<100.	9.62	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		14-Nov-07	**3180.**	720.	3200.	720.	350.	350.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		01-Apr-08	**1010.**	370.	1010.	370.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		03-Sep-08	290.	<250.	290.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Apr-09	**600.**	390.	600.	390.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2A	PW03-2A	1.8-4.6		27-Aug-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6		14-Apr-10	460.	530.	460.	530.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6		15-Sep-10	470.	300.	470.	300.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6		19-Apr-11	330.	370.	330.	370.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Aug-11	260.	<250.	260.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6	L1448683-3	29-Apr-14	<250.	400.	<250.	400.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6	L1743508-6	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2A	PW03-2A	1.8-4.6	L1908948-3	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Apr-04	**3390.**	<1000.	3390.	<1000.	230.	210.	3.69	<1.	14.5	3.3	---	---	**AW+**
PW03-2B	PW03-2B (sg)	1.1-3.7		22-Apr-04	---	---	<300.	<1000.	---	---	---	---	---	---	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		14-Oct-04	**1990.**	<1000.	1990.	<1000.	<100.	<100.	0.72	<1.	1.77	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		15-Apr-05	**1710.**	<1000.	1730.	<1000.	<100.	<100.	<0.5	<1.	10.8	2.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		21-Mar-06	**660.**	360.	660.	360.	<100.	<100.	<0.5	<1.	0.69	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		23-Aug-06	**570.**	330.	570.	330.	<100.	<100.	1.6	<1.	<0.5	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		13-Apr-07	**1870.**	450.	1870.	450.	<100.	<100.	<0.5	<1.	0.95	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		14-Nov-07	**1030.**	570.	1030.	570.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		01-Apr-08	320.	440.	320.	440.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		03-Sep-08	---	---	---	---	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		04-Sep-08	360.	400.	360.	400.	---	---	---	---	---	---	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Apr-09	450.	470.	450.	470.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		14-Apr-10	**650.**	540.	650.	540.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
PW03-2B	PW03-2B	1.1-3.7		19-Apr-11	<250.	280.	<250.	280.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Aug-11	360.	280.	360.	280.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7		10-May-12	330.	370.	330.	370.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7	L1285748-2	3-Apr-13	<250.	270.	<250.	270.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7	L1448683-4	29-Apr-14	<250.	300.	<250.	300.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7	L1743508-7	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-2B	PW03-2B	1.1-3.7	L1908948-4	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000 [1]	NS	15000 [1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
PW03-2B	PW03-2B	1.1-3.7	L1908949-1	3-Apr-17	---	---	---	---	---	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	AW-
PW03-3	PW03-3	1.2-4.1		22-Apr-04	**1050.**	<1000.	1150.	<1000.	5070.	**3400.**	**1110.**	313.	75.2	168.	---	---	**AW+**
PW03-3	PW03-3 (sg)	1.2-4.1		22-Apr-04	---	---	450.	<1000.	---	---	---	---	---	---	---	---	AW-
PW03-3	PW03-3	1.2-4.1		14-Oct-04	**800.**	<1000.	830.	<1000.	2420.	**1670.**	561.	73.2	38.6	71.	---	---	**AW+**
PW03-3	PW03-3	1.2-4.1		15-Apr-05	**680.**	<1000.	720.	<1000.	2300.	1230.	716.	183.	39.4	134.	---	---	**AW+**
PW03-3	PW03-3	1.2-4.1		13-Sep-05	480.	<1000.	480.	<1000.	1110.	780.	280.	7.8	23.5	23.5	---	---	AW-
PW03-3	PW03-3	1.2-4.1		23-Mar-06	<250.	<250.	<250.	<250.	150.	100.	41.5	3.9	3.2	3.3	---	---	AW-
PW03-3	PW03-3	1.2-4.1		23-Aug-06	**800.**	<250.	820.	<250.	1600.	<1000.	862.	110.	64.	75.	---	---	**AW+**
PW03-3	PW03-3	1.2-4.1		13-Apr-07	<250.	<250.	<250.	<250.	190.	<100.	85.9	5.	2.27	5.3	---	---	AW-
PW03-3	PW03-3	1.2-4.1		14-Nov-07	<250.	<250.	<250.	<250.	<100.	<100.	0.54	<1.	<0.5	<1.	---	---	AW-
PW03-3	PW03-3	1.2-4.1		01-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	0.75	<1.	<0.5	<1.	---	---	AW-
PW03-3	PW03-3	1.2-4.1		03-Sep-08	<250.	<250.	<250.	<250.	220.	<100.	146.	<2.	3.02	<1.5	---	---	AW-
PW03-3	PW03-3	1.2-4.1		22-Apr-09	<250.	<250.	<250.	<250.	110.	<100.	18.9	4.3	4.22	4.4	---	---	AW-
PW03-3	PW03-3	1.2-4.1		14-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-3	PW03-3	1.2-4.1		19-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	0.74	<1.	<0.5	<0.71	---	---	AW-
PW03-3	PW03-3	1.2-4.1		22-Aug-11	480.	<250.	500.	<250.	450.	230.	148.	12.6	39.8	18.1	---	---	AW-
PW03-3	PW03-3	1.2-4.1		10-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-3	PW03-3	1.2-4.1	L1448682-1	29-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-3	PW03-3	1.2-4.1	L1743508-3	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-3	PW03-3	1.2-4.1	L1907768-2	31-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-3	PW03-3	1.2-4.1	L2086841-3	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-4	PW03-4	1.8-4.0		22-Apr-04	<300.	<1000.	<300.	<1000.	<100.	<100.	2.77	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		14-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		15-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	1.51	1.3	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		13-Sep-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		21-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		23-Aug-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		13-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		06-Sep-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		01-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		03-Sep-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		22-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		27-Aug-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		14-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-4	PW03-4	1.8-4.0		15-Sep-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-4	PW03-4	1.8-4.0		19-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-4	PW03-4	1.8-4.0		13-Sep-11	<250.	<250.	<250.	<250.	---	---	---	---	---	---	---	---	AW-
PW03-4	PW03-4	1.8-4.0		22-Aug-11	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-4	PW03-4	1.8-4.0		10-May-12	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-4	PW03-4	1.8-4.0	L1448682-2	29-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-4	PW03-4	1.8-4.0	L1743508-9	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-4	PW03-4	1.8-4.0	L1908948-5	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-4	PW03-4	1.8-4.0	L1908949-2	3-Apr-17	---	---	---	---	---	---	<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	AW-
PW03-5	PW03-5	7.6-8.5		22-Apr-04	340.	<1000.	340.	<1000.	<100.	<100.	27.8	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		14-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	55.6	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		15-Apr-05	390.	<1000.	390.	<1000.	<100.	<100.	12.8	1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		13-Sep-05	330.	<1000.	330.	<1000.	<100.	<100.	0.7	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		21-Mar-06	280.	<250.	280.	<250.	<100.	<100.	1.49	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		23-Aug-06	310.	<250.	310.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		13-Apr-07	270.	<250.	270.	<250.	<100.	<100.	7.6	<5.	<2.5	<5.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		06-Sep-07	340.	<250.	340.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		01-Apr-08	330.	<250.	330.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		03-Sep-08	260.	<250.	260.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		22-Apr-09	370.	<250.	370.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		27-Aug-09	320.	<250.	320.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		14-Apr-10	450.	<250.	450.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-5	PW03-5	7.6-8.5		15-Sep-10	430.	<250.	430.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-5	PW03-5	7.6-8.5		19-Apr-11	430.	<250.	430.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-5	PW03-5	7.6-8.5		22-Aug-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5		10-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5	L1286283-1	4-Apr-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5	L1448683-5	29-Apr-14	<250.	290.	<250.	290.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5	L1608317-1	6-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5	L1743508-4	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-5	PW03-5	7.6-8.5	L1908948-6	3-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-5	PW03-5	7.6-8.5	L1908949-3	3-Apr-17	---	---	---	---	---	---	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
PW03-5	PW03-5	7.6-8.5	L2086841-4	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
PW03-5	DUP-11	7.6-8.5	L2086841-6	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				30-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	
PW03-6	PW03-6	1.1-3.0		22-Apr-04	<300.	<1000.	<300.	<1000.	<100.	<100.	7.44	1.2	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		15-Oct-04	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	1.93	1.8	---	---	AW-
PW03-6	PW03-6	1.1-3.0		15-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		21-Mar-06	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		13-Apr-07	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		01-Apr-08	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		22-Apr-09	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		14-Apr-10	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
PW03-6	PW03-6	1.1-3.0		19-Apr-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
PW03-6	PW03-6	1.1-3.0		10-May-12	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-6	PW03-6	1.1-3.0	L1448682-3	29-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-6	PW03-6	1.1-3.0	L1743508-5	9-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
PW03-6	PW03-6	1.1-3.0	L1907768-1	31-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U8	U8	3.22-6.22		12-Jul-05	**1480.**	<1000.	1480.	<1000.	<100.	<100.	7.2	<1.	<0.5	1.3	---	---	**AW+**
U8	U8	3.22-6.22		14-Sep-05	**1190.**	<1000.	1190.	<1000.	190.	170.	12.	<1.	<0.5	<1.	---	---	**AW+**
U8	U8	3.22-6.22		23-Mar-06	**1410.**	560.	1420.	560.	570.	540.	24.	<1.	7.6	4.6	---	---	**AW+**
U8	U8	3.22-6.22		23-Aug-06	**1230.**	430.	1230.	430.	360.	330.	24.5	<1.	1.77	<1.	---	---	**AW+**
U8	U8	3.22-6.22		13-Apr-07	**940.**	400.	940.	400.	430.	380.	25.2	<1.	15.2	7.6	---	---	**AW+**
U8	U8	3.22-6.22		06-Sep-07	**980.**	370.	980.	370.	130.	120.	11.	<1.	2.34	<1.	---	---	**AW+**
U8	U8	3.22-6.22		02-Apr-08	480.	600.	480.	600.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U8	U8	3.22-6.22		04-Sep-08	**1020.**	290.	1020.	290.	140.	130.	3.81	<1.	<0.5	<1.	---	---	**AW+**
U8	U8	3.22-6.22		22-Apr-09	**900.**	850.	900.	850.	<100.	<100.	0.92	<1.	1.44	<1.	---	---	**AW+**
U8	U8	3.22-6.22		31-Aug-09	**900.**	380.	900.	380.	<100.	<100.	2.4	<1.	<0.5	<1.	---	---	**AW+**
U8	U8	3.22-6.22		21-Apr-10	470.	560.	470.	560.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
U8	U8	3.22-6.22		14-Sep-10	**880.**	600.	880.	600.	<100.	<100.	1.24	<1.	<0.5	<0.71	---	---	**AW+**
U8	U8	3.22-6.22		05-Apr-11	<250.	270.	<250.	270.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
U8	U8	3.22-6.22		01-Sep-11	**530.**	<250.	530.	<250.	<100.	<100.	3.87	<0.5	<0.5	<0.75	---	---	**AW+**
U8	U8	3.22-6.22		09-May-12	370.	520.	370.	520.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U8	U8	3.22-6.22	L1282462-1	25-Mar-13	<250.	380.	<250.	380.	<100.	<100.	<0.5	1.17	<0.5	1.7	---	---	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000 [1]	NS	15000 [1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
U8	U8	3.22-6.22	L1448682-4	29-Apr-14	<250.	370.	<250.	370.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U8	U8	3.22-6.22	L1747964-1	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
U8	U8	3.22-6.22	L1911852-1	11-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U8	U8	3.22-6.22	L1911853-1	11-Apr-17	---	---	---	---	---	---	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
U8	U8	3.22-6.22	L2086841-1	30-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U9	U9	3.3-6.3		12-Jul-05	**1170.**	<1000.	1180.	<1000.	220.	210.	7.25	<1.	2.16	1.2	---	---	**AW+**
U9	U9	3.3-6.3		14-Sep-05	**1240.**	<1000.	1240.	<1000.	500.	490.	13.5	<1.	2.14	<1.	---	---	**AW+**
U9	U9	3.3-6.3		23-Mar-06	**1220.**	270.	1230.	270.	730.	700.	9.2	<1.	17.5	4.3	---	---	**AW+**
U9	U9	3.3-6.3		23-Aug-06	**1150.**	350.	1160.	350.	460.	440.	14.6	1.2	3.25	<1.	---	---	**AW+**
U9	U9	3.3-6.3		13-Apr-07	**1440.**	<250.	1450.	<250.	810.	790.	10.6	<1.	13.2	2.8	---	---	**AW+**
U9	U9	3.3-6.3		06-Sep-07	**1190.**	420.	1190.	420.	610.	590.	15.8	<1.	1.31	<1.	---	---	**AW+**
U9	U9	3.3-6.3		02-Apr-08	**1610.**	300.	1610.	300.	500.	490.	3.93	<1.	5.98	<1.	---	---	**AW+**
U9	U9	3.3-6.3		04-Sep-08	**1070.**	310.	1070.	310.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
U9	U9	3.3-6.3		22-Apr-09	**1310.**	360.	1320.	360.	470.	430.	24.5	1.1	6.09	<1.	---	---	**AW+**
U9	U9	3.3-6.3		31-Aug-09	**1150.**	340.	1150.	340.	2000.	<1000.	967.	502.	43.6	178.	---	---	**AW+**
U9	U9	3.3-6.3		21-Apr-10	**1270.**	<250.	1280.	<250.	360.	260.	56.4	27.7	4.74	8.8	---	---	**AW+**
U9	U9	3.3-6.3		14-Sep-10	**1290.**	550.	1290.	550.	<1000.	**3800.**	**3610.**	284.	159.	184.	---	---	**AW+**
U9	U9	3.3-6.3		31-Mar-11	**630.**	<250.	630.	<250.	<100.	<100.	2.67	<1.	1.1	1.69	---	---	**AW+**
U9	U9	3.3-6.3		01-Sep-11	**670.**	<250.	680.	<250.	890.	<500.	793.	<8.	2.8	5.7	---	---	**AW+**
U9	U9	3.3-6.3		09-May-12	380.	<250.	390.	<250.	550.	210.	63.9	106.	39.9	128.	---	---	AW-
U9	U9	3.3-6.3	L1282462-2	25-Mar-13	260.	<250.	260.	<250.	<100.	<100.	0.94	0.75	4.34	3.77	---	---	AW-
U9	U9	3.3-6.3	L1448682-5	29-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	0.81	<0.75	---	---	AW-
U9	U9	3.3-6.3	L1747964-2	22-Mar-16	<250.	<250.	<250.	<250.	110.	110.	<0.5	<0.5	0.98	1.34	---	---	AW-
U9	U9	3.3-6.3	L1911852-2	11-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
U9	U9	3.3-6.3	L1911853-2	11-Apr-17	---	---	---	---	---	---	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
U9	U9	3.3-6.3	L2086841-2	30-Apr-18	**560.**	480.	560.	480.	<100.	<100.	2.28	<0.5	<0.5	<0.75	<0.5	---	**AW+**
MW02-02	MW02-02	1.2-4.3		07-May-04	470.	<1000.	470.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		14-Oct-04	490.	<1000.	500.	<1000.	<100.	<100.	0.72	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		21-Apr-05	<300.	<1000.	<300.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-02	A2-MW02-02	1.2-4.3		20-Sep-05	500.	<1000.	500.	<1000.	<100.	<100.	6.53	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		28-Mar-06	<250.	<250.	<250.	<250.	270.	250.	17.	<1.	0.65	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		29-Aug-06	330.	<250.	330.	<250.	150.	140.	5.81	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		17-Apr-07	<250.	<250.	<250.	<250.	110.	110.	4.44	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		05-Sep-07	370.	<250.	370.	<250.	110.	<100.	16.6	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		08-Apr-08	<250.	<250.	<250.	<250.	100.	<100.	3.59	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		09-Sep-08	**530.**	<250.	530.	<250.	760.	740.	18.	<1.	<0.5	<1.	---	---	**AW+**
MW02-02	MW02-02	1.2-4.3		30-Apr-09	470.	<250.	480.	<250.	410.	390.	15.8	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		08-Sep-09	450.	<250.	450.	<250.	500.	470.	25.2	1.	0.63	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		12-May-10	490.	<250.	490.	<250.	290.	280.	12.1	<1.	<0.5	<1.	---	---	AW-
MW02-02	MW02-02	1.2-4.3		13-Sep-10	**560.**	<250.	560.	<250.	490.	510.	28.4	<1.	0.68	<0.71	---	---	**AW+**
MW02-02	MW02-02	1.2-4.3		11-Apr-11	430.	<250.	430.	<250.	370.	360.	8.85	<1.	<0.5	<0.71	---	---	AW-
MW02-02	MW02-02	1.2-4.3		01-Sep-11	480.	720.	480.	720.	<100.	<100.	3.01	0.52	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3		23-May-12	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3	L1283010-6	26-Mar-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3	L1449879-8	1-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3	L1610017-4	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3	L1751053-1	31-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-02	MW02-02	1.2-4.3	L1909647-1	5-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW02-03	MW02-03	1.5-4.6		29-Apr-04	460.	<1000.	460.	<1000.	<100.	<100.	1.91	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		13-Oct-04	430.	<1000.	430.	<1000.	<100.	<100.	1.91	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		21-Apr-05	**510.**	<1000.	510.	<1000.	<100.	<100.	1.57	<1.	<0.5	<1.	---	---	**AW+**
MW02-03	A2-MW02-03	1.5-4.6		20-Sep-05	390.	<1000.	400.	<1000.	<100.	<100.	1.34	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		28-Mar-06	490.	<250.	500.	<250.	<100.	<100.	1.27	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		29-Aug-06	420.	<250.	420.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		17-Apr-07	490.	<250.	500.	<250.	100.	<100.	3.99	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		05-Sep-07	450.	<250.	460.	<250.	<100.	<100.	0.97	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		08-Apr-08	390.	<250.	390.	<250.	110.	100.	1.49	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		08-Sep-08	400.	<250.	400.	<250.	130.	130.	0.61	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		30-Apr-09	**550.**	<250.	550.	<250.	120.	<100.	26.5	1.5	<0.5	<1.	---	---	**AW+**
MW02-03	MW02-03	1.5-4.6		08-Sep-09	400.	<250.	400.	<250.	<100.	<100.	0.81	<1.	<0.5	<1.	---	---	AW-
MW02-03	MW02-03	1.5-4.6		12-May-10	**550.**	<250.	550.	<250.	<100.	<100.	6.67	<1.	<0.5	<1.	---	---	**AW+**
MW02-03	MW02-03	1.5-4.6		13-Sep-10	**510.**	<250.	510.	<250.	<100.	<100.	1.65	<1.	<0.5	<0.71	---	---	**AW+**
MW02-03	MW02-03	1.5-4.6		07-Apr-11	350.	<250.	350.	<250.	<100.	<100.	1.23	<1.	<0.5	<0.71	---	---	AW-
MW02-03	MW02-03	1.5-4.6		01-Sep-11	350.	<250.	350.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6		23-May-12	310.	<250.	310.	<250.	1200.	220.	110.	207.	85.9	**581.**	---	---	**AW+**
MW02-03	MW02-03	1.5-4.6		24-Sep-12	**1640.**	450.	1650.	460.	2420.	**2330.**	55.6	3.07	25.9	7.57	---	---	**AW+**
MW02-03	MW02-03	1.5-4.6	L1283010-7	26-Mar-13	460.	<250.	460.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1345378-11	8-Aug-13	340.	<250.	340.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1449879-9	1-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1498928-2	7-Aug-14	340.	<250.	340.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1610017-5	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1751053-2	31-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-03	MW02-03	1.5-4.6	L1909647-2	5-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW02-03	MW02-03	1.5-4.6	L1911182-3	10-Apr-17	---	---	---	---	---	---	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
MW02-03	MW02-03	1.5-4.6	L2085716-2	26-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW02-04	MW02-04	1.5-4.6		28-Apr-04	**1030.**	<1000.	1030.	<1000.	250.	250.	2.21	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		13-Oct-04	**600.**	<1000.	600.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		21-Apr-05	**870.**	<1000.	870.	<1000.	<100.	<100.	0.51	<1.	<0.5	<1.	---	---	**AW+**

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
MW02-04	A2-MW02-04	1.5-4.6		20-Sep-05	**690.**	<1000.	690.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		28-Mar-06	**700.**	<250.	700.	<250.	110.	110.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		29-Aug-06	**580.**	<250.	580.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		17-Apr-07	**630.**	<250.	630.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		05-Sep-07	**590.**	<250.	590.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		08-Apr-08	420.	<250.	420.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-04	MW02-04	1.5-4.6		08-Sep-08	**550.**	<250.	550.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6		30-Apr-09	410.	<250.	410.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-04	MW02-04	1.5-4.6		08-Sep-09	480.	<250.	480.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-04	MW02-04	1.5-4.6		12-May-10	470.	<250.	470.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW02-04	MW02-04	1.5-4.6		13-Sep-10	500.	<250.	500.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
MW02-04	MW02-04	1.5-4.6		07-Apr-11	340.	<250.	340.	<250.	<100.	<100.	<0.5	<1.	<0.5	<0.71	---	---	AW-
MW02-04	MW02-04	1.5-4.6	L1283010-8	26-Mar-13	400.	<250.	400.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-04	MW02-04	1.5-4.6	L1345378-9	8-Aug-13	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-04	MW02-04	1.5-4.6	L1449879-1	1-May-14	340.	<250.	340.	<250.	150.	150.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-04	MW02-04	1.5-4.6	L1498928-3	7-Aug-14	**650.**	<250.	650.	<250.	170.	170.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
MW02-04	MW02-04	1.5-4.6	L1751053-3	31-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW02-04	MW02-04	1.5-4.6	L1909647-3	5-Apr-17	310.	<250.	310.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW02-04	MW02-04	1.5-4.6	L1911182-2	10-Apr-17	---	---	---	---	---	---	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
MW02-04	MW02-04	1.5-4.6	L2082551-1	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-02	MW03-02	3.7-7.6		28-Apr-04	**510.**	<1000.	510.	<1000.	<100.	<100.	1.5	<1.	<0.5	<1.	---	---	**AW+**
MW03-02	MW03-02	3.7-7.6		13-Oct-04	**550.**	<1000.	550.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	**AW+**
MW03-02	MW03-02	3.7-7.6		12-Apr-05	390.	<1000.	390.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		14-Sep-05	460.	<1000.	460.	<1000.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		23-Mar-06	330.	<250.	330.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		29-Aug-06	430.	<250.	430.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		17-Apr-07	340.	<250.	340.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		05-Sep-07	**650.**	280.	650.	280.	<100.	<100.	31.7	<1.	<0.5	<1.	---	---	**AW+**
MW03-02	MW03-02	3.7-7.6		02-Apr-08	360.	<250.	360.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		08-Sep-08	470.	280.	470.	280.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		30-Apr-09	---	---	380.	260.	<100.	<100.	25.	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		31-Aug-09	---	---	420.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		22-Apr-10	---	---	<250.	<250.	<100.	<100.	<0.5	<1.	<0.5	<1.	---	---	AW-
MW03-02	MW03-02	3.7-7.6		14-Sep-10	---	---	420.	320.	<100.	<100.	0.53	<1.	<0.5	<0.71	---	---	AW-
MW03-02	MW03-02	3.7-7.6		31-Mar-11	---	---	<250.	<250.	<100.	<100.	0.61	<1.	<0.5	<0.71	---	---	AW-
MW03-02	MW03-02	3.7-7.6		01-Sep-11	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6		09-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1283010-5	26-Mar-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1350199-1	19-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1449337-6	30-Apr-14	---	---	<250.	<250.	<100.	<100.	<0.5	0.61	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1501099-4	12-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1608929-5	7-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1662936-3	25-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1747969-8	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW03-02	MW03-02	3.7-7.6	L1911588-1	10-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-02	MW03-02	3.7-7.6	L2085716-1	26-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW03-03	MW03-03	6.1-13.7		29-Apr-04	**620.**	<1000.	620.	<1000.	2630.	**2580.**	19.4	<2.	23.1	10.2	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		12-Oct-04	**650.**	<1000.	650.	<1000.	890.	880.	2.62	<1.	4.22	<1.	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		21-Apr-05	**1100.**	<1000.	1110.	<1000.	780.	710.	14.4	3.5	42.9	14.9	---	---	**AW+**
MW03-03	A2-MW03-03	6.1-13.7		20-Sep-05	**1220.**	<1000.	1220.	<1000.	590.	590.	<1.5	<1.	<0.5	<1.	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		28-Mar-06	**800.**	<250.	800.	<250.	570.	500.	21.8	3.4	36.3	15.8	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		29-Aug-06	**1340.**	400.	1340.	400.	1840.	**1840.**	<3.	<2.	2.4	<2.	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		17-Apr-07	**760.**	<250.	770.	<250.	1460.	1400.	21.2	<10.	30.9	8	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		05-Sep-07	**630.**	<250.	630.	<250.	1000.	990.	5.38	<1.	3.4	2.5	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		08-Apr-08	**750.**	<250.	760.	<250.	1440.	1370.	16.4	4.1	33.1	21.9	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		08-Sep-08	**610.**	<250.	620.	<250.	1630.	**1610.**	4.71	<2.	5.65	5.3	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		30-Apr-09	**790.**	<250.	800.	<250.	1280.	1220.	14.5	1.9	23.6	16.4	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		09-Sep-09	470.	<250.	470.	<250.	1230.	1220.	2.91	<1.	2.6	2.1	---	---	AW-
MW03-03	MW03-03	6.1-13.7		12-May-10	**980.**	<250.	990.	<250.	1160.	1100.	14.1	2.8	25.6	9.4	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		14-Sep-10	**610.**	<250.	610.	<250.	710.	720.	4.23	1.1	2.96	2.75	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7		07-Apr-11	370.	<250.	370.	<250.	640.	620.	6.18	1.1	9.2	1.97	---	---	AW-
MW03-03	MW03-03	6.1-13.7		17-Aug-11	460.	<250.	460.	<250.	1730.	**1730.**	<7.	<2.	3.01	1.84	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7	L1291408-1	18-Apr-13	440.	<250.	440.	<250.	1150.	1150.	<2.	<0.5	0.5	<0.75	---	---	AW-
MW03-03	MW03-03	6.1-13.7	L1451660-1	6-May-14	**980.**	<250.	1010.	<250.	2140.	**2090.**	<6.	1.02	50.	4.76	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7	L1501939-1	13-Aug-14	450.	<250.	450.	<250.	1230.	1230.	<3.	<0.5	3.58	<0.75	---	---	**AW+**
MW03-03	MW03-03	6.1-13.7	L1751053-4	31-Mar-16	370.	<250.	370.	<250.	1020.	1020.	1.66	<0.5	0.7	<0.75	---	---	AW-
MW03-03	MW03-03	6.1-13.7	L1909647-4	5-Apr-17	**950.**	<250.	970.	<250.	1950.	**1880.**	<2.5	<2.3	61.	4.6	<2.5	---	**AW+**
MW03-03	MW03-03	6.1-13.7	L2082551-2	19-Apr-18	**650.**	<250.	650.	<250.	730.	730.	<0.5	<0.5	4.25	<0.75	<0.5	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68		21-Apr-10	**550.**	<250.	560.	<250.	320.	160.	125.	10.5	13.1	15.6	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68		14-Sep-10	500.	<250.	500.	<250.	<100.	400.	366.	1.3	20.1	4.57	---	---	AW-
A2MW09-05I	A2MW09-5I	9.18-10.68		31-Mar-11	**680.**	<250.	690.	<250.	720.	370.	292.	4.	34.7	15.9	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68		01-Sep-11	320.	<250.	330.	<250.	420.	100.	313.	1.03	5.87	0.81	---	---	AW-
A2MW09-05I	MW09-05I	9.18-10.68		09-May-12	**840.**	<250.	870.	<250.	6700.	**<5000.**	753.	1320.	450.	**1920.**	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68		13-Aug-12	500.	<250.	510.	<250.	2260.	820.	903.	58.8	122.	**357.**	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1282461-1	25-Mar-13	**<1800.**	320.	<1800.	320.	550.	430.	66.9	3.2	33.7	7.97	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1382363-1	23-Oct-13	**870.**	<250.	870.	<250.	2250.	810.	**1110.**	7.3	182.	142.	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1449337-1	30-Apr-14	**830.**	<250.	840.	<250.	1160.	900.	174.	2.3	51.9	27.6	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1501099-1	12-Aug-14	**2580.**	1840.	2600.	1840.	3700.	**1700.**	**1300.**	19.6	217.	**495.**	---	---	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1608929-1	7-May-15	480.	<250.	490.	<250.	1010.	840.	106.	1.3	25.	36.8	---	---	AW-
A2MW09-05I	A2MW09-05I	9.18-10.68	L1662936-1	25-Aug-15	**680.**	<250.	690.	<250.	3400.	**2000.**	**1050.**	11.2	126.	250.	---	---	**AW+**
A2MW09-05I	A2MW09-05I	9.18-10.68	L1747969-4	22-Mar-16	450.	<250.	450.	<250.	490.	460.	22.7	<0.5	2.47	<0.75	---	---	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1819742-1	25-Aug-16	**1090.**	350.	1120.	350.	5220.	**2480.**	**2010.**	16.6	274.	**446.**	---	<5.	**AW+**
A2MW09-05I	A2MW09-05I	9.18-10.68	L1912573-4	12-Apr-17	400.	<250.	400.	<250.	360.	340.	14.5	<0.5	1.52	<0.75	<0.5	---	AW-
A2MW09-05I	A2MW09-05I	9.18-10.68	L1987046-1	6-Sep-17	**1130.**	460.	1140.	460.	2200.	1470.	658.	5.58	11.3	54.5	<0.5	---	**AW+**
A2 MW09-05I	MW09-05I	9.18-10.68	L2085717-1	26-Apr-18	**920.**	330.	920.	330.	380.	380.	3.69	<0.5	<0.5	<0.75	<0.5	---	**AW+**
A2 MW09-05I	MW09-05I	9.18-10.68	L2103253-1	30-May-18	360.	<250.	360.	<250.	140.	140.	<1.	<0.5	<0.5	<0.75	<0.5	---	AW-
A2 MW09-05I	DUP-14	9.18-10.68	L2103253-2	30-May-18	350.	<250.	360.	<250.	160.	160.	<1.	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				30-May-18	---	---	---	---	---	---	---	---	---	---	---	---	
A2 MW09-05I	A2 MW09-05I	9.18-10.68	L2151626-1	22-Aug-18	420.	<250.	430.	<250.	540.	490.	48.8	0.58	<0.5	0.99	<0.5	---	AW-
A2MW09-06I	MW09-06I	9.33-10.83		21-Apr-10	**620.**	<250.	620.	<250.	680.	<500.	381.	<5.	6.2	<5.	---	---	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		14-Sep-10	460.	<250.	460.	<250.	<110.	560.	479.	1.	1.47	1.3	---	---	AW-
A2MW09-06I	A2MW09-06I	9.33-10.83		06-Apr-11	**930.**	<250.	940.	<250.	870.	730.	99.1	7.4	14.6	17.2	---	---	**AW+**

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPHw (C10-C19) [2,3]	EPHw (C19-C32) [3]	VHw (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
A2MW09-06I	MW09-06I	9.33-10.83		01-Sep-11	440.	<250.	450.	<250.	5020.	<840.	**1780.**	1530.	170.	**782.**	---	---	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		09-May-12	**1210.**	<250.	1260.	<250.	4280.	**1780.**	996.	379.	251.	**872.**	---	---	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		13-Aug-12	390.	<250.	400.	<250.	1130.	480.	372.	75.8	40.9	154.	---	---	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1282461-2	25-Mar-13	**940.**	<250.	990.	<250.	2170.	1480.	199.	38.3	147.	**301.**	---	---	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1350199-2	19-Aug-13	**---**	**---**	**---**	---	1080.	550.	491.	1.5	14.2	16.8	---	---	AW-
A2MW09-06I	MW09-6I	9.33-10.83	L1350563-2	20-Aug-13	**950.**	270.	950.	270.	---	---	---	---	---	---	---	**---**	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1449337-3	30-Apr-14	**1010.**	<250.	1050.	<250.	1880.	1350.	95.8	14.	187.	230.	---	---	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1501099-2	12-Aug-14	**690.**	960.	700.	960.	1560.	800.	601.	3.	57.8	103.	---	---	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1608318-1	6-May-15	500.	<250.	500.	<250.	370.	300.	38.3	0.64	17.1	15.4	---	---	AW-
A2MW09-06I	MW09-6I	9.33-10.83	L1662936-2	25-Aug-15	350.	<250.	350.	<250.	800.	470.	315.	1.4	4.6	10.	---	---	AW-
A2MW09-06I	MW09-6I	9.33-10.83	L1747969-5	22-Mar-16	**570.**	<250.	570.	<250.	660.	570.	15.4	0.64	54.7	15.9	---	---	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1819742-2	25-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	24.2	<0.5	2.24	<0.75	---	2.71	AW-
A2MW09-06I	MW09-6I	9.33-10.83	L1912573-5	12-Apr-17	**540.**	<250.	540.	<250.	560.	520.	6.27	<0.5	27.6	4.08	<0.5	---	**AW+**
A2MW09-06I	MW09-6I	9.33-10.83	L1987046-2	6-Sep-17	350.	<250.	350.	<250.	350.	240.	116.	0.53	<0.5	<0.75	<0.5	---	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L2085717-2	26-Apr-18	**2230.**	1410.	2230.	1410.	450.	440.	3.27	<0.5	6.26	<0.75	<0.5	---	**AW+**
A2MW09-06I	A2 MW09-06I	9.33-10.83	L2151626-2	22-Aug-18	<250.	<250.	<250.	<250.	310.	300.	13.4	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-06S	MW09-06S	2.44-5.44		21-Apr-10	**530.**	<250.	540.	<250.	160.	150.	12.1	<1.	2.2	1.7	---	---	**AW+**
A2MW09-06S	MW09-06S	2.44-5.44		14-Sep-10	490.	<250.	490.	<250.	<100.	430.	320.	12.5	12.	5.92	---	---	AW-
A2MW09-06S	A2MW09-06S	2.44-5.44		06-Apr-11	<250.	<250.	<250.	<250.	910.	730.	138.	9.3	16.3	17.8	---	---	AW-
A2MW09-06S	MW09-06S	2.44-5.44		01-Sep-11	470.	<250.	490.	<250.	4000.	<1000.	**1590.**	1210.	122.	**442.**	---	---	**AW+**
A2MW09-06S	MW09-06S	2.44-5.44	L1449337-2	30-Apr-14	**590.**	<250.	600.	<250.	470.	300.	2.7	1.85	24.6	142.	---	---	**AW+**
A2MW09-06S	MW09-06S	2.44-5.44	L1911855-1	11-Apr-17	---	---	---	---	---	---	<0.5	<0.45	1.78	0.87	<0.5	<0.5	AW-
A2MW09-06S	MW09-06S	2.44-5.44	L1911856-1	11-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-10	MW09-10	2.22-5.22		21-Apr-10	**1980.**	310.	2010.	310.	9900.	**<5000.**	**8280.**	917.	190.	**1350.**	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22		14-Sep-10	**1530.**	390.	1550.	390.	1060.	**5090.**	**3920.**	27.	38.	38.	---	---	**AW+**
A2MW09-10	A2MW09-10	2.22-5.22		31-Mar-11	**2010.**	<250.	2130.	<250.	13500.	**3100.**	**6770.**	524.	725.	**2420.**	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22		09-May-12	**1800.**	300.	1860.	300.	**16900.**	**4600.**	**7470.**	826.	831.	**3150.**	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1282463-1	25-Mar-13	**2630.**	530.	2710.	530.	9700.	**<1900.**	**7830.**	127.	439.	**856.**	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1449336-1	30-Apr-14	**2520.**	480.	2620.	480.	8700.	**<5000.**	**5250.**	113.	672.	**968.**	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1747969-1	22-Mar-16	**1090.**	300.	1140.	300.	5800.	**2500.**	**2520.**	66.8	417.	291.	---	---	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1914178-1	18-Apr-17	**1420.**	370.	1490.	370.	4100.	1500.	**1840.**	50.1	387.	262.	<0.5	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05		22-Apr-10	**1730.**	250.	1820.	250.	**32000.**	**<10000.**	**9310.**	**10900.**	1310.	**6300.**	---	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05		09-May-12	**2720.**	1090.	2840.	1090.	**26300.**	**<4300.**	**4150.**	**9190.**	1700.	**8940.**	---	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1283007-1	26-Mar-13	**2160.**	<250.	2280.	<250.	**26000.**	**<10000.**	**5190.**	**10400.**	1480.	**8640.**	---	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1449336-2	30-Apr-14	**3090.**	490.	3240.	490.	**26400.**	**<5000.**	**1950.**	**7790.**	1940.	**10200.**	---	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1608929-3	7-May-15	**1920.**	<250.	2010.	<250.	**17000.**	**5600.**	**1840.**	773.	1410.	**7370.**	---	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1747969-6	22-Mar-16	**2150.**	270.	2250.	270.	14100.	**6000.**	648.	139.	1330.	**5960.**	---	---	**AW+**
A2MW09-11	A2MW09-11	2.05-5.05	L1914178-2	18-Apr-17	**2140.**	430.	2220.	430.	5600.	**3000.**	91.7	9.15	504.	**2030.**	<0.5	---	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L2085717-7	26-Apr-18	**1810.**	300.	1910.	300.	9300.	**3600.**	167.	19.1	1180.	**4350.**	<0.5	---	**AW+**
A2MW09-12	MW09-12	2.14-5.14		22-Apr-10	**940.**	<250.	1020.	<250.	3700.	**1800.**	**1730.**	<10.	53.2	116.	---	---	**AW+**
A2MW09-12	MW09-12	2.14-5.14		14-Sep-10	**1210.**	590.	1230.	590.	860.	**2320.**	**1260.**	2.6	48.1	147.	---	---	**AW+**
A2MW09-12	A2MW09-12	2.14-5.14		31-Mar-11	<250.	<250.	<250.	<250.	<100.	<100.	0.64	<1.	<0.5	<0.71	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14		09-May-12	<250.	<250.	<250.	<250.	<100.	<100.	7.2	0.55	<0.5	1.24	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L1282461-3	25-Mar-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L1449337-4	30-Apr-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L1608929-4	7-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L1747969-7	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L1914178-3	18-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-12	MW09-12	2.14-5.14	L2085717-3	26-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-13	MW09-13	2.02-5.02		22-Apr-10	**870.**	<250.	870.	<250.	<100.	<100.	28.3	<1.	<0.5	<1.	---	---	**AW+**
A2MW09-13	MW09-13	2.02-5.02		14-Sep-10	**840.**	420.	840.	420.	<100.	<100.	0.76	<1.	<0.5	<0.71	---	---	**AW+**
A2MW09-13	A2MW09-13	2.02-5.02		05-May-11	---	---	---	---	<100.	<100.	4.73	<1.	<0.5	<0.71	---	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L1283010-1	26-Mar-13	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L1449879-5	1-May-14	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L1610017-1	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L1747969-2	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L1911588-2	10-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-13	MW09-13	2.02-5.02	L2085717-4	26-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-14	MW09-14	2.03-5.03		22-Apr-10	**570.**	<250.	580.	<250.	350.	300.	46.2	1.6	<0.5	3.5	---	---	**AW+**
A2MW09-14	MW09-14	2.03-5.03		14-Sep-10	**1210.**	470.	1210.	470.	220.	320.	97.3	<1.	<0.5	2.4	---	---	**AW+**
A2MW09-14	A2MW09-14	2.03-5.03		05-May-11	**590.**	<250.	590.	<250.	450.	340.	106.	1.4	<0.5	4.13	---	---	**AW+**
A2MW09-14	MW09-14	2.03-5.03	L1283010-2	26-Mar-13	**800.**	<250.	800.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	**AW+**
A2MW09-14	MW09-14	2.03-5.03	L1449879-6	1-May-14	490.	<250.	490.	<250.	110.	110.	1.39	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-14	MW09-14	2.03-5.03	L1498925-1	7-Aug-14	360.	<250.	360.	<250.	<100.	<100.	1.27	1.24	<0.5	2.63	---	5.	AW-
A2MW09-14	MW09-14	2.03-5.03	L1610017-2	11-May-15	**610.**	<250.	620.	<250.	480.	420.	59.1	<2.	<0.5	2.19	---	---	**AW+**
A2MW09-14	MW09-14	2.03-5.03	L1751053-5	31-Mar-16	260.	<250.	260.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-14	MW09-14	2.03-5.03	L1911588-3	10-Apr-17	320.	<250.	320.	<250.	190.	190.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-14	MW09-14	2.03-5.03	L2085717-5	26-Apr-18	290.	<250.	290.	<250.	130.	130.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
A2MW09-15	MW09-15	1.35-4.35		22-Apr-10	**1600.**	<250.	1600.	<250.	260.	240.	9.13	<1.	2.96	1.9	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35		14-Sep-10	**2180.**	430.	2180.	430.	580.	590.	5.11	<1.	1.75	1.46	---	---	**AW+**
A2MW09-15	A2MW09-15	1.35-4.35		11-Apr-11	**1430.**	<250.	1430.	<250.	420.	420.	1.86	<1.	1.37	1.27	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35		01-Sep-11	**---**	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-15	MW09-15	1.35-4.35		24-May-12	**---**	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-15	MW09-15	1.35-4.35	L1283010-3	26-Mar-13	**1020.**	<250.	1020.	<250.	170.	160.	3.31	<0.5	0.87	<0.75	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1345378-8	8-Aug-13	**980.**	<250.	980.	<250.	270.	260.	5.33	0.77	1.91	1.47	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1449879-7	1-May-14	**770.**	<250.	770.	<250.	220.	220.	2.44	<0.5	<0.5	<0.75	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1498925-2	7-Aug-14	**760.**	<250.	760.	<250.	430.	430.	<1.5	<0.5	<0.5	<0.75	---	12.4	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1610017-3	11-May-15	400.	<250.	400.	<250.	180.	180.	<0.6	<0.5	<0.5	<0.75	---	---	AW-
A2MW09-15	MW09-15	1.35-4.35	L1766653-1	10-May-16	**540.**	<250.	540.	<250.	300.	300.	<0.7	<0.5	<0.5	<0.75	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1822946-1	1-Sep-16	**600.**	<250.	600.	<250.	600.	600.	<1.	<0.5	<0.5	<0.75	---	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L1911588-4	10-Apr-17	**520.**	<250.	520.	<250.	400.	400.	<0.5	<0.5	<0.5	<0.75	<0.5	---	**AW+**
A2MW09-15	MW09-15	1.35-4.35	L2085717-6	26-Apr-18	**530.**	<250.	530.	<250.	260.	260.	<0.5	<0.5	<0.5	<0.75	<0.5	---	**AW+**
WS2-D	WS2-D	4.6-7.6		21-Apr-04	---	---	---	---	---	---	---	---	---	---	---	**49100.**	**AW+**
WS2-D	WS-2D	4.6-7.6		18-Oct-04	---	---	---	---	---	---	---	---	---	---	---	**15500.**	**AW+**
WS2-D	WS-2D	4.6-7.6		14-Apr-05	---	---	---	---	---	---	---	---	---	---	---	**23500.**	**AW+**
WS2-D	A2-WS-2D	4.6-7.6		14-Sep-05	---	---	---	---	---	---	---	---	---	---	---	**36300.**	**AW+**
WS2-D	WS2D	4.6-7.6		20-Mar-06	---	---	---	---	---	---	---	---	---	---	---	3130.	AW-
WS2-D	WS2D	4.6-7.6		23-Aug-06	---	---	---	---	---	---	---	---	---	---	---	**7200.**	**AW+**
WS2-D	WS2D	4.6-7.6		10-Apr-07	---	---	---	---	---	---	---	---	---	---	---	278.	AW-
WS2-D	WS2D	4.6-7.6		01-Apr-08	---	---	---	---	---	---	---	---	---	---	---	893.	AW-
WS2-D	WS2D	4.6-7.6		29-Apr-09	---	---	---	---	---	---	---	---	---	---	---	74.8	AW-
WS2-D	WS2D	4.6-7.6		27-Aug-09	---	---	---	---	---	---	---	---	---	---	---	1090.	AW-
WS2-D	WS2D	4.6-7.6		13-Apr-10	---	---	---	---	---	---	---	---	---	---	---	7.55	AW-
WS2-D	WS2-D	4.6-7.6		12-Apr-11	---	---	---	---	---	---	---	---	---	---	---	2.	AW-
WS2-D	WS2-D	4.6-7.6		24-Aug-11	---	---	---	---	---	---	---	---	---	---	---	657.	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					LEPHw [3]	HEPHw [3]	EPH_W (C10-C19) [2,3]	EPH_W (C19-C32) [3]	VHw (C6-C10)	VPH_W	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**													
WS2-D	WS2D	4.6-7.6		29-May-12	---	---	---	---	---	---	---	---	---	---	---	20.1	AW-
WS2-D	WS2-D	4.6-7.6		21-Aug-12	---	---	---	---	---	---	---	---	---	---	---	193.	AW-
WS2-D	WS2-D	4.6-7.6	L1292848-2	23-Apr-13	---	---	---	---	---	---	---	---	---	---	---	0.63	AW-
WS2-D	WS2-D	4.6-7.6	L1351356-2	21-Aug-13	---	---	---	---	---	---	---	---	---	---	---	449.	AW-
WS2-D	WS2-D	4.6-7.6	L1459120-2	22-May-14	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	2.72	AW-
WS2-D	WS2-D	4.6-7.6	L1506853-2	22-Aug-14	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	83.9	AW-
WS2-D	WS2-D	4.6-7.6	L1584769-1	5-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	1.65	AW-
WS2-D	WS2-D	4.6-7.6	L1659479-5	18-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	24.9	AW-
WS2-D	WS2-D	4.6-7.6	L1742377-2	8-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	<0.5	AW-
WS2-D	WS2-D	4.6-7.6	L1809959-3	8-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	5.92	AW-
WS2-D	WS2-D	4.6-7.6	L1898884-3	8-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
WS2-D	WS2-D	4.6-7.6	L1980058-1	23-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	2.27	AW-
WS2-D	WS2-D	4.6-7.6	L2088139-1	2-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	<0.5	AW-
WS2-D	WS2-D	4.6-7.6	L2153915-1	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	2.91	AW-
WS2-D2	WS2-D2	10.7-12.2		21-Apr-04	---	---	---	---	---	---	---	---	---	---	---	**12300.**	**AW+**
WS2-D2	WS-2D2	10.7-12.2		18-Oct-04	---	---	---	---	---	---	---	---	---	---	---	**7720.**	**AW+**
WS2-D2	WS-2D2	10.7-12.2		14-Apr-05	---	---	---	---	---	---	---	---	---	---	---	**18200.**	**AW+**
WS2-D2	A2-WS-2D2	10.7-12.2		14-Sep-05	---	---	---	---	---	---	---	---	---	---	---	**23100.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		21-Mar-06	---	---	---	---	---	---	---	---	---	---	---	**10100.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		23-Aug-06	---	---	---	---	---	---	---	---	---	---	---	**11300.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		11-Apr-07	---	---	---	---	---	---	---	---	---	---	---	3460.	AW-
WS2-D2	WS2-D2	10.7-12.2		30-Aug-07	---	---	---	---	---	---	---	---	---	---	---	**10400.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		01-Apr-08	---	---	---	---	---	---	---	---	---	---	---	**9230.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		28-Aug-08	---	---	---	---	---	---	---	---	---	---	---	**10500.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		29-Apr-09	---	---	---	---	---	---	---	---	---	---	---	**8240.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		27-Aug-09	---	---	---	---	---	---	---	---	---	---	---	4070.	AW-
WS2-D2	WS2-D2	10.7-12.2		13-Apr-10	---	---	---	---	---	---	---	---	---	---	---	2000.	AW-
WS2-D2	WS2-D2	10.7-12.2		09-Sep-10	---	---	---	---	---	---	---	---	---	---	---	**7160.**	**AW+**
WS2-D2	WS2-D2	10.7-12.2		13-Apr-11	---	---	---	---	---	---	---	---	---	---	---	1590.	AW-
WS2-D2	WS2-D2	10.7-12.2		24-Aug-11	---	---	---	---	---	---	---	---	---	---	---	1560.	AW-
WS2-D2	WS2-D2	10.7-12.2		30-May-12	---	---	---	---	---	---	---	---	---	---	---	1160.	AW-
WS2-D2	WS2-D2	10.7-12.2		21-Aug-12	---	---	---	---	---	---	---	---	---	---	---	1560.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1292848-3	23-Apr-13	---	---	---	---	---	---	---	---	---	---	---	546.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1351356-3	21-Aug-13	---	---	---	---	---	---	---	---	---	---	---	1230.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1459120-1	22-May-14	---	---	---	---	<100.	<100.	<1.	<1.	<1.	<1.4	---	616.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1506853-3	22-Aug-14	---	---	---	---	<100.	<100.	<2.5	<2.5	<2.5	<3.5	---	881.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1584769-4	5-Mar-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	402.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1658732-2	17-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	327.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1743813-2	10-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	146.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1809959-4	8-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	315.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1898884-4	8-Mar-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	150.	AW-
WS2-D2	WS2-D2	10.7-12.2	L1980058-2	23-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	229.	AW-
WS2-D2	WS2-D2	10.7-12.2	L2088139-2	2-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	163.	AW-
WS2-D2	DUP-13	10.7-12.2	L2088139-4	2-May-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	166.	AW-
QA/QC RPD				02-May-18	---	---	---	---	---	---	---	---	---	---	---	1.8%	
WS2-D2	WS2-D2	10.7-12.2	L2153915-2	27-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	227.	AW-
MW11-3S	MW11-3S	5.00-8.00		21-Jul-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00		22-May-12	---	---	280.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00		14-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1289006-5	11-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1344198-2	7-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1452404-3	7-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1501930-1	13-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1610017-7	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1663797-1	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1747945-1	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1817088-1	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1908950-1	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L1975358-1	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L2082551-3	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3S	MW11-3S	5.00-8.00	L2150755-1	21-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3S	DUP-1	5.00-8.00	L2150755-4	21-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				21-Aug-18	---	---	---	---	---	---	---	---	---	---	---	---	
MW11-3I	MW11-3I	11-12.5		21-Jul-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5		22-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5		14-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1289006-4	11-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1344198-3	7-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1452404-4	7-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1501930-2	13-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1610017-8	11-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1663797-2	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1747945-2	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1817088-2	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3I	MW11-3I	11-12.5	L1908950-2	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3I	MW11-3I	11-12.5	L1975358-2	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3I	MW11-3I	11-12.5	L2082551-4	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3I	MW11-3I	11-12.5	L2150755-2	21-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3D	MW11-3D	18.5-20		21-Jul-11	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20		22-May-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20		14-Aug-12	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1289006-3	11-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1344198-4	7-Aug-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1452404-5	7-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1501930-3	13-Aug-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-

TABLE B-2
AREA 2 CONCENTRATIONS OF PETROLEUM HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval (mbgs)	ALS Laboratory Report #	Sample Date	LEPHw [3]	HEPHw [3]	EPHw (C10-C19) [2,3]	EPHw (C19-C32) [3]	VHw (C6-C10)	VPHw	Benzene	Toluene	Ethylbenzene	Xylenes	Styrene	MTBE	Groundwater Classification
Generic Numerical Water Standards [4]																	
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	500	NS	5000[1]	NS	15000[1]	1500	1000	2000	2500	300	720	4400	
	Site-Specific Screening Levels (SSSLs)				3000	NS	5000	NS	15000	15000	21000	7700	3200	3300	NS	NS	
MW11-3D	MW11-3D	18.5-20	L1610761-1	12-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1663797-3	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1747945-3	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1817088-3	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-3D	MW11-3D	18.5-20	L1908950-3	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3D	MW11-3D	18.5-20	L1975358-3	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3D	MW11-3D	18.5-20	L2082551-5	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-3D	MW11-3D	18.5-20	L2150755-3	21-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4S	MW11-4S	5.00-8.00		21-Jul-11	480.	<250.	480.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00		22-May-12	---	---	330.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00		14-Aug-12	---	---	460.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1289006-6	11-Apr-13	---	---	330.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1344198-11	7-Aug-13	---	---	370.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1452404-6	7-May-14	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1501930-4	13-Aug-14	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1610761-2	12-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1663797-4	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1747945-4	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1817088-4	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1908950-4	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L1975358-4	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L2082551-6	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4S	MW11-4S	5.00-8.00	L2149934-1	20-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	0.54	<0.45	<0.5	<0.75	<0.5	---	AW-
MW11-4I	MW11-4I	11-12.5		21-Jul-11	400.	<250.	400.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5		22-May-12	---	---	530.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5		14-Aug-12	---	---	460.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1289006-7	11-Apr-13	---	---	430.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1344198-10	7-Aug-13	---	---	320.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1452404-7	7-May-14	---	---	280.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1501930-5	13-Aug-14	---	---	340.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1610761-3	12-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1663797-5	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1747945-5	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1817088-5	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4I	MW11-4I	11-12.5	L1908950-5	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4I	MW11-4I	11-12.5	L1975358-5	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4I	MW11-4I	11-12.5	L2082551-7	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4I	MW11-4I	11-12.5	L2149934-2	20-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	---	AW-
MW11-4D	MW11-4D	18.5-20		21-Jul-11	390.	<250.	390.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20		22-May-12	---	---	490.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20		14-Aug-12	---	---	430.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1289006-8	11-Apr-13	---	---	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1344198-5	7-Aug-13	---	---	300.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1452404-8	7-May-14	---	---	280.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1501930-6	13-Aug-14	---	---	310.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1610761-4	12-May-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1663797-6	26-Aug-15	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1747945-6	22-Mar-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1817088-6	22-Aug-16	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	---	---	AW-
MW11-4D	MW11-4D	18.5-20	L1908950-6	4-Apr-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4D	MW11-4D	18.5-20	L1975358-6	15-Aug-17	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4D	MW11-4D	18.5-20	L2082551-8	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
MW11-4D	DUP-9	18.5-20	L2082551-9	19-Apr-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
QA/QC RPD				19-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	
MW11-4D	MW11-4D	18.5-20	L2149934-3	20-Aug-18	<250.	<250.	<250.	<250.	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<7.	AW-
Travel Blank	TRAVEL BLANK-06		L2082551-10	19-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-1		L2085717-9	26-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	0.95	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-08		L2086841-8	30-Apr-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-09		L2087549-3	1-May-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-10		L2088139-5	2-May-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.71	<0.5	<0.5	AW-
Travel Blank	TRAVEL BLANK-13		L2103253-2	30-May-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-1		L2149934-4	20-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
Travel Blank	TRAVEL BLANK-2		L2150755-5	21-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-3		L2151626-3	22-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.5	<0.5	<0.75	<0.5	---	AW-
Travel Blank	TRAVEL BLANK-4		L2153915-9	27-Aug-18	---	---	---	---	<100.	<100.	<0.5	<0.45	<0.5	<0.75	<0.5	<0.5	AW-
Reported Detection Limit					250.	250.	250.	250.	100.	100.	0.5	0.5	0.5	0.75	0.5	0.5	

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 12 amendments, January 2019)
EPH_W	Extractable petroleum hydrocarbons in water
$LEPH_W$	Light extractable petroleum hydrocarbons in water
$HEPH_W$	Heavy extractable petroleum hydrocarbons in water
MTBE	Methyl tert-butyl ether
VH	Volatile hydrocarbons
VPH_W	Volatile petroleum hydrocarbons in water
QA/QC	Quality Assurance/Quality Control
RPD	Relative percent difference
NS	No standard established for indicated parameter
mbgs	Metres below ground surface
µg/L	Micrograms per litre
ppb	Parts per billion
<	Sample concentration less than the detection limit indicated.
---	Sample not analyzed for indicated parameter or not calculated.

BOLD	Sample concentration greater than CSR standard for aquatic life (AW).
BOLD RED HIGHLIGHTED	Exceeds Site Specific Screening Levels (SSSLs)

Notes:

1 CSR Standards are applicable at all sites, irrespective of water use
2 BC MoE groundwater AW standard (500 µg/L) is for LEPH corrected for PAHs; EPHW (C10-C19) is LEPH uncorrected for PAHs and therefore conservative.
3 Some LEPH/HEPH and EPH10-19/EPH19-32 results from ALS were affected by laboratory contamination. The former values are available upon request.
4 Criterion concentration in µg/L.

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval	ALS Laboratory Report #	Sample Date	Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
G2-3B	G2-3B	10.1-13.1		26-Apr-04	0.053	<0.09	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.41**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		15-Oct-04	<0.05	<0.06	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.431**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		12-Apr-05	0.053	0.055	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.054	<0.05	<0.05	<0.05	**0.719**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.252**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		23-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.108	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		24-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	**0.273**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		12-Apr-07	0.068	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.071	<0.05	<0.07	<0.05	**0.217**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		10-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.242**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		01-Apr-08	0.052	<0.09	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.065	<0.05	<0.08	<0.05	**0.218**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.151	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		28-Apr-09	0.07	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.09	<0.05	0.198	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		01-Sep-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.146	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		14-Apr-10	0.068	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.098	<0.05	<0.05	<0.05	0.137	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		09-Sep-10	<0.05	<0.06	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.268**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		18-Apr-11	0.126	<0.15	<0.07	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.155	<0.05	<0.06	<0.05	**0.34**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		09-Aug-11	0.084	<0.1	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.095	<0.05	<0.05	<0.05	**0.232**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1		18-May-12	0.051	<0.5	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.088	<0.05	<0.05	<0.05	0.155	<0.05	AW-
G2-3B	G2-3B	10.1-13.1		22-Aug-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.183	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1299117-2	8-May-13	0.072	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.083	<0.05	<0.05	<0.05	**0.293**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1	L1367083-1	23-Sep-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.082	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1461112-1	27-May-14	0.1	<0.05	0.053	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.118	<0.05	<0.05	<0.05	**0.272**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1	L1508365-3	26-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.158	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1583423-1	3-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1674072-3	16-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1743509-2	9-Mar-16	0.061	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.082	<0.05	<0.05	<0.05	0.199	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L1812426-5	11-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.209**	<0.05	**AW+**
G2-3B	G2-3B	10.1-13.1	L1904760-5	23-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.111	<0.05	<0.05	<0.05	0.159	<0.05	AW-
G2-3B	G2-3B	10.1-13.1	L2153915-6	27-Aug-18	<0.01	<0.2	<0.04	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.03	0.015	<0.01	<0.05	<0.02	**0.334**	<0.05	**AW+**
G2-3C	G2-3C	18.3-22.9		26-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9		15-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9		12-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1583423-2	3-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1675019-2	17-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1743509-1	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1812426-6	11-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1904760-6	23-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L1906194-3	28-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-3C	G2-3C	18.3-22.9	L2153915-7	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G2-3C	DUP-2	18.3-22.9	L2153915-8	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				27-Aug-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
G2-9A	G2-9A	6.1-9.1	L1583423-3	3-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L1674072-2	16-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L1743509-3	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L1812426-3	11-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L1906194-1	28-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	0.056	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L1980058-5	23-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L2087549-2	1-May-18	<0.01	<0.04	<0.02	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	0.184	<0.05	AW-
G2-9A	G2-9A	6.1-9.1	L2153915-4	27-Aug-18	<0.01	<0.02	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	0.077	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1583423-6	3-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1675019-1	17-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1743813-9	10-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1812426-4	11-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1906194-2	28-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L1980058-3	23-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L2088139-3	2-May-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G2-9B	G2-9B	18.9-21.9	L2153915-5	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1583423-4	3-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1674072-1	16-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1742176-1	7-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1811986-4	10-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1906194-4	28-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L1980058-6	23-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-10	G2-10	4.9-6.4	L2087549-1	1-May-18	0.01	<0.4	<0.04	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.05	0.039	<0.01	<0.05	<0.03	**0.296**	<0.05	**AW+**
G2-10	G2-10	4.9-6.4	L2153915-3	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	0.014	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		29-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		12-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		11-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	A2-G2-11A	4.6-6.1		20-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		28-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		17-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		05-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		08-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		08-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		21-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		05-May-11	0.127	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	0.098	0.069	<0.05	<0.25	0.219	<0.09	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		08-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.27	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1		24-May-12	<0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.55	<0.05	**11.1**	0.06	<0.05	<0.1	**AW+**
G2-11A	G2-11A	4.6-6.1		29-Aug-12	<0.08	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.263	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1290904-1	17-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.089	<0.05	0.855	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1350566-1	20-Aug-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.078	<0.05	0.199	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1454047-1	12-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1503989-1	18-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.068	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1610763-1	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1674072-4	16-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1752248-1	4-Apr-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L1822946-2	1-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.07	AW-
G2-11A	G2-11A	4.6-6.1	L1912573-1	12-Apr-17	<0.2	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.655	<0.05	8.48	0.084	<0.05	<0.6	AW-
G2-11A	G2-11A	4.6-6.1	L1982266-1	28-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.114	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11A	G2-11A	4.6-6.1	L2086842-1	30-Apr-18	0.012	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.024	0.02	<0.01	<0.05	<0.02	0.017	<0.05	AW-
G2-11A	DUP-12	4.6-6.1	L2086842-3	30-Apr-18	0.014	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	0.011	0.022	<0.01	<0.05	<0.02	0.01	<0.05	AW-
QA/QC RPD				30-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
G2-11A	G2-11A	4.6-6.1	L2154663-1	28-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.018	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		29-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		12-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		11-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	A2-G2-11B	7.0-8.5		20-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		04-Apr-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		29-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		17-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		05-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		08-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5		30-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1610763-2	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1674072-5	16-Sep-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1752248-2	4-Apr-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1822946-3	1-Sep-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1912573-2	12-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L1982266-2	28-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L2086842-2	30-Apr-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
G2-11B	G2-11B	7.0-8.5	L2154663-2	28-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0		22-Apr-04	<0.8	<0.08	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.69	<0.05	**269.**	0.904	<0.05	0.308	**AW+**
PW03-1A	PW03-1A	2.4-4.0		15-Oct-04	1.08	<0.2	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	2.78	<0.05	**273.**	1.94	<0.05	<0.4	**AW+**
PW03-1A	PW03-1A	2.4-4.0		15-Apr-05	1.08	0.101	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	2.	<0.05	**393.**	1.44	<0.05	<0.3	**AW+**

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval	ALS Laboratory Report #	Sample Date	Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
PW03-1A	Dup 102	2.4-4.0		15-Apr-05	1.19	<0.05	**1.5**	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	2.06	<0.05	**345.**	1.51	<0.05	<0.05	**AW+**
PW03-1A	PW03-1A	2.4-4.0		13-Sep-05	0.846	<0.065	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.19	<0.05	**222.**	0.551	<0.05	<0.05	**AW+**
PW03-1A	PW03-1A	2.4-4.0		23-Mar-06	0.953	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.3	<0.05	**335.**	0.586	<0.05	<0.3	**AW+**
PW03-1A	PW03-1A	2.4-4.0		23-Aug-06	0.929	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.5	<0.05	**149.**	0.631	<0.05	<0.6	**AW+**
PW03-1A	PW03-1A	2.4-4.0		13-Apr-07	1.6	**<1.**	**<1.**	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	2.4	<0.05	**375.**	1.1	<0.05	<1.	**AW+**
PW03-1A	PW03-1A	2.4-4.0		06-Sep-07	1.	**<1.**	**<1.**	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.5	<0.05	**218.**	<1.	<0.05	<1.	**AW+**
PW03-1A	PW03-1A	2.4-4.0		14-Nov-07	1.1	**<1.**	**<1.**	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	2.	<0.05	**291.**	<1.	<0.05	<1.	**AW+**
PW03-1A	PW03-1A	2.4-4.0		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0		04-Sep-08	<1.	**<1.**	**<1.**	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.1	<1.	<0.05	3.7	<1.	0.072	<1.	**AW+**
PW03-1A	PW03-1A	2.4-4.0		04-May-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.5	1.06	<0.05	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0		14-Apr-10	<0.3	<0.1	<0.1	<0.1	<0.01	<0.1	<0.05	<0.1	<0.05	<0.1	<0.2	<0.05	<2.	<1.1	<0.1	<0.7	AW-
PW03-1A	PW03-1A	2.4-4.0		15-Sep-10	<0.5	<0.5	<0.5	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	1.04	<0.5	<0.05	<0.5	AW-
PW03-1A	PW03-1A	2.4-4.0		19-Apr-11	<0.18	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.05	<0.22	AW-
PW03-1A	PW03-1A	2.4-4.0		22-Aug-11	<0.14	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15	<0.15	<0.05	<0.15	AW-
PW03-1A	PW03-1A	2.4-4.0	L1448683-1	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0	L1743508-2	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0	L1908948-1	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1A	PW03-1A	2.4-4.0	L2086841-5	30-Apr-18	<0.01	<0.02	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		22-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.42	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1BX	1.1-3.7		22-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.29	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.11	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.25	<0.05	0.172	AW-
PW03-1B	PW03-1BX	1.1-3.7		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.04	<0.05	<0.05	<0.25	AW-
PW03-1B	PW03-1B	1.1-3.7		04-May-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.197	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7		10-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	DUP-7	1.1-3.7		10-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7	L1285748-1	3-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7	L1448683-2	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7	L1743508-1	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7	L1908948-2	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-1B	PW03-1B	1.1-3.7	L2086841-7	30-Apr-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Apr-04	0.54	<0.2	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.32	<0.05	**21.3**	0.817	<0.05	0.258	**AW+**
PW03-2A	PW03-2A	1.8-4.6		14-Oct-04	0.683	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.59	<0.05	**61.4**	1.05	<0.05	<0.3	**AW+**
PW03-2A	PW03-2A	1.8-4.6		15-Apr-05	0.745	0.105	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.62	<0.05	**29.**	1.06	<0.05	0.367	**AW+**
PW03-2A	PW03-2A	1.8-4.6		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	Dup2	1.8-4.6		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		23-Aug-06	0.277	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.242	<0.05	<0.5	0.098	<0.05	<0.2	AW-
PW03-2A	PW03-2A	1.8-4.6		13-Apr-07	0.362	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.795	<0.05	5.07	0.439	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		06-Sep-07	0.247	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.456	<0.05	<0.4	0.43	<0.05	<0.2	AW-
PW03-2A	PW03-2A	1.8-4.6		14-Nov-07	<0.7	<0.1	<0.09	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.32	<0.05	**12.6**	1.14	<0.05	<0.3	**AW+**
PW03-2A	PW03-2A	1.8-4.6		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.2	<0.2	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		27-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6		22-Aug-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	DUP-8	1.8-4.6		22-Aug-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6	L1448683-3	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6	L1743508-6	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2A	PW03-2A	1.8-4.6	L1908948-3	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Apr-04	0.078	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.7	<0.07	<0.05	<0.08	AW-
PW03-2B	PW03-2B	1.1-3.7		14-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.287	0.061	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		15-Apr-05	0.084	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.077	<0.05	**16.9**	<0.05	<0.05	<0.05	**AW+**
PW03-2B	PW03-2B	1.1-3.7		13-Sep-05	0.429	<0.06	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.251	<0.05	<1.2	0.393	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.297	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		23-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	0.81	<0.5	<0.05	<0.5	AW-
PW03-2B	PW03-2B	1.1-3.7		14-Nov-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.117	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		04-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		22-Aug-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7		10-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7	L1285748-2	3-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7	L1448683-4	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7	L1743508-7	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-2B	PW03-2B	1.1-3.7	L1908948-4	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		22-Apr-04	0.187	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.143	<0.05	**101.**	<0.05	0.098	<0.4	**AW+**
PW03-3	PW03-3	1.2-4.1		14-Oct-04	0.185	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.069	<0.05	**30.4**	<0.05	0.103	<0.6	**AW+**
PW03-3	PW03-3	1.2-4.1		15-Apr-05	0.156	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.116	<0.05	**42.9**	0.084	<0.05	<0.5	**AW+**
PW03-3	PW03-3	1.2-4.1		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	0.068	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		23-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.659	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		23-Aug-06	0.136	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.083	<0.05	**22.4**	0.059	<0.05	<0.4	**AW+**
PW03-3	PW03-3	1.2-4.1		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.39	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		14-Nov-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.078	<0.05	<0.05	<0.05	AW-
PW03-3	Dup 4	1.2-4.1		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.099	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<2.	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.24	0.062	<0.05	0.055	AW-
PW03-3	PW03-3	1.2-4.1		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.06	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.124	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1		22-Aug-11	0.114	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.104	<0.05	**25.3**	<0.05	<0.05	<0.2	**AW+**
PW03-3	PW03-3	1.2-4.1		10-May-12	<0.05	<0.05	<0.05	<0.05	<0.02	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1	L1448682-1	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1	L1743508-3	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1	L1907768-2	31-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-3	PW03-3	1.2-4.1	L2086841-3	30-Apr-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		22-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.078	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		14-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	DUP5	1.8-4.0		14-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		15-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.114	<0.05	<0.05	<0.05	AW-
PW03-4	Dup 103	1.8-4.0		15-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.099	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	DUP2	1.8-4.0		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		23-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	DUP4	1.8-4.0		23-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4X	1.8-4.0		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		06-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		27-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4X	1.8-4.0		27-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval	ALS Laboratory Report #	Sample Date	Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
PW03-4	PW03-4	1.8-4.0		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0		13-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	DUP-7	1.8-4.0		13-Sep-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0	L1448682-2	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0	L1743508-9	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-4	PW03-4	1.8-4.0	L1908948-5	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		22-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.226	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		14-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		15-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.182	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.06	AW-
PW03-5	DUP4	7.6-8.5		13-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.193	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.132	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		23-Aug-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		06-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		03-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	1.25	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		27-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
PW03-5	DUP-16	7.6-8.5		15-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.063	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.085	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		22-Aug-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5		10-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L1286283-1	4-Apr-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L1448683-5	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L1608317-1	6-May-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L1743508-4	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	DUP-3	7.6-8.5	L1743508-8	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L1908948-6	3-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-5	PW03-5	7.6-8.5	L2086841-4	30-Apr-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
PW03-5	DUP-11	7.6-8.5	L2086841-6	30-Apr-18	<0.01	<0.02	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				30-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
PW03-6	PW03-6	1.1-3.0		22-Apr-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.171	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		14-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.693	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		15-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		21-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		13-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		01-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		22-Apr-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		14-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0		19-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0	L1448682-3	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0	L1743508-5	9-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
PW03-6	PW03-6	1.1-3.0	L1907768-1	31-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		12-Jul-05	<0.15	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.884	<0.05	<0.05	<0.06	AW-
U8	U8	3.22-6.22		14-Sep-05	<0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		23-Mar-06	0.329	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.347	<0.05	3.05	0.134	<0.05	<0.05	AW-
U8	U8	3.22-6.22		23-Aug-06	0.375	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.165	<0.05	<2.	0.078	<0.05	<0.08	AW-
U8	U8	3.22-6.22		13-Apr-07	0.209	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.205	<0.05	<2.	<0.05	<0.05	<0.2	AW-
U8	U8	3.22-6.22		06-Sep-07	<0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		02-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		04-Sep-08	0.086	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.086	<0.05	<0.6	<0.05	<0.05	<0.15	AW-
U8	U8	3.22-6.22		22-Apr-09	0.106	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.108	<0.05	<5.	<0.05	<0.05	<0.1	AW-
U8	U8	3.22-6.22		31-Aug-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.053	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		02-Feb-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.267	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		21-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		14-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.111	<0.05	<0.13	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		05-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22		01-Sep-11	<0.07	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.254	<0.05	<0.5	0.325	<0.05	<0.2	AW-
U8	U8	3.22-6.22		09-May-12	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1265496-2	05-Feb-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1282462-1	25-Mar-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.064	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1405124-6	18-Dec-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1448682-4	29-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1747964-1	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1873026-4	21-Dec-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L1911852-1	11-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
U8	U8	3.22-6.22	L2086841-1	30-Apr-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
U9	U9	3.3-6.3		12-Jul-05	<0.55	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.414	<0.05	3.68	0.46	<0.05	<0.2	AW-
U9	U9	3.3-6.3		14-Sep-05	<0.6	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.126	<0.05	<0.9	0.235	<0.05	<0.1	AW-
U9	U9	3.3-6.3		23-Mar-06	0.812	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.689	<0.05	**10.9**	0.569	<0.05	<0.4	**AW+**
U9	U9	3.3-6.3		23-Aug-06	0.87	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.261	<0.05	<2.	0.183	<0.05	<0.3	AW-
U9	U9	3.3-6.3		13-Apr-07	1.03	<0.07	0.092	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.23	<0.05	9.95	0.794	<0.05	<0.5	AW-
U9	U9	3.3-6.3		06-Sep-07	<0.6	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.4	<0.05	<0.05	<0.2	AW-
U9	U9	3.3-6.3		02-Apr-08	<2.	<0.2	<0.09	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.33	<0.05	7.21	0.757	<0.05	<0.4	AW-
U9	U9	3.3-6.3		04-Sep-08	0.632	0.098	0.059	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.379	<0.05	<0.6	0.171	<0.05	<0.25	AW-
U9	U9	3.3-6.3		22-Apr-09	0.889	<0.1	<0.1	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.1	<0.05	<10.	0.645	<0.05	<0.5	AW-
U9	U9	3.3-6.3		31-Aug-09	0.59	<0.05	0.066	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.222	<0.05	4.02	0.157	<0.05	<0.25	AW-
U9	U9	3.3-6.3		2-Feb-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.176	<0.05	2.05	0.054	<0.05	<0.2	AW-
U9	U9	3.3-6.3		21-Apr-10	1.	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.7	<0.05	6.22	1.1	<0.05	<0.75	AW-
U9	U9	3.3-6.3		14-Sep-10	<0.7	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.912	<0.05	<3.2	0.296	<0.05	<0.26	AW-
U9	U9	3.3-6.3		31-Mar-11	0.432	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.871	<0.05	2.	0.761	<0.05	<0.05	AW-
U9	U9	3.3-6.3		01-Sep-11	0.584	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.85	<0.05	3.56	0.411	<0.05	<0.2	AW-
U9	U9	3.3-6.3		09-May-12	0.131	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.152	<0.05	2.66	<0.06	<0.05	<0.08	AW-
U9	U9	3.3-6.3		05-Feb-13	0.328	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.445	<0.05	3.99	0.225	<0.05	<0.2	AW-
U9	U9	3.3-6.3	L1282462-2	25-Mar-13	<0.2	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.132	<0.05	1.23	<0.05	<0.05	<0.1	AW-
U9	U9	3.3-6.3	L1405682-9	19-Dec-13	0.704	<0.05	<0.1	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.07	<0.05	**52.7**	1.05	<0.05	<0.6	**AW+**
U9	U9	3.3-6.3	L1448682-5	29-Apr-14	0.068	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.062	<0.05	0.933	<0.05	<0.05	<0.07	AW-
U9	U9	3.3-6.3	L1747964-2	22-Mar-16	0.083	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.078	<0.05	0.611	<0.05	<0.05	<0.3	AW-
U9	U9	3.3-6.3	L1873026-5	21-Dec-16	0.296	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.389	<0.05	1.16	0.163	<0.05	<0.2	AW-
U9	U9	3.3-6.3	L1911852-2	11-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.08	AW-
U9	U9	3.3-6.3	L2086841-2	30-Apr-18	<0.01	<0.07	<0.02	<0.01	<0.006	<0.015	<0.01	<0.03	<0.005	<0.01	0.011	<0.01	<0.05	<0.02	0.036	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		07-May-04	<0.2	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		14-Oct-04	0.096	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		21-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	A2-MW02-02	1.2-4.3		20-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		28-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		29-Aug-06	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.101	<0.05	<0.2	<0.05	<0.05	<0.1	AW-
MW02-02	MW02-02	1.2-4.3		17-Apr-07	0.054	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		05-Sep-07	0.213	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.111	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		08-Apr-08	0.072	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		09-Sep-08	0.439	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.331	<0.05	<0.4	<0.08	<0.05	0.199	AW-
MW02-02	MW02-02	1.2-4.3		30-Apr-09	0.344	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.267	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
MW02-02	MW02-02	1.2-4.3		08-Sep-09	0.397	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.359	<0.05	<0.35	0.06	<0.05	<0.3	AW-
MW02-02	MW02-02	1.2-4.3		12-May-10	0.288	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.28	<0.05	<0.29	<0.05	<0.05	<0.2	AW-
MW02-02	MW02-02	1.2-4.3		13-Sep-10	0.348	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.328	<0.05	<0.25	0.057	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3		11-Apr-11	0.37	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.308	<0.05	0.332	0.054	<0.05	<0.3	AW-
MW02-02	MW02-02	1.2-4.3		01-Sep-11	0.125	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.144	<0.05	0.35	0.061	<0.05	<0.08	AW-
MW02-02	MW02-02	1.2-4.3		23-May-12	<0.07	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.072	<0.05	<0.09	<0.05	<0.05	<0.07	AW-
MW02-02	MW02-02	1.2-4.3		05-Feb-13	0.088	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.079	<0.05	<0.2	<0.05	<0.05	<0.09	AW-
MW02-02	MW02-02	1.2-4.3	L1283010-6	26-Mar-13	<0.08	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.1	<0.05	<0.05	<0.08	AW-
MW02-02	MW02-02	1.2-4.3	L1405682-10	19-Dec-13	<0.1	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.1	AW-
MW02-02	MW02-02	1.2-4.3	L1449879-8	1-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.066	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3	L1610017-4	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval	ALS Laboratory Report #	Sample Date	Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
MW02-02	MW02-02	1.2-4.3	L1751053-1	31-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-02	MW02-02	1.2-4.3	L1909647-1	5-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6		29-Apr-04	<0.06	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6		13-Oct-04	0.398	<0.2	0.098	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.67	<0.05	<0.3	<0.05	<0.05	<0.15	AW-
MW02-03	MW02-03	1.5-4.6		21-Apr-05	0.347	0.136	0.086	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.576	<0.05	0.211	<0.05	<0.05	<0.15	AW-
MW02-03	A2-MW02-03	1.5-4.6		20-Sep-05	0.391	<0.3	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.654	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6		28-Mar-06	0.34	<0.05	0.149	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.636	<0.05	<0.2	<0.05	<0.05	<0.2	AW-
MW02-03	MW02-03	1.5-4.6		29-Aug-06	0.512	<0.5	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.716	<0.05	<0.5	<0.05	<0.05	<0.3	AW-
MW02-03	MW02-03	1.5-4.6		17-Apr-07	0.438	<0.5	<0.2	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.657	<0.05	<0.4	<0.05	<0.05	<0.08	AW-
MW02-03	MW02-03	1.5-4.6		05-Sep-07	0.409	<0.4	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.685	<0.05	<0.2	<0.07	0.054	<0.3	AW-
MW02-03	MW02-03	1.5-4.6		08-Apr-08	0.302	<0.3	<0.2	<0.05	<0.02	<0.1	<0.05	<0.05	<0.05	<0.05	0.421	<0.05	<0.4	<0.05	0.051	<0.06	AW-
MW02-03	MW02-03	1.5-4.6		08-Sep-08	0.426	0.391	<0.2	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.624	<0.05	<0.15	<0.25	0.055	0.196	AW-
MW02-03	MW02-03	1.5-4.6		30-Apr-09	0.445	<0.5	<0.5	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.535	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
MW02-03	MW02-03	1.5-4.6		08-Sep-09	0.463	<0.05	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.606	<0.05	<0.35	<0.05	0.05	<0.45	AW-
MW02-03	MW02-03	1.5-4.6		12-May-10	0.441	<0.31	<0.15	<0.05	<0.03	<0.1	<0.05	<0.05	<0.05	<0.05	0.518	<0.05	<0.28	<0.05	<0.05	<0.18	AW-
MW02-03	MW02-03	1.5-4.6		13-Sep-10	0.448	<0.05	<0.17	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.597	<0.05	<0.24	<0.05	<0.05	<0.2	AW-
MW02-03	MW02-03	1.5-4.6		07-Apr-11	0.457	<0.05	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.569	<0.05	<0.3	<0.05	<0.05	<0.2	AW-
MW02-03	MW02-03	1.5-4.6		01-Sep-11	0.13	<0.5	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.22	<0.05	<0.3	<0.07	0.064	<0.07	AW-
MW02-03	MW02-03	1.5-4.6		23-May-12	<0.05	<0.05	<0.09	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.067	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6		05-Feb-13	<0.05	<0.05	0.08	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.09	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6	L1283010-7	26-Mar-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.052	<0.05	<0.09	<0.05	<0.05	<0.09	AW-
MW02-03	MW02-03	1.5-4.6	L1345378-11	8-Aug-13	<0.05	<0.2	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6	L1405681-1	19-Dec-13	<0.05	<0.09	0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.07	AW-
MW02-03	MW02-03	1.5-4.6	L1449879-9	1-May-14	<0.05	<0.05	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.069	<0.05	<0.2	<0.05	<0.05	<0.1	AW-
MW02-03	MW02-03	1.5-4.6	L1498928-2	7-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6	L1610017-5	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.09	AW-
MW02-03	MW02-03	1.5-4.6	L1751053-2	31-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6	L1909647-2	5-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-03	MW02-03	1.5-4.6	L2085716-2	26-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		29-Apr-04	<0.4	<0.2	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.391	<0.05	<0.4	<0.05	<0.05	<0.1	AW-
MW02-04	MW02-04	1.5-4.6		13-Oct-04	<0.08	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		21-Apr-05	<0.1	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.088	<0.05	<0.05	<0.05	AW-
MW02-04	A2-MW02-04	1.5-4.6		20-Sep-05	<0.1	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.081	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		28-Mar-06	<0.08	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.082	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		29-Aug-06	<0.1	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		17-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		05-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		08-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		08-Sep-08	<0.15	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.102	<0.05	<0.4	<0.06	<0.05	<0.07	AW-
MW02-04	MW02-04	1.5-4.6		30-Apr-09	<0.1	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.07	AW-
MW02-04	MW02-04	1.5-4.6		08-Sep-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		12-May-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		13-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		07-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6		04-Feb-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6	L1283010-8	26-Mar-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.112	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6	L1449879-1	1-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.08	AW-
MW02-04	MW02-04	1.5-4.6	L1498928-3	7-Aug-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.6	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6	L1751053-3	31-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW02-04	MW02-04	1.5-4.6	L1909647-3	5-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	AW-
MW02-04	MW02-04	1.5-4.6	L2082551-1	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		29-Apr-04	0.552	<0.3	<0.2	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.844	<0.05	<0.3	<0.7	<0.05	<0.2	AW-
MW03-02	MW03-02	3.7-7.6		13-Oct-04	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		12-Apr-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.15	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		14-Sep-05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.093	<0.06	AW-
MW03-02	MW03-02	3.7-7.6		23-Mar-06	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		29-Aug-06	<0.06	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		17-Apr-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		05-Sep-07	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		02-Apr-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		09-Sep-08	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.17	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		03-Feb-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.7	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6		05-Feb-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L1405682-11	19-Dec-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L1608929-5	7-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L1662936-3	25-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L1747969-8	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L1911588-1	10-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-02	MW03-02	3.7-7.6	L2085716-1	26-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW03-03	MW03-03	6.1-13.7		29-Apr-04	0.369	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.126	<0.05	4.09	0.104	<0.05	<0.1	AW-
MW03-03	MW03-03	6.1-13.7		12-Oct-04	0.197	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.057	<0.05	<0.6	0.053	<0.05	<0.05	AW-
MW03-03	MW03-03	6.1-13.7		21-Apr-05	0.58	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.424	<0.05	7.6	0.241	<0.05	0.331	AW-
MW03-03	A2-MW03-03	6.1-13.7		20-Sep-05	0.367	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	0.091	<0.05	<0.05	AW-
MW03-03	MW03-03	6.1-13.7		28-Mar-06	0.351	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.24	<0.05	2.96	0.054	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7		29-Aug-06	0.34	<0.2	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.133	<0.05	<1.	0.118	<0.05	<0.1	AW-
MW03-03	MW03-03	6.1-13.7		17-Apr-07	0.478	<0.07	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.305	<0.05	2.87	0.096	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7		05-Sep-07	0.381	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.152	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7		08-Apr-08	0.647	<0.06	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.484	<0.05	**12.**	0.314	<0.05	<0.2	**AW+**
MW03-03	MW03-03	6.1-13.7		08-Sep-08	0.274	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.143	<0.05	1.26	0.064	<0.05	<0.05	AW-
MW03-03	MW03-03	6.1-13.7		30-Apr-09	0.499	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.391	<0.05	5.26	0.156	<0.05	<0.05	AW-
MW03-03	MW03-03	6.1-13.7		09-Sep-09	0.295	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.172	<0.05	<0.95	0.069	<0.05	<0.25	AW-
MW03-03	MW03-03	6.1-13.7		12-May-10	0.672	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.554	<0.05	6.64	0.379	<0.05	<0.36	AW-
MW03-03	MW03-03	6.1-13.7		14-Sep-10	0.285	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.141	<0.05	<0.59	0.051	<0.05	<0.11	AW-
MW03-03	MW03-03	6.1-13.7		07-Apr-11	0.255	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.224	<0.05	1.77	0.104	<0.05	<0.15	AW-
MW03-03	MW03-03	6.1-13.7		17-Aug-11	0.606	<0.06	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.35	<0.05	1.62	0.326	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7	L1291408-1	18-Apr-13	0.216	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.132	<0.05	<0.4	0.125	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7	L1451660-1	6-May-14	0.789	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.48	<0.05	**28.**	0.452	<0.05	<0.7	**AW+**
MW03-03	MW03-03	6.1-13.7	L1501939-1	13-Aug-14	0.47	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.298	<0.05	<0.5	0.504	<0.05	<0.2	AW-
MW03-03	MW03-03	6.1-13.7	L1751053-4	31-Mar-16	0.398	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.304	<0.05	<0.8	0.356	<0.05	<2.	AW-
MW03-03	MW03-03	6.1-13.7	L1909647-4	5-Apr-17	0.938	<0.05	0.058	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.705	<0.05	**18.9**	0.689	<0.05	<0.3	**AW+**
MW03-03	MW03-03	6.1-13.7	L2082551-2	19-Apr-18	0.54	<0.08	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.524	<0.05	<0.8	0.591	<0.05	<2.	AW-
A2MW09-05I	A2MW09-05I	9.18-10.68		22-Dec-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.552	<0.05	<0.05	<0.05	AW-
A2MW09-05I	MW09-05I	9.18-10.68		21-Apr-10	0.093	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.068	<0.05	1.14	0.083	<0.05	<0.08	AW-
A2MW09-05I	MW09-05I	9.18-10.68		14-Sep-10	<0.08	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.78	<0.05	<0.05	<0.05	AW-
A2MW09-05I	A2MW09-5I	9.18-10.68		31-Mar-11	0.199	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.226	<0.05	3.21	0.215	<0.05	<0.05	AW-
A2MW09-05I	MW09-05I	9.18-10.68		01-Sep-11	0.072	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.4	<0.05	<0.05	<0.07	AW-
A2MW09-05I	MW09-5I	9.18-10.68		09-May-12	<0.5	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.598	<0.05	**30.5**	0.502	<0.05	<0.3	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68		13-Aug-12	0.165	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.234	<0.05	7.5	0.157	<0.05	<0.2	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1265496-1	05-Feb-13	<0.4	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.437	<0.05	5.57	0.32	<0.05	<0.2	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1282461-1	25-Mar-13	<0.5	<0.1	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.525	<0.05	4.43	0.33	<0.05	<0.4	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1382363-1	23-Oct-13	0.179	0.063	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.24	<0.05	7.54	0.125	<0.05	<0.2	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1405682-3	19-Dec-13	0.343	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.523	<0.05	**18.5**	0.366	<0.05	<0.3	**AW+**
A2MW09-05I	MW09-05I	9.18-10.68	L1449337-1	30-Apr-14	0.43	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.5	<0.05	5.62	0.462	<0.05	<0.05	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1501099-1	12-Aug-14	0.534	<0.05	<0.08	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.797	<0.05	**20.8**	1.13	0.074	<0.4	**AW+**
A2MW09-05I	A2MW09-05I	9.18-10.68	L1608929-1	7-May-15	0.478	<0.05	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.764	<0.05	5.61	0.702	<0.05	<2.	AW-
A2MW09-05I	A2MW09-05I	9.18-10.68	L1662936-1	25-Aug-15	0.477	<0.2	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.745	<0.05	**14.3**	0.811	<0.05	<2.	**AW+**
A2MW09-05I	A2MW09-05I	9.18-10.68	L1747969-4	22-Mar-16	0.425	<0.05	<0.06	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.523	<0.05	<1.	0.285	<0.05	<0.3	AW-
A2MW09-05I	A2MW09-05I	9.18-10.68	L1819742-1	25-Aug-16	0.418	<0.1	<0.07	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.738	<0.05	**24.4**	0.697	<0.05	<3.	**AW+**
A2MW09-05I	A2MW09-05I	9.18-10.68	L1873026-1	21-Dec-16	0.683	<0.05	<0.07	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.914	<0.05	<2.	0.473	<0.05	<0.7	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1912573-4	12-Apr-17	0.388	<0.05	<0.06	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.53	<0.05	<2.	0.15	<0.05	<2.	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L1987046-1	06-Sep-17	0.414	<0.05	<0.08	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.681	<0.05	<6.	0.537	<0.05	<2.	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L2085717-1	26-Apr-18	0.454	<0.2	<0.08	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.69	<0.05	<2.	<0.06	0.058	<2.	AW-
A2MW09-05I	MW09-05I	9.18-10.68	L2103253-1	30-May-18	0.288	<0.01	<0.05	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.428	<0.01	<0.8	<0.02	0.016	<0.6	AW-
A2MW09-05I	DUP-14	9.18-10.68	L2103253-2	30-May-18	0.314	0.081	0.04	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.482	<0.01	<0.9	<0.02	0.018	<0.6	AW-
QA/QC RPD				30-May-18	8.6%	---	---	---	---	---	---	---	---	---	11.9%	---	---	---	---	---	
A2MW09-05I	A2 MW09-05I	9.18-10.68	L2151626-1	22-Aug-18	0.426	<0.2	<0.08	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	0.681	<0.01	<2.	0.096	0.03	<1.	AW-

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

Well ID	Sample ID	Screened Interval	ALS Laboratory Report #	Sample Date	Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
A2MW09-06I	A2MW09-06I	9.33-10.83		22-Dec-09	0.097	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.114	<0.05	1.22	<0.06	<0.05	<0.2	AW-
A2MW09-06I	MW09-06I	9.33-10.83		21-Apr-10	0.171	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.139	<0.05	1.81	0.133	<0.05	<0.1	AW-
A2MW09-06I	MW09-06I	9.33-10.83		14-Sep-10	0.116	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.055	<0.05	<0.24	<0.05	0.059	<0.12	AW-
A2MW09-06I	A2MW09-06I	9.33-10.83		06-Apr-11	0.355	<0.09	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.545	<0.05	**11.9**	0.505	<0.05	<0.3	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		01-Sep-11	0.178	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.163	<0.05	**17.8**	<0.05	<0.05	<0.2	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		09-May-12	<0.7	<0.09	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.845	<0.05	**41.9**	0.79	0.071	<0.5	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83		13-Aug-12	0.102	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.141	<0.05	5.76	0.141	<0.05	<0.2	AW-
A2MW09-06I	MW09-06I	9.33-10.83		05-Feb-13	0.548	<0.09	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.81	<0.05	**33.**	0.879	<0.05	<0.3	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83	L1282461-2	25-Mar-13	<0.7	<0.1	<0.1	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.893	<0.05	**46.2**	0.908	<0.05	<1.	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83	L1350563-2	20-Aug-13	<0.1	<0.1	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.133	<0.05	0.545	0.154	<0.05	<0.2	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1405682-7	19-Dec-13	0.365	<0.05	<0.1	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.595	<0.05	**14.6**	0.597	0.063	<0.1	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83	L1449337-3	30-Apr-14	0.668	<0.05	<0.1	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.07	<0.05	**33.3**	1.16	0.054	<0.06	**AW+**
A2MW09-06I	MW09-06I	9.33-10.83	L1501099-2	12-Aug-14	0.185	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.289	<0.05	6.43	0.367	<0.05	<0.05	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1608318-1	6-May-15	0.247	<0.01	<0.05	<0.01	<0.01	<0.02	<0.01	<0.02	<0.01	<0.02	0.435	<0.01	<2.	0.494	0.083	<0.8	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1662936-2	25-Aug-15	0.122	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.171	<0.05	<1.	0.106	0.071	<2.	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1747969-5	22-Mar-16	0.407	<0.05	<0.07	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.653	<0.05	4.45	0.608	<0.05	<2.	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1819742-2	25-Aug-16	<0.05	<0.2	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.087	<0.05	<0.2	0.198	0.092	<0.4	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1912573-5	12-Apr-17	0.5	<0.05	<0.07	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.877	<0.05	<5.	0.68	0.056	<2.	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L1987046-2	6-Sep-17	0.114	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.208	<0.05	<0.4	<0.05	0.058	<0.6	AW-
A2MW09-06I	MW09-06I	9.33-10.83	L2085717-2	26-Apr-18	0.371	**<0.6**	<0.2	<0.05	<0.005	<0.1	<0.05	<0.06	<0.005	0.097	0.72	<0.05	<2.	0.391	**0.644**	<2.	**AW+**
A2MW09-06I	A2 MW09-06I	9.33-10.83	L2151626-2	22-Aug-18	0.133	<0.01	<0.06	<0.01	<0.005	0.025	<0.01	<0.03	<0.005	0.015	0.218	0.011	<0.5	<0.02	0.084	<0.5	AW-
A2MW09-06S	A2MW09-06S	2.44-5.44		21-Dec-09	<0.1	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<2.	<0.05	<0.05	<0.1	AW-
A2MW09-06S	MW09-06S	2.44-5.44		21-Apr-10	0.086	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.164	<0.05	6.94	<0.05	<0.05	<0.06	AW-
A2MW09-06S	MW09-06S	2.44-5.44		14-Sep-10	<0.15	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.071	<0.05	<0.91	<0.05	0.099	<0.08	AW-
A2MW09-06S	A2MW09-06S	2.44-5.44		06-Apr-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-06S	MW09-06S	2.44-5.44		01-Sep-11	0.176	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.182	<0.05	**15.7**	0.089	0.083	<0.2	**AW+**
A2MW09-06S	MW09-06S	2.44-5.44	L1449337-2	30-Apr-14	0.241	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.472	<0.05	9.61	0.338	<0.05	<0.05	AW-
A2MW09-06S	MW09-06S	2.44-5.44	L1911856-1	11-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.05	AW-
A2MW09-10	A2MW09-10	2.22-5.22		22-Dec-09	0.499	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.545	<0.05	**19.3**	<0.06	<0.05	<0.5	**AW+**
A2MW09-10	A2MW09-10	2.22-5.22		02-Feb-10	0.486	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.394	<0.05	**43.**	0.127	<0.05	<0.4	**AW+**
A2MW09-10	MW09-10	2.22-5.22		21-Apr-10	0.525	<0.08	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.658	<0.05	**29.6**	0.223	<0.05	<0.35	**AW+**
A2MW09-10	MW09-10	2.22-5.22		14-Sep-10	0.356	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.125	<0.05	**15.4**	0.311	<0.05	0.316	**AW+**
A2MW09-10	A2MW09-10	2.22-5.22		31-Mar-11	0.748	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.06	<0.05	**116.**	0.578	<0.05	<0.35	**AW+**
A2MW09-10	MW09-10	2.22-5.22		09-May-12	0.364	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.572	<0.05	**60.4**	0.32	<0.05	<0.4	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1265496-3	05-Feb-13	0.287	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.425	<0.05	**50.3**	<0.2	<0.05	<0.2	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1282463-1	25-Mar-13	0.365	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.423	<0.05	**73.3**	0.106	<0.05	<0.4	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1449336-1	30-Apr-14	0.507	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.779	<0.05	**100.**	0.332	<0.05	<0.2	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1747969-1	22-Mar-16	0.221	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.311	<0.05	**50.8**	0.134	<0.05	<0.9	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1873026-2	21-Dec-16	0.57	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.757	<0.05	**64.9**	0.174	<0.05	<0.09	**AW+**
A2MW09-10	MW09-10	2.22-5.22	L1914178-1	18-Apr-17	0.517	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.885	<0.05	**71.1**	0.213	<0.05	<2.	**AW+**
A2MW09-11	A2MW09-11	2.05-5.05		22-Dec-09	0.544	<0.1	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.393	<0.05	**39.8**	<0.05	0.087	<0.9	**AW+**
A2MW09-11	A2MW09-11	2.05-5.05		03-Feb-10	0.437	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.39	<0.05	**45.**	0.098	<0.05	0.508	**AW+**
A2MW09-11	MW09-11	2.05-5.05		22-Apr-10	0.594	<0.07	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.653	<0.05	**94.4**	0.317	<0.05	<0.8	**AW+**
A2MW09-11	MW09-11	2.05-5.05		09-May-12	0.622	<0.2	0.059	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.951	<0.05	**115.**	0.723	0.155	<0.8	**AW+**
A2MW09-11	MW09-11	2.05-5.05		04-Feb-13	<0.7	<0.2	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.943	<0.05	**84.6**	0.85	0.243	<0.9	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1283007-1	26-Mar-13	0.474	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.56	<0.05	**118.**	0.363	0.064	<0.6	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1405682-5	19-Dec-13	0.412	<0.2	<0.1	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.752	<0.05	**108.**	0.553	0.124	<0.7	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1449336-2	30-Apr-14	0.519	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.762	<0.05	**145.**	0.467	0.119	<0.05	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1608929-3	7-May-15	0.495	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.637	<0.05	**91.6**	0.445	0.117	<3.	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1747969-6	22-Mar-16	0.517	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.625	<0.05	**98.6**	0.414	0.178	<4.	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1873026-3	21-Dec-16	0.719	<0.05	0.061	<0.05	0.0088	<0.1	<0.05	<0.05	<0.005	<0.05	0.758	<0.05	**130.**	0.498	0.209	<0.2	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L1914178-2	18-Apr-17	0.628	<0.05	<0.08	<0.05	0.0083	<0.1	<0.05	<0.05	<0.005	<0.05	0.801	<0.05	**83.6**	0.573	**0.203**	<4.	**AW+**
A2MW09-11	MW09-11	2.05-5.05	L2085717-7	26-Apr-18	0.413	<0.3	<0.05	<0.05	<0.02	<0.1	<0.05	<0.05	<0.005	<0.05	0.666	<0.05	**99.4**	0.451	0.196	<4.	**AW+**
A2MW09-12	A2MW09-12	2.14-5.14		22-Dec-09	0.649	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.615	<0.05	**113.**	0.395	<0.05	<2.	**AW+**
A2MW09-12	A2MW09-12	2.14-5.14		03-Feb-10	0.414	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.363	<0.05	**66.5**	0.179	<0.05	0.643	**AW+**
A2MW09-12	MW09-12	2.14-5.14		22-Apr-10	0.405	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.308	<0.05	**74.1**	0.142	<0.05	<0.7	**AW+**
A2MW09-12	MW09-12	2.14-5.14		14-Sep-10	0.321	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**16.8**	<0.05	0.051	0.503	**AW+**
A2MW09-12	A2MW09-12	2.14-5.14		31-Mar-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.107	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14		05-Feb-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1282461-3	25-Mar-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1405682-6	19-Dec-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.283	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1449337-4	30-Apr-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.098	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1608929-4	7-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1747969-7	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L1914178-3	18-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-12	MW09-12	2.14-5.14	L2085717-3	26-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	A2MW09-13	2.02-5.02		22-Dec-09	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.48	<0.05	<0.05	<0.05	AW-
A2MW09-13	A2MW09-13	2.02-5.02		03-Feb-10	0.39	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.34	<0.05	**58.**	0.088	<0.05	<0.7	**AW+**
A2MW09-13	MW09-13	2.02-5.02		22-Apr-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.6	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02		14-Sep-10	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02		04-Feb-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.062	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1283010-1	26-Mar-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1405681-3	19-Dec-13	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1449879-5	1-May-14	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1610017-1	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1747969-2	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L1911588-2	10-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-13	MW09-13	2.02-5.02	L2085717-4	26-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
A2MW09-14	A2MW09-14	2.03-5.03		23-Dec-09	1.09	<0.05	<0.2	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.	<0.05	<0.6	<0.05	<0.05	<0.4	AW-
A2MW09-14	A2MW09-14	2.03-5.03		03-Feb-10	1.18	<0.05	0.105	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.17	<0.05	<0.9	0.075	<0.05	<0.4	AW-
A2MW09-14	MW09-14	2.03-5.03		22-Apr-10	1.34	<0.08	<0.2	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	1.33	<0.05	<1.	0.155	<0.05	<0.4	AW-
A2MW09-14	MW09-14	2.03-5.03		14-Sep-10	1.17	<0.05	0.09	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.15	<0.05	<0.26	0.135	<0.05	<0.31	AW-
A2MW09-14	A2MW09-14	2.03-5.03		05-May-11	1.25	<0.05	0.092	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.33	<0.05	<1.5	0.234	<0.05	<0.4	AW-
A2MW09-14	MW09-14	2.03-5.03	L1283010-2	26-Mar-13	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.2	<0.05	<0.05	<0.07	AW-
A2MW09-14	MW09-14	2.03-5.03	L1405681-2	19-Dec-13	<0.4	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.123	<0.05	<0.2	<0.05	<0.05	<0.1	AW-
A2MW09-14	MW09-14	2.03-5.03	L1449879-6	1-May-14	0.359	<0.05	<0.09	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.311	<0.05	<0.6	<0.05	<0.05	<0.2	AW-
A2MW09-14	MW09-14	2.03-5.03	L1498925-1	7-Aug-14	0.203	<0.05	0.078	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	<0.6	0.201	<0.05	<0.05	AW-
A2MW09-14	MW09-14	2.03-5.03	L1610017-2	11-May-15	2.23	<0.05	<0.3	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	1.64	<0.05	<2.	0.53	<0.05	<4.	AW-
A2MW09-14	MW09-14	2.03-5.03	L1751053-5	31-Mar-16	0.117	<0.05	0.062	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.158	<0.05	<0.3	<0.05	<0.05	<0.2	AW-
A2MW09-14	MW09-14	2.03-5.03	L1911588-3	10-Apr-17	0.593	<0.05	<0.2	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.315	<0.05	<0.9	<0.05	<0.05	<0.8	AW-
A2MW09-14	MW09-14	2.03-5.03	L2085717-5	26-Apr-18	0.144	<0.08	0.096	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	0.291	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
A2MW09-15	A2MW09-15	1.35-4.35		23-Dec-09	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.05	<0.05	<0.07	AW-
A2MW09-15	A2MW09-15	1.35-4.35		03-Feb-10	<0.6	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.7	<0.05	<0.05	<0.05	AW-
A2MW09-15	MW09-15	1.35-4.35		22-Apr-10	<0.7	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	0.087	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35		14-Sep-10	<0.61	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.12	<0.05	<0.44	<0.05	<0.05	<0.09	AW-
A2MW09-15	A2MW09-15	1.35-4.35		11-Apr-11	<0.5	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.113	<0.05	0.927	<0.05	<0.05	<0.07	AW-
A2MW09-15	A2MW09-15	1.35-4.35		05-Feb-13	<0.5	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
A2MW09-15	MW09-15	1.35-4.35	L1283010-3	26-Mar-13	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.085	<0.05	<0.4	<0.05	<0.05	<0.06	AW-
A2MW09-15	MW09-15	1.35-4.35	L1345378-8	8-Aug-13	0.402	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	0.061	<0.05	<0.9	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35	L1449879-7	1-May-14	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.4	<0.05	<0.05	<0.1	AW-
A2MW09-15	MW09-15	1.35-4.35	L1498925-2	7-Aug-14	<0.3	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35	L1610017-3	11-May-15	<0.07	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.3	AW-
A2MW09-15	MW09-15	1.35-4.35	L1766653-1	10-May-16	0.053	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35	L1822946-1	01-Sep-16	0.093	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<1.	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35	L1911588-4	10-Apr-17	0.087	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	AW-
A2MW09-15	MW09-15	1.35-4.35	L2085717-6	26-Apr-18	<0.1	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.4	<0.05	<0.05	<0.4	AW-
WS2-D	WS2-D	4.6-7.6	L1584769-1	5-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	4.6-7.6	L1659479-5	18-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	4.6-7.6	L1742377-2	8-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	4.6-7.6	L1809959-3	08-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	4.6-7.6	L1898884-3	08-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	4.6-7.6	L1980058-1	23-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D	WS2-D	10.7-12.2	L2088139-1	02-May-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
WS2-D	WS2-D	10.7-12.2	L2153915-1	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-

TABLE B-3
AREA 2 CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					Acenaphthene	Acridine	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(ghi)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	Groundwater Classification
Generic Numerical Water Standards[2]																					
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)[1]	60	0.5	1	1	0.1	NS	NS	1	NS	2	120	NS	10	3	0.2	34	
	Site Specific Screening Levels				60	30	40	1	2.8	NS	NS	1	NS	40	120	NS	440	3	40	34	
Well ID	**Sample ID**	**Screened Interval**	**ALS Laboratory Report #**	**Sample Date**																	
WS2-D2	WS2-D2	10.7-12.2	L1584769-4	5-Mar-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L1658732-2	17-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L1743813-2	10-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L1809959-4	08-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L1898884-4	08-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L1980058-2	23-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
WS2-D2	WS2-D2	10.7-12.2	L2088139-2	02-May-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
WS2-D2	DUP-13	10.7-12.2	L2088139-4	02-May-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				02-May-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
WS2-D2	WS2-D2	10.7-12.2	L2153915-2	27-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1610017-7	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1663797-1	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1747945-1	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1817088-1	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3D	18.5-20	L1663797-3	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1908950-1	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L1975358-1	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L2082551-3	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3S	MW11-3S	5.00-8.00	L2150755-1	21-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-3S	DUP-1	5.00-8.00	L2150755-4	21-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
QA/QC RPD				21-Aug-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MW11-3I	MW11-3I	11-12.5		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1610017-8	11-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1663797-2	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1747945-2	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1817088-2	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1908950-2	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L1975358-2	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L2082551-4	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3I	MW11-3I	11-12.5	L2150755-2	21-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-3D	MW11-3D	18.5-20		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1610761-1	12-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1663797-3	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1747945-3	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1817088-3	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1908950-3	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L1975358-3	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L2082551-5	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-3D	MW11-3D	18.5-20	L2150755-3	21-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.08	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1610761-2	12-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1663797-4	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1747945-4	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1817088-4	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1908950-4	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L1975358-4	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L2082551-6	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4S	MW11-4S	5.00-8.00	L2149934-1	20-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-4I	MW11-4I	11-12.5		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1610761-3	12-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1663797-5	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1747945-5	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1817088-5	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1908950-5	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L1975358-5	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L2082551-7	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4I	MW11-4I	11-12.5	L2149934-2	20-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
MW11-4D	MW11-4D	18.5-20		21-Jul-11	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1610761-4	12-May-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1663797-6	26-Aug-15	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1747945-6	22-Mar-16	<0.05	<0.05	<0.05	<0.05	<0.01	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1817088-6	22-Aug-16	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1908950-6	4-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L1975358-6	15-Aug-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	MW11-4D	18.5-20	L2082551-8	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
MW11-4D	DUP-9	18.5-20	L2082551-9	19-Apr-18	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
QA/QC RPD				19-Apr-18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
MW11-4D	MW11-4D	18.5-20	L2149934-3	20-Aug-18	<0.01	<0.01	<0.01	<0.01	<0.005	<0.015	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.05	<0.02	<0.01	<0.05	AW-
EQUIPMENT B	EQUIPMENT BLANK-1		L1899447-4	09-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
EQUIPMENT B	EQUIP BLANK #1		L1904760-8	23-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
EQUIPMENT B	E-BLANK-1		L1907768-4	31-Mar-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
EQUIPMENT B	EQUIPMENT BLANK-2		L1909647-5	05-Apr-17	<0.05	<0.05	<0.05	<0.05	<0.005	<0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	AW-
Reported Detection Limit					0.05	0.05	0.05	0.05	0.005	0.1	0.05	0.05	0.005	0.05	0.05	0.05	0.05	0.05	0.05	0.05	

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 12 amendments, January 2019)
NS	No standard established for indicated parameter
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
mbgs	Metres below ground surface
µg/L	Micrograms per litre
ppb	Parts per billion
<	Sample concentration less than the reported detection limit indicated
---	Sample not analyzed for indicated parameter

Notes:

1 CSR AW standards apply to both freshwater and marine receiving environments
2 Criterion concentration reported in µg/L

BOLD	Sample concentration greater than CSR standard for aquatic life (AW)
BOLD RED HIGHLIGHTED	Exceeds Site Specific Screening Levels (SSSLs)

TABLE B-4
AREA 2 CONCENTRATIONS OF DISSOLVED METALS IN GROUNDWATER
SEMI-ANNUAL PERIMETER MONITORING PROGRAM
PARKLAND BURNABY REFINERY
µg/L (ppb)

					pH	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Hardness (mg/L CaCO3)	Aluminum	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium (+6)	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Sodium	Thallium	Titanium	Uranium	Vanadium	Zinc	Groundwater Classification
CSR	Schedule 3.2 - Marine Aquatic Life			(AW)	NS	NS	NS	NS	NS	NS	2500	125	5000	1000	12000	15	NS	560	40	20	NS	20	NS	NS	0.25	10000	83	20	15	NS	3	1000	85	NS	100	NS
	Site-Specific Screening Levels (SSSLs)				NS	NS	NS	NS	NS	NS	2500	125	5000	1000	12000	90	NS	500	1100	62	NS	1400	NS	NS	NS	10000	750	20	NS	NS	3	NS	1000	NS	900	NS
Well ID	**Sample ID**	**Screened Interval (mbgs)**	**ALS Laboratory Report #**	**Sample Date**																															
MW11-3S	MW11-3S	5.00-8.00	L1676220-3	21-Sep-15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<10.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	7.4	AW-
MW11-3S	MW11-3S	5.00-8.00	L1747945-1	22-Mar-16	5.66	11.79	308.	2.14	57.3	<10.	<0.5	<1.	45.	<5.	<100.	0.065	19000.	<0.5	<0.5	<1.	<30.	<1.	2380.	30.	<0.2	<1.	<5.	<1.	<0.05	66000.	<0.2	<50.	<0.2	<30.	7.4	AW-
MW11-3S	MW11-3S	5.00-8.00	L1817091-1	22-Aug-16	5.34	13.02	434.	0.92	38.6	15.	<0.5	<1.	47.	<5.	<100.	0.054	11800.	<0.5	<0.5	<1.	<30.	<1.	2230.	64.	<0.2	<1.	<5.	<1.	<0.05	95400.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3S	MW11-3S	5.00-8.00	L1908950-1	4-Apr-17	5.93	11.66	339.	8.23	64.1	<10.	<0.5	<1.	48.	<5.	<100.	0.052	21900.	<0.5	<0.5	2.7	<30.	<1.	2270.	36.	<0.2	<1.	<5.	<1.	<0.05	66000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3S	MW11-3S	5.00-8.00	L1975358-1	15-Aug-17	5.42	13.66	455.	1.76	47.6	17.	<0.5	<1.	55.	<5.	<100.	0.101	14600.	<0.5	<0.5	1.6	<30.	<1.	2680.	69.	---	<1.	<5.	<1.	<0.05	98500.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3S	MW11-3S	5.00-8.00	L2082551-3	19-Apr-18	5.25	10.65	257.	3.25	52.3	32.5	<0.1	0.22	41.1	<0.1	13.	0.023	18500.	<0.1	<0.1	0.23	65.	0.071	1470.	13.1	---	0.1	0.89	<0.05	0.016	40700.	<0.01	<1.5	0.04	<0.5	1.5	AW-
MW11-3S	MW11-3S	5.00-8.00	L2150755-1	21-Aug-18	5.13	12.45	429.	1.92	50.6	17.6	<0.1	0.25	58.4	<0.1	21.	0.099	15400.	0.1	0.16	0.4	<10.	<0.05	2960.	69.	<0.005	<0.05	1.35	<0.05	0.012	80800.	0.013	<0.3	<0.01	<0.5	2.1	AW-
MW11-3S	DUP-1	5.00-8.00	L2150755-4	21-Aug-18	5.13	12.45	429.	1.92	47.8	18.	<0.1	0.25	58.3	<0.1	19.	0.101	14200.	<0.1	0.16	0.41	<10.	<0.05	2970.	69.9	<0.005	<0.05	1.4	<0.05	0.011	81700.	0.011	<0.3	<0.01	<0.5	2.	AW-
QA/QC RPD				21-Aug-18	---	---	---	---	5.7%	---	---	---	---	---	---	---	---	8.1%	---	---	---	---	---	0.3%	1.3%	---	---	---	---	---	1.1%	---	---	---	---	---	
MW11-3I	MW11-3I	11-12.5	L1676220-4	21-Sep-15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<10.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9.7	AW-
MW11-3I	MW11-3I	11-12.5	L1747945-2	22-Mar-16	5.89	12.29	349.	1.9	64.4	<10.	<0.5	<1.	35.	<5.	<100.	0.082	18200.	<0.5	0.87	<1.	39.	<1.	4580.	220.	<0.2	<1.	<5.	<1.	<0.05	92200.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3I	MW11-3I	11-12.5	L1817091-2	22-Aug-16	5.78	13.1	482.	0.68	67.5	<10.	<0.5	<1.	39.	<5.	<100.	0.084	19000.	<0.5	0.92	<1.	<30.	<1.	4850.	235.	<0.2	<1.	<5.	<1.	<0.05	105000.	<0.2	<50.	<0.2	<30.	5.1	AW-
MW11-3I	MW11-3I	11-12.5	L1908950-2	4-Apr-17	5.85	12.54	458.	1.67	65.3	13.	<0.5	<1.	39.	<5.	<100.	0.109	18700.	<0.5	0.82	3.1	<30.	<1.	4550.	213.	<0.2	<1.	<5.	<1.	<0.05	97800.	<0.2	<50.	<0.2	<30.	7.5	AW-
MW11-3I	MW11-3I	11-12.5	L1975358-2	15-Aug-17	5.79	13.25	473.	0.33	74.6	<10.	<0.5	<1.	42.	<5.	<100.	0.081	21100.	<0.5	0.86	<1.	<30.	<1.	5330.	254.	---	<1.	<5.	<1.	<0.05	104000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3I	MW11-3I	11-12.5	L2082551-4	19-Apr-18	5.6	12.03	536.	0.82	73.1	2.4	<0.1	0.27	45.2	<0.1	30.	0.095	20500.	<0.1	0.84	0.34	<10.	<0.05	5340.	219.	---	0.108	3.05	<0.05	<0.01	107000.	<0.01	<0.3	0.011	<0.5	2.9	AW-
MW11-3I	MW11-3I	11-12.5	L2150755-2	21-Aug-18	5.41	12.89	506.	0.73	84.9	2.1	<0.1	0.28	46.8	<0.1	27.	0.095	23200.	<0.1	0.83	0.47	<10.	<0.05	6520.	219.	<0.005	0.124	3.2	0.052	<0.01	93300.	<0.01	<0.3	0.012	<0.5	2.9	AW-
MW11-3D	MW11-3D	18.5-20	L1676220-5	21-Sep-15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<10.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9.7	AW-
MW11-3D	MW11-3D	18.5-20	L1747945-3	22-Mar-16	6.65	12.	784.	0.3	374.	<10.	<0.5	4.2	164.	<5.	<100.	<0.05	103000.	<0.5	0.93	<1.	4320.	<1.	28200.	1300.	<0.2	<1.	<5.	<1.	<0.05	57700.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3D	MW11-3D	18.5-20	L1817091-3	22-Aug-16	6.55	13.07	802.	0.13	379.	<10.	<0.5	4.6	166.	<5.	<100.	<0.05	105000.	<0.5	0.94	<1.	4100.	<1.	28700.	1310.	<0.2	<1.	<5.	<1.	<0.05	61600.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3D	MW11-3D	18.5-20	L1908950-3	4-Apr-17	6.47	12.52	794.	0.23	375.	<10.	<0.5	4.3	164.	<5.	<100.	<0.05	103000.	<0.5	0.92	2.1	4320.	<1.	28200.	1310.	<0.2	<1.	<5.	<1.	<0.05	61900.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3D	MW11-3D	18.5-20	L1975358-3	15-Aug-17	6.41	14.27	787.	1.09	374.	<10.	<0.5	4.3	162.	<5.	<100.	<0.05	103000.	<0.5	0.89	1.3	4170.	<1.	28500.	1310.	---	<1.	<5.	<1.	<0.05	63700.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-3D	MW11-3D	18.5-20	L2082551-5	19-Apr-18	6.36	12.41	846.	0.29	350.	28.5	<0.1	4.24	155.	<0.1	29.	<0.005	98000.	<0.1	0.91	<0.2	4090.	<0.05	25700.	1300.	---	0.142	1.7	<0.05	<0.01	63000.	<0.01	1.17	0.013	<0.5	1.6	AW-
MW11-3D	MW11-3D	18.5-20	L2150755-3	21-Aug-18	6.34	12.96	795.	2.71	340.	<1.	<0.1	4.07	143.	<0.1	30.	0.07	94600.	<0.1	0.85	<0.2	3680.	<0.05	25300.	1230.	<0.005	0.183	1.76	<0.05	<0.01	63500.	<0.01	<0.3	0.023	<0.5	6.3	AW-
MW11-4S	MW11-4S	5 - 8.0	L1452404-6	7-May-14	5.44	10.57	798.	1.68	58.8	27.	<0.5	<1.	41.	<5.	<100.	0.168	17600.	<0.5	14.	**29.9**	305.	<1.	3590.	1560.	<0.2	<1.	11.8	<1.	<0.05	196000.	<0.2	<50.	<0.2	<30.	25.9	**AW+**
MW11-4S	MW11-4S	5 - 8.0	L1663797-4	26-Aug-15	5.5	12.16	832.	1.76	41.8	19.	<0.5	<1.	36.	<5.	<100.	0.12	12000.	<0.5	11.4	16.6	95.	<1.	2880.	1190.	<0.2	<1.	10.8	<1.	<0.05	185000.	<0.2	<50.	<0.2	<30.	19.3	AW-
MW11-4S	MW11-4S	5 - 8.0	L1676220-1	21-Sep-15	---	---	---	---	---		---	---	---	---	---	---	---	---	---	**31.**	---	---	---	---	---	---	---	---	---	---	---	---	---	---	24.8	**AW+**
MW11-4S	MW11-4S	5 - 8.0	L1747945-4	22-Mar-16	6.69	10.84	729.	0.18	41.2	18.	<0.5	<1.	32.	<5.	<100.	0.122	12300.	<0.5	9.3	**28.3**	<30.	<1.	2560.	1090.	<0.2	<1.	8.7	<1.	<0.05	178000.	<0.2	<50.	<0.2	<30.	13.2	**AW+**
MW11-4S	MW11-4S	5 - 8.0	L1817091-4	22-Aug-16	5.67	11.69	821.	1.95	46.4	19.	<0.5	<1.	35.	<5.	<100.	0.104	13700.	<0.5	10.3	**32.7**	<30.	<1.	2940.	1280.	<0.2	<1.	9.	<1.	<0.05	205000.	<0.2	<50.	<0.2	<30.	15.7	**AW+**
MW11-4S	MW11-4S	5 - 8.0	L1908950-4	4-Apr-17	5.75	10.59	695.	0.42	36.	14.	<0.5	<1.	32.	<5.	<100.	0.086	10600.	<0.5	7.24	**29.9**	<30.	<1.	2300.	1000.	<0.2	<1.	7.1	<1.	<0.05	179000.	<0.2	<50.	<0.2	<30.	12.2	**AW+**
MW11-4S	MW11-4S	5 - 8.0	L1975358-4	15-Aug-17	5.62	12.46	864.	0.77	58.2	<10.	<0.5	<1.	55.	<5.	<100.	0.071	17300.	<0.5	9.15	6.6	4640.	<1.	3620.	1300.	---	<1.	5.9	<1.	<0.05	212000.	<0.2	<50.	<0.2	<30.	9.6	AW-
MW11-4S	MW11-4S	5 - 8.0	L2082551-6	19-Apr-18	5.52	11.05	966.	0.25	67.	13.8	<0.1	0.67	58.1	<0.1	29.	0.079	20000.	0.1	9.15	4.79	3150.	<0.05	4170.	1470.	---	0.081	6.29	0.066	<0.01	209000.	0.024	<0.3	0.017	<0.5	6.3	AW-
MW11-4S	MW11-4S	5 - 8.0	L2149934-1	20-Aug-18	5.46	12.18	1035.	2.3	62.9	20.	<0.1	0.54	52.6	<0.1	30.	0.174	17800.	<0.1	14.5	12.	884.	<0.05	4470.	1730.	<0.005	0.072	12.3	0.078	<0.01	238000.	0.026	<0.3	0.016	<0.5	11.3	AW-
MW11-4I	MW11-4I	11.0-12.5	L1452404-7	7-May-14	5.49	11.19	948.	1.2	152.	<10.	<0.5	<1.	67.	<5.	<100.	0.112	41900.	<0.5	3.95	1.3	2260.	<1.	11600.	907.	<0.2	<1.	<5.	<1.	<0.05	194000.	<0.2	<50.	<0.2	<30.	6.1	AW-
MW11-4I	MW11-4I	11.0-12.5	L1501930-5	13-Aug-14	5.39	12.3	948.	2.93	153.	<10.	<0.5	<1.	66.	<5.	<100.	0.197	42100.	<0.5	4.3	1.3	2010.	<1.	11600.	936.	<0.2	<1.	<5.	<1.	<0.05	201000.	<0.2	<50.	<0.2	<30.	6.2	AW-
MW11-4I	MW11-4I	11.0-12.5	L1676220-2	21-Sep-15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	<10.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	24.6	AW-
MW11-4I	MW11-4I	11.0-12.5	L1747945-5	22-Mar-16	6.69	11.08	793.	0.52	105.	<10.	<0.5	<1.	52.	<5.	<100.	0.122	29500.	<0.5	4.78	<1.	1040.	<1.	7620.	777.	<0.2	<1.	<5.	<1.	<0.05	169000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-4I	MW11-4I	11.0-12.5	L1817091-5	22-Aug-16	5.65	11.63	837.	0.25	104.	<10.	<0.5	<1.	55.	<5.	<100.	0.093	29700.	<0.5	6.37	1.1	1020.	<1.	7220.	851.	<0.2	<1.	<5.	<1.	<0.05	185000.	<0.2	<50.	<0.2	<30.	9.	AW-
MW11-4I	MW11-4I	11.0-12.5	L1908950-5	4-Apr-17	5.66	11.3	767.	0.51	92.5	<10.	<0.5	<1.	52.	<5.	<100.	0.146	26000.	<0.5	5.12	3.8	563.	<1.	6690.	776.	<0.2	<1.	<5.	<1.	<0.05	173000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-4I	MW11-4I	11.0-12.5	L1975358-5	15-Aug-17	5.55	12.54	809.	0.45	91.	<10.	<0.5	<1.	53.	<5.	<100.	0.082	26000.	<0.5	6.29	3.7	557.	<1.	6320.	882.	---	<1.	<5.	<1.	<0.05	185000.	<0.2	<50.	<0.2	<30.	6.4	AW-
MW11-4I	MW11-4I	11.0-12.5	L2082551-7	19-Apr-18	5.09	11.13	964.	1.38	118.	6.7	<0.1	0.5	66.7	<0.1	26.	0.133	32500.	<0.1	6.93	1.41	1170.	<0.05	9060.	982.	---	0.212	4.31	<0.05	<0.01	211000.	0.012	<0.3	0.026	<0.5	6.3	AW-
MW11-4I	MW11-4I	11.0-12.5	L2149934-2	20-Aug-18	5.63	12.6	976.	3.43	113.	9.1	<0.1	0.47	66.3	<0.1	27.	0.143	32100.	<0.1	8.63	1.87	616.	<0.05	8040.	1090.	<0.005	0.241	4.72	<0.05	<0.01	211000.	0.012	<0.3	0.02	<0.5	7.8	AW-
MW11-4D	MW11-4D	18.5-20	L1747945-6	22-Mar-16	6.64	11.13	791.	0.24	113.	<10.	<0.5	<1.	50.	<5.	<100.	0.081	31000.	<0.5	4.55	<1.	543.	<1.	8700.	635.	<0.2	<1.	<5.	<1.	<0.05	164000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-4D	MW11-4D	18.5-20	L1817091-6	22-Aug-16	5.37	12.15	882.	0.32	163.	<10.	<0.5	<1.	60.	<5.	<100.	0.072	44200.	<0.5	5.05	<1.	3800.	<1.	12800.	859.	<0.2	<1.	<5.	<1.	<0.05	156000.	<0.2	<50.	<0.2	<30.	13.2	AW-
MW11-4D	MW11-4D	18.5-20	L1908950-6	4-Apr-17	5.8	11.63	780.	0.35	145.	<10.	<0.5	<1.	58.	<5.	<100.	0.084	38800.	<0.5	3.63	2.6	3410.	<1.	11700.	734.	<0.2	<1.	<5.	<1.	<0.05	150000.	<0.2	<50.	<0.2	<30.	<5.	AW-
MW11-4D	MW11-4D	18.5-20	L1975358-6	15-Aug-17	5.8	13.26	897.	1.96	197.	<10.	<0.5	<1.	75.	<5.	<100.	0.06	52200.	<0.5	4.89	3.	6070.	<1.	16200.	994.	---	<1.	<5.	<1.	<0.05	147000.	<0.2	<50.	<0.2	<30.	16.	AW-
MW11-4D	MW11-4D	18.5-20	L2082551-8	19-Apr-18	5.77	11.6	913.	0.14	160.	4.4	<0.1	0.59	72.1	<0.1	22.	0.095	41500.	<0.1	4.72	1.25	4220.	<0.05	13800.	881.	---	0.115	3.72	<0.05	<0.01	177000.	<0.01	<0.3	0.018	<0.5	3.1	AW-
MW11-4D	DUP-9	18.5-20	L2082551-9	19-Apr-18	5.77	11.6	913.	0.14	160.	4.2	<0.1	0.59	71.6	<0.1	22.	0.092	41400.	<0.1	4.61	1.24	4210.	<0.05	13600.	852.	---	0.113	3.65	<0.05	<0.01	172000.	<0.01	<0.3	0.019	<0.5	2.9	AW-
QA/QC RPD				19-Apr-18	---	---	---	---	0.0%	---	---	---	---	---	---	---	---	0.2%	---	2.4%	---	0.2%	---	1.5%	3.3%	---	---	---	---	---	2.9%	---	---	---	---	---	
MW11-4D	MW11-4D	18.5-20	L2149934-3	20-Aug-18	5.92	12.1	986.	6.7	172.	30.1	<0.1	0.69	75.4	<0.1	25.	0.242	45600.	<0.1	6.91	1.76	3750.	0.075	14200.	1070.	<0.005	0.103	3.68	0.051	<0.01	183000.	<0.01	<1.5	0.015	<0.5	9.7	AW-
Reported Detection Limit					---	---	---	---	0.5	10.	0.5	1.	20.	5.	100.	0.05	100.	0.5	0.5	1.	30.	1.	100.	10.	0.2	1.	5.	1.	0.05	2000.	0.2	50.	0.2	30.	5.	

Abbreviations:

CSR	Contaminated Sites Regulation (including Stage 12 amendments, January 2019)	RPD	Relative Percent Difference	ppb	Parts per billion
NS	No standard established for indicated parameter.	mbgs	Metres below ground surface	<	Sample concentration less than the detection limit indicated.
QA/QC	Quality Assurance/Quality Control	µg/L	Micrograms per litre	---	Sample not analyzed for indicated parameter.

Notes:

1 To be conservative total metals have been compared to dissolved metals standards

BOLD Sample concentration greater than CSR standard for marine aquatic life (AW)

BOLD RED HIGHLIGHTED Exceeds Site Specific Screening Levels (SSSLs)

Appendix C Perimeter Extraction System Operations and Performance

1 OVERVIEW

The Perimeter Extraction System (PES) is a line of closely spaced extraction wells along the Area 2 northern fence line of the Parkland Burnaby Refinery (Refinery). The pumps within the PES wells extract total fluids with the intent to depress the groundwater table and preclude the off-site migration of non-aqueous phase liquid (NAPL) and dissolved phase petroleum hydrocarbons (PHCs) in groundwater that originate from the Area 2 NAPL plume. The total fluids are collected by a network of top loading pneumatic pumps to ensure that light non-aqueous phase liquid (NAPL) is collected and removed from each extraction well.

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

Additional PES information is summarized by component in Table 1 below.

Table 1 PES Component Summary

System Component	Number of Components	Description
Pneumatic Pump	40	QED Environmental Systems AP4 / AP4+ AutoPump
Air Compressor System		
1. Air Compressor	1	Ingersoll Rand UP6-30-125 operated at approximately 110 pounds per square inch (psi).
2. Dryer Unit	1	Ingersoll Rand Desiccant Dryer HL Series Model HP120PH00AA operated at a dew point of -40°F
Oil / Water Separator		
3. Oil / Water Separator	1	Ecologix Environmental System Oil Water Separator with HD Q-PAC coalescing plates. Single wall 12 gauge stainless steel construction.
4. NAPL Storage Container (Lube Cube)	1	Containment Solutions 60 gallon 10 gauge steel single wall construction.
5. Flow Meter	1	Area-Velocity Flow Meter – Model AVFM 5.0
Sequestering System		
1. Chemical Dosing Pump	1	LMI Milton Roy Chemical Metering Pump Model E731-312SI
2. Sequestering Agent	1	LineClear 50 Blended Phosphonate/Maleic Homopolymers/Stabilizer stored in 275 gallon poly tote with a 360 gallon secondary containment spill pallet.
3. Line-Charging Pump	1	Oberdorfer Chemsteel Model R104 Stainless Steel Sealed Rotary Gear pump.
4. Pressure Compensating Drippers	40	Netafim Woodpecker Pressure Compensating (WPC) with CNL. Pressure range of 14.5 to 58 psi.

This report has been prepared to fulfil the annual reporting requirements as outlined in the Operation, Monitoring, and Maintenance Plan prepared by AECOM Canada Limited (AECOM) in January 2016.

2 OPERATION

The primary system operation activities performed by AECOM are:

- Semi-monthly monitoring of the pumping performance and water level at each active extraction well;
- Pump replacement and performance troubleshooting;
- Quarterly monitoring of groundwater monitoring wells in the vicinity of the PES; and,
- Quarterly effluent characterization program.

A summary of the observations and activities are provided in the following sections.

2.1 Semi Monthly Extraction Pump Monitoring

Semi-monthly monitoring was completed for 2018 except during the scheduled turnaround at the Refinery between February to mid-March 2018 when semi-monthly monitoring of the PES was suspended.

On a semi-monthly basis, the depth to pump intake and the depth to water were monitored at each active extraction well to monitor drawdown in the well as the key indicator of PES performance and reliability. A water column greater than one meter above any pump was the trigger for troubleshooting and / or replacement. This is an improvement from prior years where three meters was used as the trigger for pump maintenance. If the pump did not function following troubleshooting it was removed and replaced with a working pump from the spare pump inventory. If the pump worked following troubleshooting but subsequent monitoring demonstrated poor reliability, the pump was also replaced with a functioning spare pump. As an indicator of PES reliability, the average water column above a pump's intake was evaluated over each quarter and on an annual basis.

This information is summarized in Table 1 below.

Table 1 - Summary of Active Extraction Wells with Greater than Three Meters of Water Column

	Number of Extraction Wells*				
Average Water Column Above Pump Intake	**January - March (Q1)**	**April - June (Q2)**	**July-September (Q3)**	**October to December (Q4)**	**January - December (Annual Average)**
>3m	5	3	1	1	0
<3m to >1m	2	4	4	2	6
<1m	33	33	35	37	34

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

Despite instances throughout each quarter where an average water column of greater than three meters was observed due to reduced pump performance, the pump replacement approach was effective at maintaining the average annual water column less than 3m above the pump at all 40 extraction wells throughout 2018. The reliability of the entire PES is further demonstrated by an average annual water column above the pump intake of less than 1 meter at 34 of the 40 extraction wells. Of the six locations (UEIB-17, UEIB-18, UEIB-27, UEIB-29, UEIB-43, and UEIB-55) with an average annual water column between 1-3 m above the pump intake, five are located in the eastern section of the PES. The other

location (UEIB-43) is the western most extraction well. In all instances these wells are outside of the known NAPL plume in Area 2 and generally represent an improved performance from previous years, particularly the eastern section of the PES where pump fouling was historically more prevalent.

In general, troubleshooting efforts attributed the reduced reliability to a combination of factors including insufficient compressed air supply, biofouling, and pump wear and tear. Ongoing troubleshooting efforts and maintenance activities are summarized in Section 3 of this appendix.

2.2 Quarterly Groundwater Monitoring

Groundwater levels in the nearby monitoring wells were monitored quarterly throughout 2018. The water level measurements along with semi-monthly extraction well data were used to evaluate the influence of the hydraulic barrier along the northern perimeter of the Refinery. The quarterly monitoring events were completed in March to April, June, August to September, and November 2018. The quarterly monitoring data and extraction pump data measured along the upper bench is illustrated on Figures C-1 through C-4. Groundwater contouring based on groundwater elevations measured in nearby monitoring wells is illustrated on Figures C-5 through C-8.

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

- In 2018, groundwater elevations along the Upper and Lower Benches remained generally below the 2012 baseline elevations across the entire PES, which indicates that the limited periods of unreliable localized drawdown summarized in Table 1 did not have a widespread effect on the PES performance.
- It is typical during wet periods of the year (e.g. first and fourth quarters) to see a perched water table in the overlying alluvium / colluvium while underlying wells screened in the till are more stable throughout the year. In both instances the contouring and particle path analyses indicate hydraulic capture is generally maintained across the PES.
- Of the six extraction wells which were identified as having an average annual water column greater than one meter (but less than 3m), UEIB-29 is the only location where there is also a downgradient monitoring well (MW03-03) where sample concentrations were greater than the Contaminated Site Regulation (CSR) aquatic life (AW) standards. As a result, additional evaluation of UEIB-29 drawdown alongside measured groundwater elevations and concentrations in samples collected from MW03-03 is illustrated on Graph C-1. The following should be noted:
    - The reliability of the drawdown is improved from prior years;
    - Of the 21 monitoring events in 2018 there are five events where reduced drawdown was observed for the annual average water column to be greater than 1 m and less than 3 m (this provides an indication of the reliable performance of the five other PES wells);
    - No more than two events occurred consecutively; and,
    - Due to insufficient groundwater a sample could not be collected from MW03-03 in August of 2018 to verify the improved performance of the PES.

2.3 Total Fluid and Effluent Extraction Rates

Total fluid extraction rates were determined on a pump-by-pump basis as follows:

$$Total\ Fluid\ Extraction\ Rate\ (by\ well) = \frac{\#\ of\ pump\ cycles \times average\ volume\ per\ cycle}{elapsed\ time}$$

The number of pump cycles were recorded from the pump-dedicated cycle counter, along with the date and time, during each semi-monthly monitoring event and the average volume per cycle for each pump was re-evaluated quarterly.

The average pump volume per cycle was estimated as follows:

- Discharge total fluids collected by each pump into an empty 208 litre (L) drum.
- Record the cycle counter at the beginning and end of each test to determine the total number of pump cycles.
- Measure and calculate the volume of water within the drum.
- Divide the total volume in the drum by the number of pump cycles.

Based on the method summarized above the PES collected an estimated 32,402 cubic meters (m^3) of total fluid in 2018.

In addition to verifying the volume, the surface of the water in each drum is visually inspected for the presence of NAPL or sheen. In 2018, NAPL was not observed; however, sheen was routinely observed on the water surface in the drum at four extraction wells (UEIB-53, UEIB-54, UEIB-45 and UEIB-46). To support NAPL collection estimation, it was assumed that the presence of sheen in a drum test represents 0.01% NAPL, by volume, of total fluids collected by that pump. Note that prior to November 22, 2012, sheen was estimated to represent 0.1% NAPL. A summary of the total fluids and NAPL removed by the PES, by year, is listed in Table 2.

Table 2 Summary of Total Fluids and NAPL Removed by the PES

Year	Total Fluids Collected	Estimated NAPL Collected
2018	32,402 m^3	~ 190 L^2
2017	38,642 m^3	~ 210 L^2
2016[1]	33,369 m^3	~ 200 L^2
2015[1]	43,218 m^3	~ 240 L^2
2014[1]	54,213 m^3	~ 500 L^2
2013[1]	48,491 m^3	~ 300 L^2
2012[1]	40,159m^3	~ 500 L^2
2011	12,900 m^3	~21,700 L^3

Notes:

[1] - Historically reported volumes have been corrected in this report to include only the total fluids collected by the PES. Previous totals also include total fluids collected by pumps located in EX-1 to EX-4, and U2-4.
[2] - NAPL Extracted = 0.01% x the total volume of water collected from an extraction well during a quarter where NAPL or sheen was observed during the drum test for that extraction well.
[3] - NAPL Extracted = 0.1% x the total volume of water collected from an extraction well during a quarter where NAPL or sheen was observed during the drum test for that extraction well.

Estimated flow rates and NAPL collection rates for all active extraction wells since 2012 are provided in Table C-1.

3 MAINTENANCE

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

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

A summary of the major maintenance and notable troubleshooting performed in 2018 is provided in the bulleted list below.

- The blowdown and inlet valve on the PES air compressor was replaced by Wiseworth Canada Inc. in March of 2018.
- The desiccant, inlet and outlet filters as well as the check valves for the air dryer on the PES air compressor were replaced in May of 2018.
- In May 2018 pumps and associated down well tubing was installed in UEIB-56 and UEIB-51 to replace UEIB-20 and UEIB-1, respectively. Also, four underperforming pumps (UEIB-18, UEIB-27, UEIB-29 and UEIB-40) were removed and replaced with spare pumps.
- Sequestering agent drippers were replaced in each of the active UEIB extraction wells in May of 2018.
- The pump in UEIB-17 was replaced with a refurbished spare pump in June of 2018.
- Annual redevelopment of the active PES extraction wells was completed by Mac & Mac during July of 2018.
- The OWS including the coalescing media was cleaned by Mac & Mac during July of 2018.
- The pumps in UEIB-42 and UEIB-43 were replaced with refurbished spare pumps in July of 2018.
- The pump in UEIB-19 was replaced with a refurbished spare pump in August of 2018.
- Pilot valves on the dryer unit of the PES air compressor were replaced in September of 2018 by Parkland's maintenance department.
- The annual pump maintenance program was performed in October of 2018. Pumps within extraction wells UEIB-27, UEIB-34, UEIB-37 and UEIB-41 were replaced with refurbished spare pumps.

- Sequestering system commissioning continued in June of 2018 following the end of the 2017 winterization period. Commissioning continued throughout 2018 until the system was winterized again in November of 2018. In 2018, the recycled water supply to the sequestering system from the OWS resulted in poor distribution of the sequestering agent throughout the distribution system. A clean temporary water supply was connected to the system which improved the flow through the system. A similar temporary clean water source will be used through 2019.

4 PERFORMANCE ASSESSMENT

The performance of the PES is evaluated on a quarterly basis using the data collected from the semi-monthly system monitoring events, quarterly groundwater monitoring program, effluent characterization activities, and system maintenance. These activities have been previously summarized in this document. Part of the performance evaluation includes the preparation of groundwater contour drawings and particle flow paths. These contours are developed using Surfer 13 by Golden Software. The groundwater data and contour maps are then reviewed to assess the performance of the PES in conjunction with the PES pump operating data over that quarter. The quarterly contour drawings are provided as Figures C-5 through C-8. Further discussion of the hydraulic capture is provided in Section 4.1.

As indicated in Sections 2.1 and 2.2, the hydraulic drawdown across the majority of the PES was reliable and sustained throughout 2018. In each quarter there were instances where drawdown in select wells was flagged during system monitoring due to a water column of greater than 1 m above the pump intake. However, prompt pump troubleshooting and replacement minimized the duration of reduced drawdown. An indication of the success of the pump exchange is that the average annual water column did not exceed 3 m above the pump intake in any of the active PES wells despite there being instances throughout each quarter where select wells had an average water column of greater than 3 m.

When the water column above the pump intake was averaged over 2018 for each well, an average water column greater than one but less than three meters was observed in six of the forty wells. All of those wells were located outside of the known NAPL plume. In the instance of UEIB-29 (one of the six wells), a total of five monitoring events throughout the year resulted in an average water column of between 1 m to 3 m. Due to the limited duration of these events and the influence of adjacent extraction wells it is unlikely that the limited duration of decreased drawdown is of concern at UEIB-29 or any of the other five locations.

In addition to the routine maintenance, system improvements completed in 2018 are anticipated to further improve the performance and reliability of the PES. System improvements in 2018 believed to increase the PES performance include:

- Installation of pumps and associated down well tubing in UEIB-56 and UEIB-51 in May of 2018. This installation of a pump in UEIB-51 improved drawdown in the known NAPL plume in Area 2 and decreased the wells spacing between UEIB-52 and UEIB-32. The installation at UEIB-56 replaced UEIB-20 as an extraction well (due to an underperforming pump stuck in the well).
- Repair and operation of the PES air compressor dryer unit as of October 24th, 2018 following troubleshooting efforts by Wiseworth Canada, Parkland, and AECOM. Repairs included replacement of the desiccant, inlet and outlet filters, check valves and multiple exhaust mufflers. It is anticipated that providing dry, compressed air to the extraction pumps will extend the operating time and reliability of the pumps.

The performance assessments through 2019 will continue to monitor and evaluate the effect of the PES performance, including these improvements.

4.1 Capture Assessment

The capture zone assessment is based on data collected during the quarterly monitoring programs in 2018 and the groundwater contouring and flow paths presented in Figures C-5 through C-8. As part of the assessment, it is important to note the hydraulic conductivities for the PES area range from 5 x 10^{-6}

meters per second (m/s) to 1 x 10^{-10} m/s with a geometric mean of 5 x 10^{-7} m/s (URS 2013a). Based on this information, the estimated time required for groundwater to travel from the PES to the Parkland property boundary under non-pumping conditions is six months (URS 2013b).

The following notes provide justification of the contours, data selection, and flow path interpretation.

- Information resolution is based on the available monitoring points. In some areas, there is a denser well network than others. Overall, the monitoring well locations are generally sufficient to interpret flow and capture.
- A constant head boundary of 28.8 m has been added to the contour to represent Burrard Inlet. The constant head boundary was created within the intertidal shoreline.
- Monitoring wells that are seasonally dry have been removed from the contour.
- In areas with a dense well network, preference is given to monitoring wells screened in the till layer during the winter months. The monitoring wells screened in the till layer will be less susceptible to the presence of a seasonal perched water table and represent the stratigraphic layer where NAPL has been historically encountered.
- The groundwater flow paths are initiated from approximately 35 m upgradient of the PES and generally orthogonal to the groundwater contours. In some instances, the flow paths were smoothed based on the interpretation of an AECOM engineer.

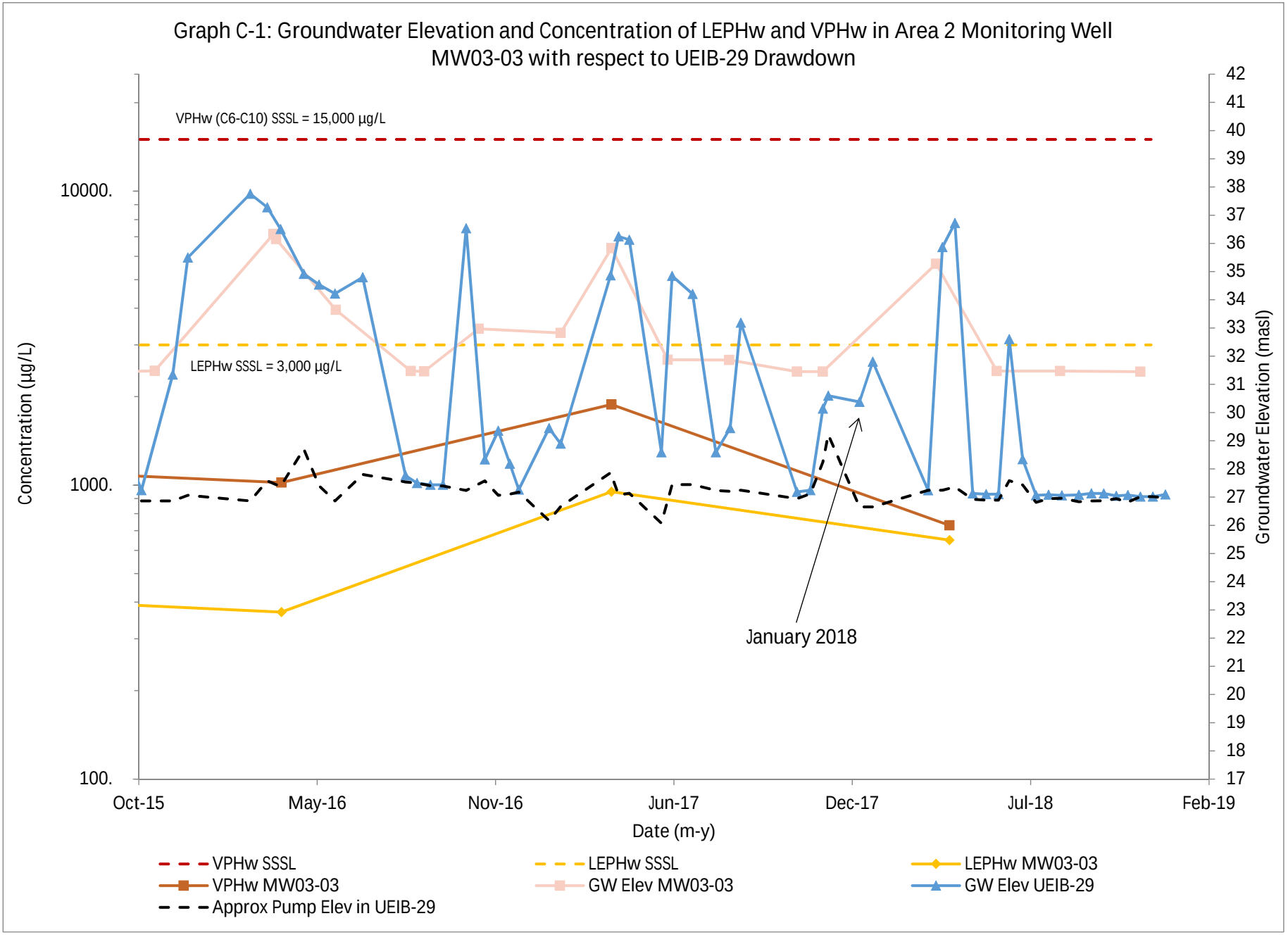
The 2018 capture assessment is summarized in the following notes:

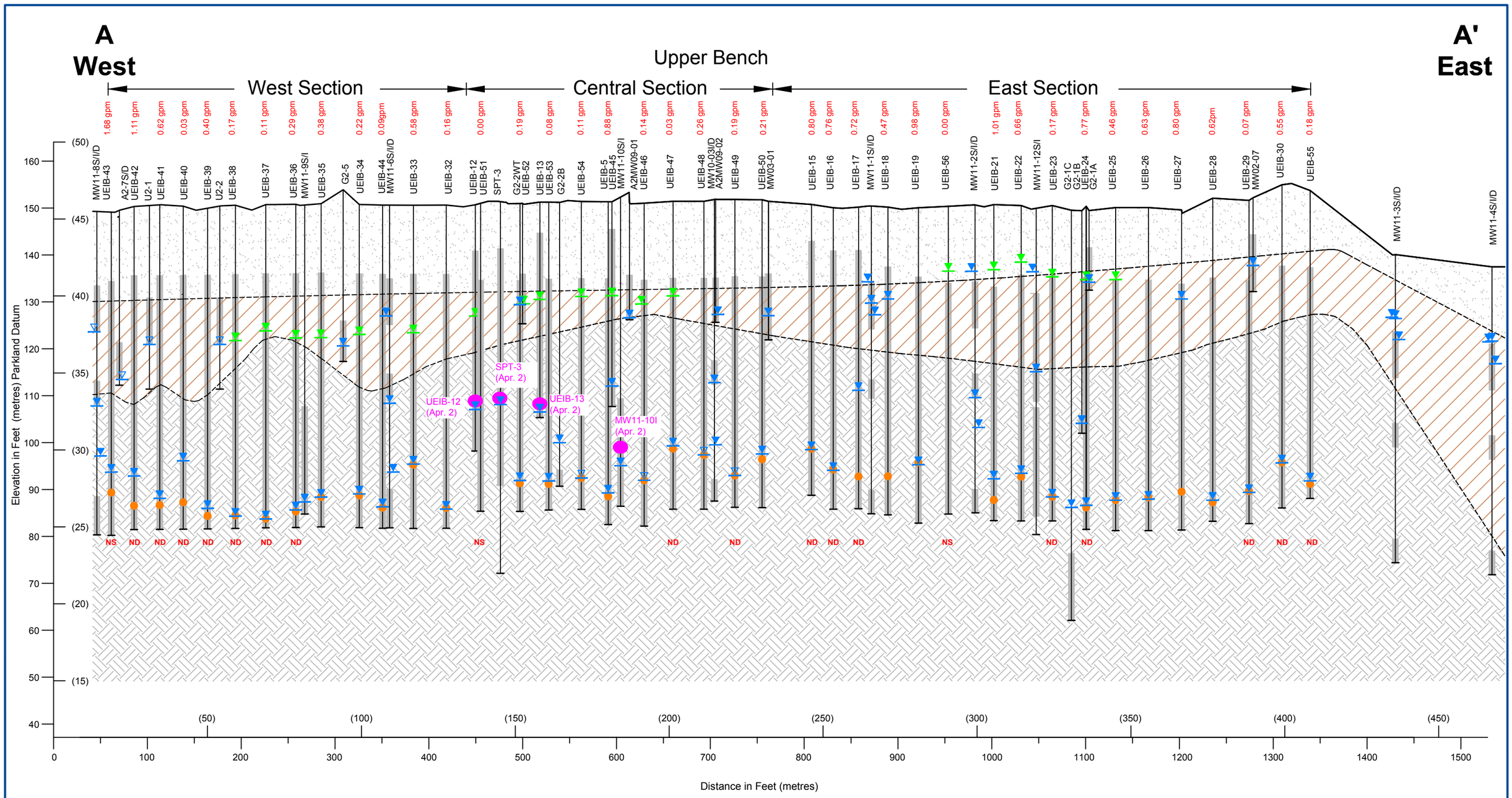
- Hydraulic capture was generally maintained across the entire PES for 2018.
- In the first quarter (Q1), illustrated on Figure C-5, the contouring and particle path analyses demonstrates adequate capture is maintained despite reduced drawdown observed in the vicinity of UEIB-51, UEIB-18, UEIB-56, and UEIB-27. The implementation of a standard operating procedure for pump removal and replacement, and the installation of new pumps into UEIB-51 and UEIB-56 in the second quarter (Q2) were completed to improve PES reliability.
- In the second quarter (Q2), illustrated on Figure C-6, the contouring and particle path analysis demonstrated hydraulic control was maintained. During this quarter, UEIB-17 was one of the pumps indicated in Table 1 as having a water column above the pump of greater than three meters. The reduced drawdown in this well is depicted in the contouring; however, as indicated by the particle path analyses hydraulic capture is maintained by the adjacent extraction wells.
- In the third quarter (Q3), illustrated on Figure C-7, the contouring and particle path analyses demonstrated hydraulic control was maintained across the length of the PES. During this quarter unreliable drawdown was observed in UEIB-55 but due to its location and capture of nearby UEIB-30 reliable PES performance was maintained.
- In the fourth quarter (Q4), illustrated on Figure C-8, reliable hydraulic capture is observed across the PES.
- Based on the groundwater contours and associated flow paths, the influence and improvements as a result of the installation of pumps in extraction wells UEIB-56 and UEIB-51 are evident. The groundwater elevation in these two areas are further depressed by the influence of these wells and result in more evenly distributed particle flow paths through these areas. The new pumping well influence on down gradient groundwater quality will be monitored during future sampling events, particularly water quality monitoring at monitoring wells A2MW09-05I and A2MW09-15.

Based on the available monitoring information summarized above the PES operating was reliable throughout 2018.

5 CONCLUSION

Based on groundwater monitoring data and system operational data, the PES continued to intercept and prevent the off-site migration of NAPL. The dissolved phase hydrocarbons along the northern perimeter of Area 2 are further evaluated in the Section 9.0 of the main report.


Graph C-1: Groundwater Elevation and Concentration of LEPHw and VPHw in Area 2 Monitoring Well MW03-03 with respect to UEIB-29 Drawdown
VPHw (C6-C10) SSSL = 15,000 µg/L
LEPHw SSSL = 3,000 µg/L
January 2018
Concentration (µg/L)
10000.
1000.
100.
Groundwater Elevation (masl)
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
Oct-15
May-16
Nov-16
Jun-17
Dec-17
Jul-18
Feb-19
Date (m-y)
VPHw SSSL
LEPHw SSSL
LEPHw MW03-03
VPHw MW03-03
GW Elev MW03-03
GW Elev UEIB-29
Approx Pump Elev in UEIB-29



LEGEND:

Fill

Alluvium/colluvium

Till

Monitoring Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, March 26, 27, 28, 29 and April 2, 3, 4, 2018

Dry

Extraction Pump Elevation, March 26, 27, 28, 29 and April 2, 3, 4, 2018

Fluid Extraction Rate (March 26, 27, 28, 29 and April 2, 3, 4, 2018) 0.17 gpm

NAPL Detected in 2018 (most recent date)

Well ID

NS = No Sample Collected in March 2018

ND = March 2018 Reported Concentrations of EPH10-19, EPH19-32, and VPH below Reported Detection Limits

ABBREVATIONS:
gpm US gallons per minute

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

Horizontal Scale
feet
0 50 100
metres
0 20 40

Vertical Scale
feet
0 10 20
metres
0 5 10

AECOM

UPPER BENCH EXTRACTION WELL AND MONITORING WELL GROUNDWATER ELEVATIONS FOR MARCH AND APRIL 2018

Perimeter Extraction System - First Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

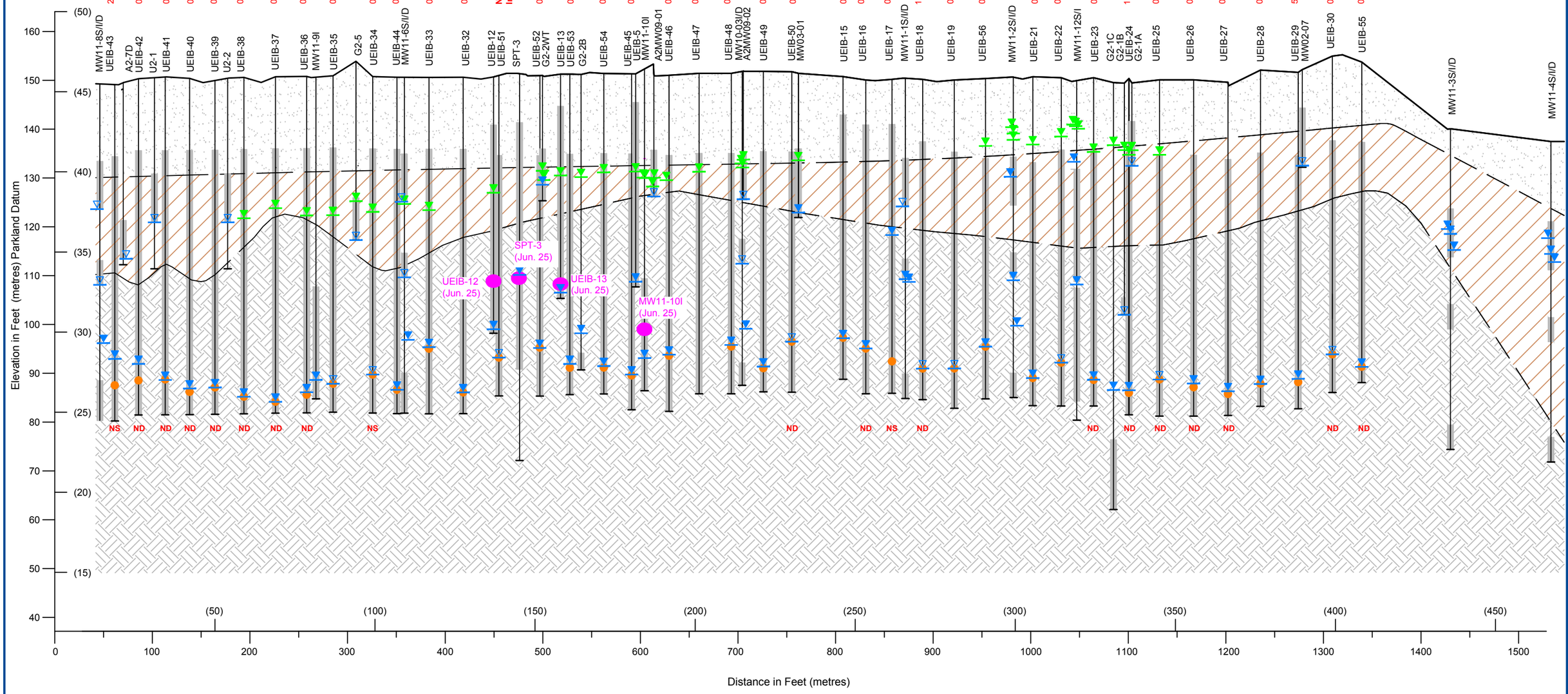
DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
February 2019	60569034	TS	0	FIGURE C-1

FILE NAME: U:\URS-CHEVRON\60569034.2018 Remediation Systems Operation\400-Technical\Q1 2018 PES Update\Figures\20190226 C-1 GW ELV MAR&APR 2018 (Comb-F02-F03).dwg

A West — A' East

Upper Bench

West Section | Central Section | East Section



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, June 11, 13, 14, 2018

Dry

Extraction Pump Elevation, June 11, 13, 14, 2018

Fluid Extraction Rate (June 11, 13, 14, 2018) 0.17 gpm

NAPL Detected in 2018 (most recent date) Well ID

NS = No Sample Collected in June 2018

ND = June 2018 Reported Concentrations of EPH10-19, EPH19-32, and VPH below Reported Detection Limits

ABBREVATIONS:
gpm US gallons per minute

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

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

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

UPPER BENCH EXTRACTION WELL AND MONITORING WELL GROUNDWATER ELEVATIONS FOR JUNE 2018

Perimeter Extraction System - Second Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
February 2019	60569034	TS	0	FIGURE C-2

AECOM

FILE NAME: U:\URS-CHEVRON\60569034.2018 Remediation Systems Operation\400-Technical\Q2 2018 PES Update\Figures\20190226 C-2 GW ELV JUN 2018 (Comb-F02-F03).dwg

A West — A' East

Upper Bench

West Section | Central Section | East Section

MW11-8S/I/D	A2-7D	U2-1	UEIB-40	UEIB-39	UEIB-38	UEIB-37	UEIB-36	UEIB-35	G2-5	UEIB-34	UEIB-44	UEIB-33	UEIB-32	UEIB-12	UEIB-52	UEIB-13	UEIB-54	UEIB-45	UEIB-5	A2MW09-01	UEIB-46	UEIB-47	UEIB-48	MW10-03I/D	A2MW09-02	UEIB-49	UEIB-50	UEIB-15	UEIB-16	UEIB-17	MW11-1S/I/D	UEIB-18	UEIB-19	UEIB-56	MW11-2S/I/D	UEIB-21	UEIB-22	MW11-12S/I	UEIB-23	G2-1C	G2-1B	UEIB-24	G2-1A	UEIB-25	UEIB-26	UEIB-27	UEIB-28	UEIB-29	UEIB-30	UEIB-55	MW11-3S/I/D	MW11-4S/I/D
UEIB-43	UEIB-42	UEIB-41						MW11-9I			MW11-6S/I/D			UEIB-51	G2-2WT	UEIB-53	G2-2B		MW11-10I		UEIB-46			MW09-01		MW03-01										MW11-2S/I/D			MW11-12S/I										MW02-07				
1.58 gpm	0.64 gpm	0.31 gpm	0.34 gpm	0.00 gpm	0.15 gpm	0.08 gpm	0.16 gpm	0.49 gpm	0.00 gpm	0.09 gpm		0.12 gpm	0.13 gpm	No Information	2.13 gpm	0.04 gpm	0.05 gpm	0.69 gpm		0.10 gpm	0.00 gpm	0.14 gpm			0.13 gpm	0.10 gpm	0.11 gpm	0.27 gpm	0.02 gpm		0.47 gpm	1.09 gpm	0.29 gpm		0.72 gpm	0.09 gpm		0.13 gpm	0.94 gpm		0.34 gpm	0.25 gpm	0.21 gpm	0.20 gpm	0.68 gpm*	0.00 gpm	0.19 gpm		
NS	ND	ND	DC	ND	DC	ND	ND	DC	NS	DC		DC	DC	DC	DC	DC	DC	DC		DC	NS	DC			DC	ND	DC	ND	ND		ND	ND	ND		ND	ND		NS	ND		ND	ND	DC	ND	ND	NS	DC		

UEIB-12 (Jun. 25) — SPT-3 (Aug. 29) — UEIB-13 (Aug. 29) — MW11-10I (Aug. 29)

Elevation in Feet (metres) Parkland Datum

160 (50) 150 (45) 140 (40) 130 (40) 120 (35) 110 (35) 100 (30) 90 (30) 80 (25) 70 (20) 60 (20) 50 (15) 40

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500

(50) (100) (150) (200) (250) (300) (350) (400) (450)

Distance in Feet (metres)

LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, August 20, 21, 28, 29, 30 and September 11, 2018

Dry

Extraction Pump Elevation, August 20, 21, 28, 29, 30 and September 11, 2018

Fluid Extraction Rate (August 20, 21, 28, 29, 30 and September 11, 2018) — 0.17 gpm

NAPL Detected in 2018 (most recent date)

Well ID

NS = No Sample Collected in September 2018

ND = September 2018 Reported Concentrations of EPH10-19, EPH19-32, and VPH below Reported Detection Limits

DC = September 2018 Reported Concentrations of EPH10-19, EPH19-32, and VPH Detected

ABBREVIATIONS:
gpm US gallons per minute

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

* Based on results of a single drum test event due to cycle counter malfunction. Typical average extraction rate is based on average over the last three quarters.

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

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

AECOM

UPPER BENCH EXTRACTION WELL AND MONITORING WELL GROUNDWATER ELEVATIONS FOR AUGUST AND SEPTEMBER 2018

Perimeter Extraction System - Third Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
February 2019	60569034	TS	0	FIGURE C-3

FILE NAME: U:\URS-CHEVRON\60569034.2018 Remediation Systems Operation\400-Technical\Q3 Update\Figures\20190226 C-3 GW ELV AUG-SEP 2018 (Comb-F02-F03).dwg

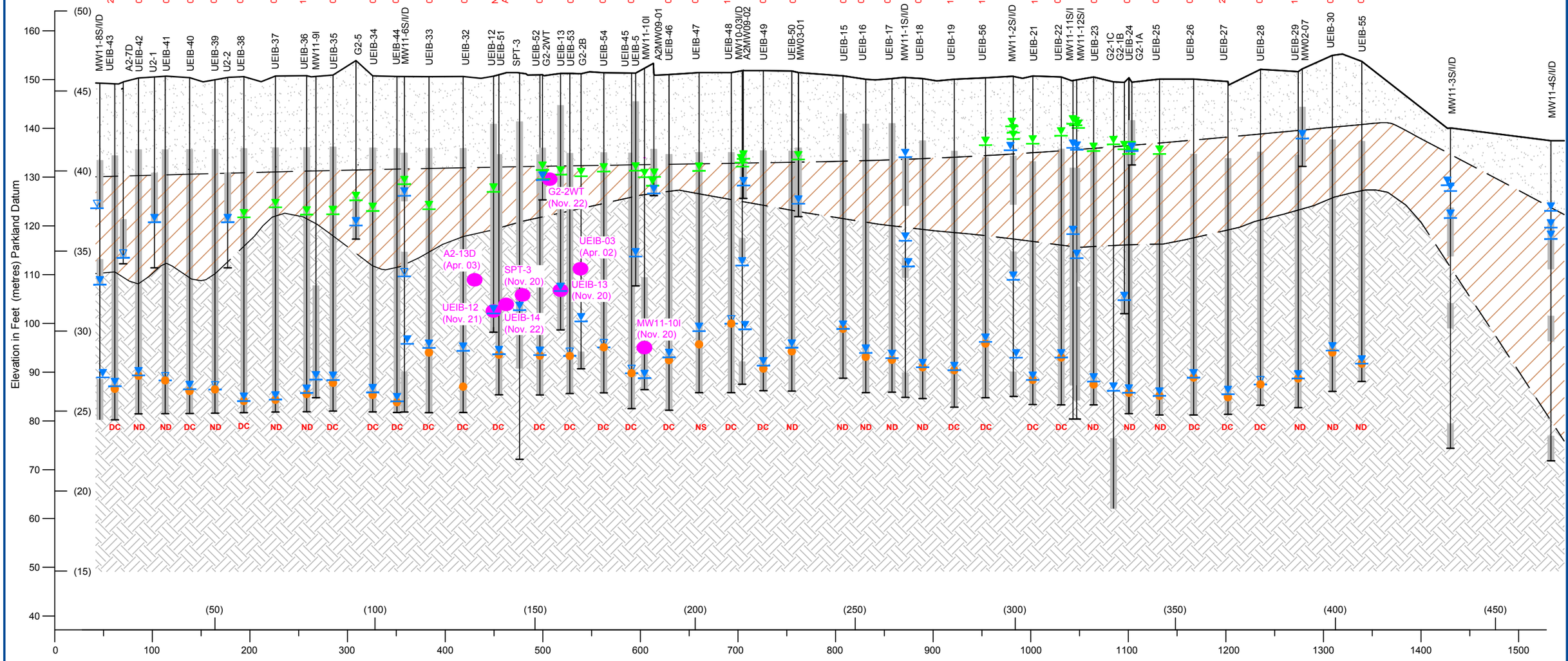
A West — A' East

Upper Bench

West Section | Central Section | East Section

Elevation in Feet (metres) Parkland Datum

Distance in Feet (metres)



LEGEND:

Fill

Alluvium/colluvium

Till

Extraction Well

Well Screen

Static Groundwater Elevation, January 23, 2012

Pumping Groundwater Elevation, November 18, 19, 20, 21, 22, 2018

Dry

Extraction Pump Elevation, November 18, 19, 20, 21, 22, 2018

Fluid Extraction Rate (November 18, 19, 20, 21, 22, 2018) 0.17 gpm

NAPL Detected in 2018 (most recent date)

Well ID

NS = No Sample Collected in November 2018

ND = November 2018 Reported Concentrations of EPH10-19, EPH19-32, and VPH below Reported Detection Limits

DC = November 2018 Reported Concentrations of EPH10-19, EPH19-32, or VPH Detected

ABBREVATIONS:
gpm US gallons per minute

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

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

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

AECOM

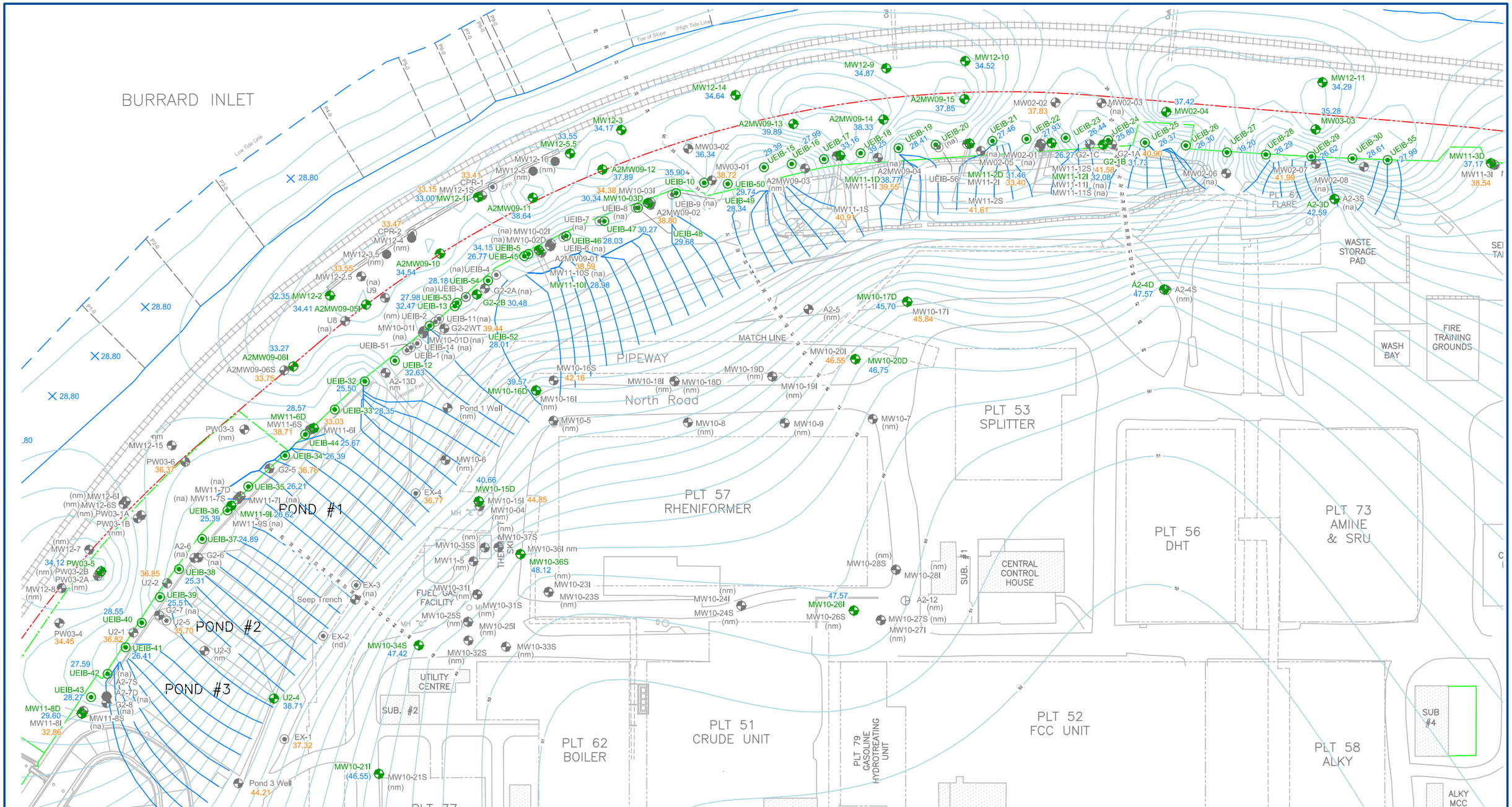
UPPER BENCH EXTRACTION WELL AND MONITORING WELL GROUNDWATER ELEVATIONS FOR NOVEMBER 2018

Perimeter Extraction System - Fourth Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2019	60569034	TS	0	FIGURE C-4

FILE NAME: U:\URS-CHEVRON\60569034.2018 Remediation Systems Operation\400-Technical\Q4 2018 PES Update\Figures\20190226 C-4 GW ELV NOV 2018 (Comb-F02-F03).dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Borehole
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) March 26, 27, 28, and 29, 2018 April 2, 3, 4 and 23 to 25, 2018 — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well Not Monitored — nm
- Well used in Groundwater Contouring

ABBREVIATIONS:

na	not applicable
nd	non-detect
nm	not measured

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - MARCH AND APRIL 2018

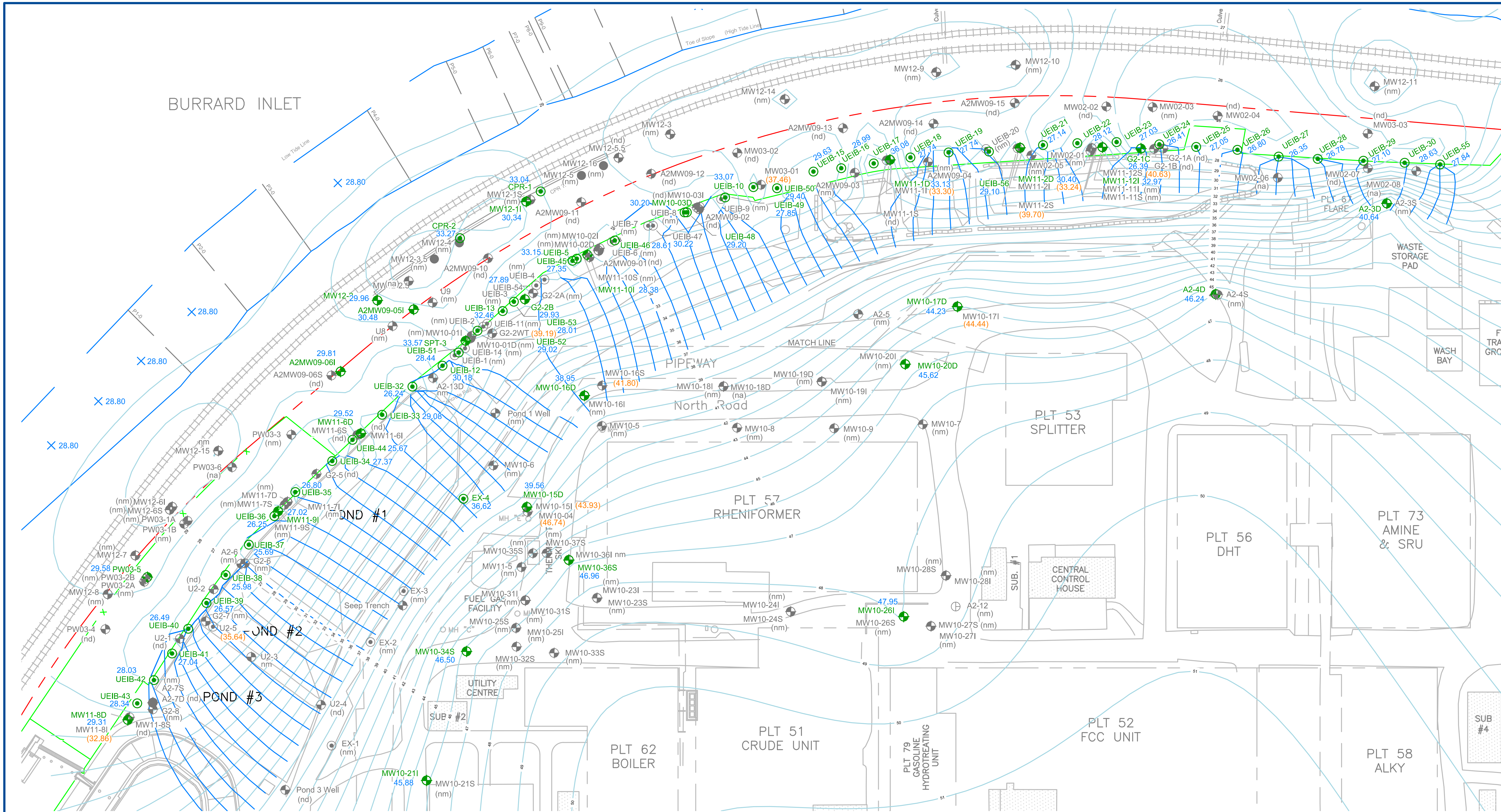
Perimeter Extraction System - First Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
May 2018	60569034	TS	0	Figure C-5

AECOM

FILE NAME: \\cabny1fp001\prod\1686\Projects\URS-CHEVRON\60569856 2018 Perimeter Monitoring\400-Technical\2018 Annual Report\Justin - Working Folder\Tables and Figures\Appendix - C\C-5 to C-8\20190222 05 GW Elev Q1 2018 TILL LAYER.dwg



LEGEND:

Property Line		Extraction Well	
Fence Line		Groundwater Flow	
Foreshore Sampling Transect		Groundwater Contour (m) (Interval 1.0 metres)	
Borehole		Groundwater Elevation (m) June 11-14, 2018	32.49
Monitoring Well			

Groundwater Elevation (m) not used to extrapolate contours (40.14)

Mean Tide Elevation Point

Well used in Groundwater Contouring

ABBREVIATIONS:

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

NOTES:

For boundary contouring purposes the April 2018 groundwater elevation for MW12-9, MW12-10, MW12-11, MW12-13 and MW12-14 were corrected by -2.32m based on the lesser of the fluctuation in the water table observed in MW12-2 and MW12-1I.

GRID NORTH
N W E S

metres 0 20 40

AECOM

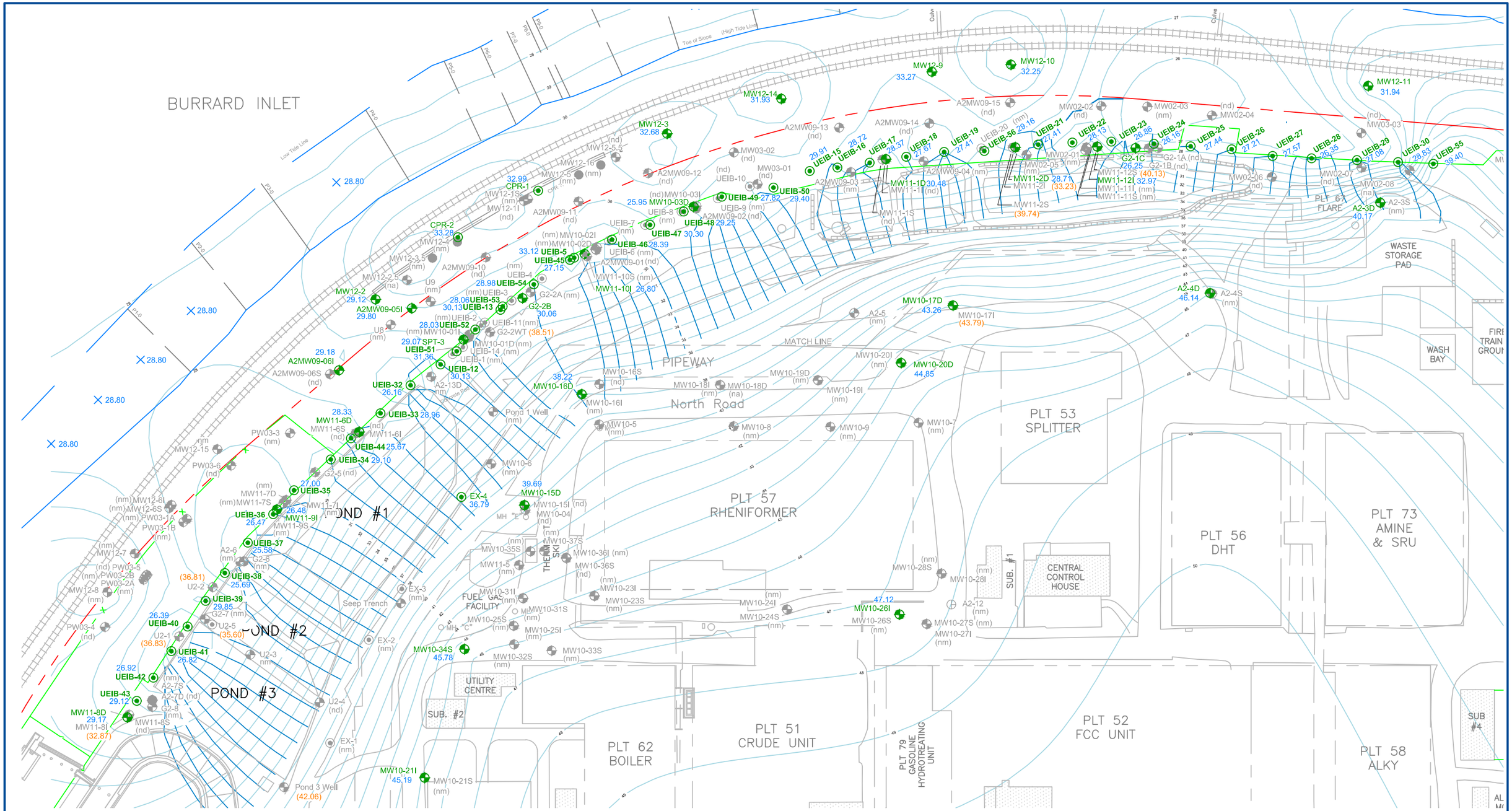
PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - JUNE 2018

Perimeter Extraction System - Second Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
August 2018	60569034	TS	0	FIGURE C-6

FILE NAME: H:\URS-CHEVRON\60569034 2018 Remediation Systems Operation\400-Technical\Q2 2018 PES Update\Figures\20180718 05 TILL LAYER.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Borehole
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) August 21, 28, 29, 30 and September 11, 2018 — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

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

NOTE:
Available groundwater elevation data collected from monitoring wells on the CP right-of-way in October 2018 has been used for contouring purposes.

GRID NORTH

metres 0 20 40

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - AUGUST/SEPTEMBER 2018

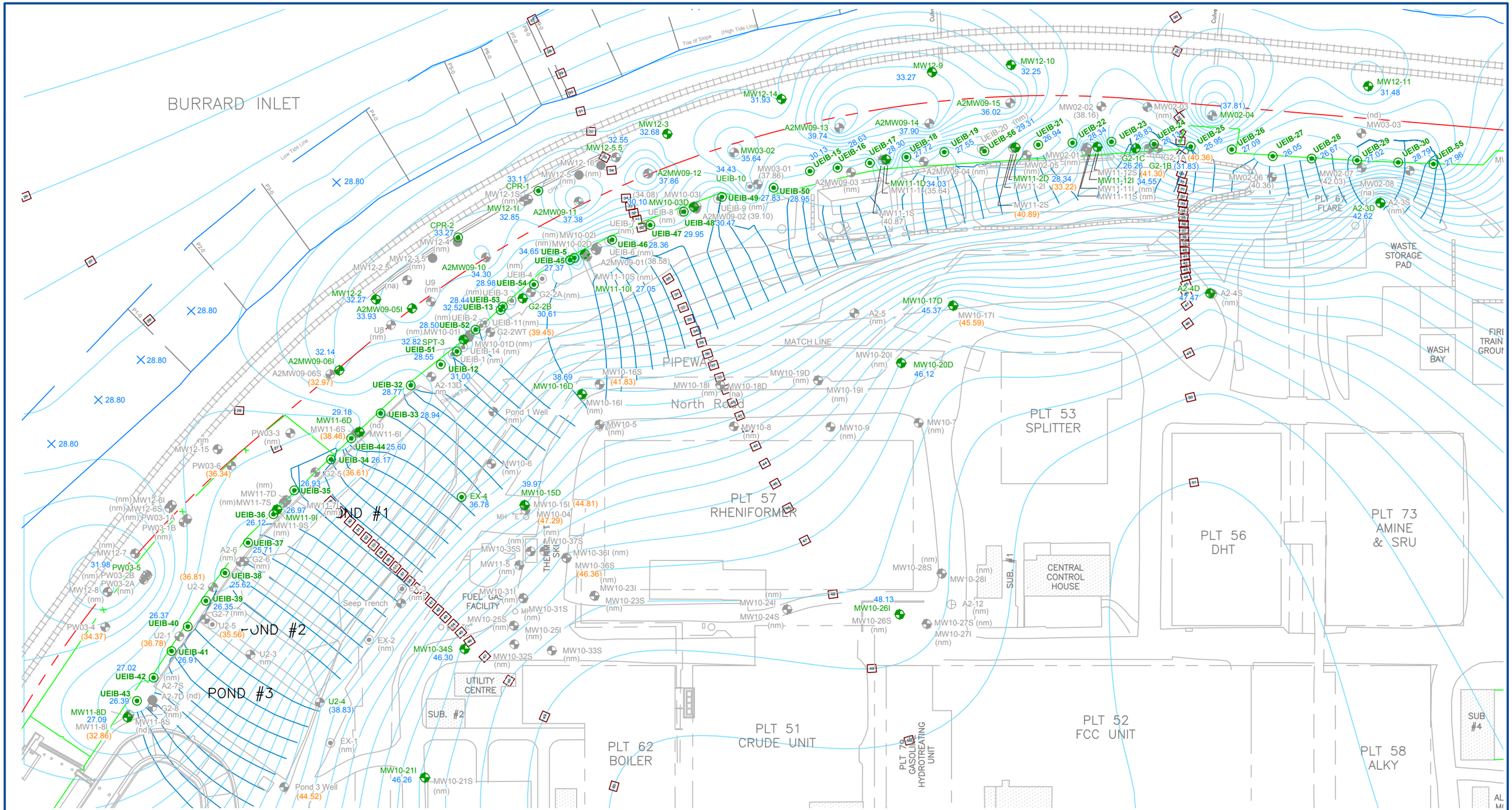
Perimeter Extraction System - Third Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
October 2018	60569034	TS	0	Figure C-7

AECOM

FILE NAME: \\cabny1fp001\prod\1686\Projects\URS-CHEVRON\60569856 2018 Perimeter Monitoring\400-Technical\2018 Annual Report\Justin - Working Folder\Tables and Figures\Appendix - C\C-5 to C-8\20181029 05 TILL LAYER Q3.dwg



LEGEND:

- Property Line
- Fence Line
- Foreshore Sampling Transect
- Borehole
- Monitoring Well
- Extraction Well
- Groundwater Flow
- Groundwater Contour (m) (Interval 1.0 metres)
- Groundwater Elevation (m) October 15, November 19, 20, 21 and 22, 2018 — 32.49
- Groundwater Elevation (m) not used to extrapolate contours — (40.14)
- Mean Tide Elevation Point
- Well used in Groundwater Contouring

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

NOTE:
Available groundwater elevation data collected from monitoring wells on the CP right-of-way in October 2018 has been used for contouring purposes.

GRID NORTH
N
W E
S

metres
0 20 40

AECOM

PERIMETER EXTRACTION SYSTEM GROUNDWATER ELEVATIONS AND CONTOURS - October and November 2018

Perimeter Extraction System - Fourth Quarter 2018 Performance Assessment
Area 2 - Parkland Refinery, Burnaby, BC

PARKLAND REFINING (B.C.) LTD.

DATE:	PROJECT NO.:	DRAWN BY:	REVISION NO.:	DRAWING NO.:
January 2019	60569034	TS	0	Figure C-8

FILE NAME: \\cabny1fp001\prod\1686\Projects\URS-CHEVRON\60569856 2018 Perimeter Monitoring\400-Technical\2018 Annual Report\Justin - Working Folder\Tables and Figures\Appendix - C\C-5 to C-8\20190207 05 TILL LAYER_JVB Q4.dwg

TABLE C-1
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE
PARKLAND BURNABY REFINERY

Extraction Well	June 27, 2012		July 25, 2012					November 22, 2012					December 19, 2012						February 14, 2013						June 6, 2013					
	Total Fluids Extracted (m^3)	Fluid Extraction Rate[10] (gpm)	Total Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Fluid Extraction Rate (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	Total Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)
UEIB-1[1]	78	N/A	78	N/A	N/A	2,680	N/A	78	N/A	N/A	2,680	N/A	78	N/A	N/A	2,680	0.00	N/A	78	N/A	N/A	2,680	0.00	N/A	78	N/A	N/A	2,680	0.00	N/A
UEIB-2[2]/UEIB-52[13]	157	0.02	158	0.05	0.01	1,578	0.09	158	0.00	0.00	1,578	0.00	164	0.10	0.02	1,578	0.00	0.00	179	0.26	0.05	1,578	0.00	0.00	201	0.20	0.04	1,578	0.00	0.00
UEIB-3/UEIB-53[13]	442	0.00	442	0.00	0.00	4,465	0.20	446	0.03	0.01	4,465	0.00	452	0.18	0.03	4,465	0.00	0.00	466	0.24	0.04	4,465	0.00	0.00	491	0.23	0.04	4,465	0.00	0.00
UEIB-4/UEIB-54[13]	308	0.00	308	0.00	0.00	154	0.13	308	0.00	0.00	154	-	309	0.02	0.00	154	0.00	0.00	311	0.05	0.01	154	0.00	0.00	315	0.04	0.01	154	0.00	0.00
UEIB-5[8]	358	N/A	358	0.62	0.11	184	0.22	358	N/A	N/A	184	N/A	358	N/A	N/A	184	0.00	N/A	358	N/A	N/A	184	0.00	N/A	358	N/A	N/A	184	0.00	N/A
UEIB-6[9]	209	N/A	209	0.50	0.09	6,025	0.16	209	N/A	N/A	6,025	N/A	209	N/A	N/A	6,025	0.00	N/A	209	N/A	N/A	6,025	0.00	N/A	209	N/A	N/A	6,025	0.00	N/A
UEIB-7/UEIB-47[13]	292	0.00	292	0.00	0.00	5,644	0.17	293	0.01	0.00	5,644	0.00	294	0.03	0.01	5,644	0.00	0.00	295	0.02	0.00	5,644	0.00	0.00	298	0.02	0.00	5,644	0.00	0.00
UEIB-8/UEIB-48[13]	1,099	0.13	1,108	0.40	0.07	0.00	0.00	1,108	0.00	0.00	0.00	0.00	1,123	0.17	0.03	0.00	0.00	0.00	1,151	0.50	0.09	0.00	0.00	0.00	1,180	0.25	0.05	0.00	0.00	0.00
UEIB-9/UEIB-49[13]	1,645	0.09	1,651	0.27	0.05	0.00	0.00	1,657	0.05	0.01	0.00	0.00	1,669	0.19	0.03	0.00	0.00	0.00	1,706	0.65	0.12	0.00	0.00	0.00	1,780	0.67	0.12	0.00	0.00	0.00
UEIB-10[4]/UEIB-50[13]	792	0.00	792	0.22	0.04	0.00	0.00	792	0.04	0.01	0.00	0.00	792	0.04	0.01	0.00	0.00	0.00	792	N/A	N/A	0.00	0.00	N/A	792	N/A	N/A	0.00	0.00	N/A
UEIB-11[3]	10	N/A	10	N/A	N/A	0.00	N/A	10	N/A	N/A	0.00	N/A	10	N/A	N/A	0.00	0.00	N/A	10	N/A	N/A	0.00	0.00	N/A	10	N/A	N/A	0.00	0.00	N/A
UEIB-14[1,4]/UEIB-51[13]	85	0.00	85	0.00	0.00	825	0.11	85	N/A	N/A	825	N/A	85	0.00	0.00	825	0.00	N/A	85	0.00	0.00	825	0.00	0.00	85	0.00	0.00	825	0.00	0.00
UEIB-15	579	1.12	1,013	5.31	0.97	0.00	0.00	1,282	4.62	0.85	0.00	0.00	1,415	4.78	0.88	0.00	0.00	0.00	1,674	4.46	0.82	0.00	0.00	0.00	2,205	4.78	0.88	0.00	0.00	0.00
UEIB-16	413	0.01	416	0.12	0.02	0.00	0.00	543	1.99	0.36	0.00	0.00	714	5.35	0.98	0.00	0.00	0.00	975	4.03	0.74	0.00	0.00	0.00	1,467	4.44	0.81	0.00	0.00	0.00
UEIB-17	277	0.29	309	1.16	0.21	0.00	0.00	499	2.17	0.40	0.00	0.00	602	3.60	0.66	0.00	0.00	0.00	752	2.13	0.39	0.00	0.00	0.00	1,071	2.87	0.53	0.00	0.00	0.00
UEIB-18	491	0.54	553	2.19	0.40	0.00	0.00	894	3.22	0.59	0.00	0.00	1,009	3.97	0.73	0.00	0.00	0.00	1,224	3.66	0.67	0.00	0.00	0.00	1,669	4.01	0.74	0.00	0.00	0.00
UEIB-19	1,083	1.39	1,232	5.23	0.96	0.00	0.00	2,040	4.75	0.87	0.00	0.00	2,372	11.26	2.07	0.00	0.00	0.00	2,614	4.87	0.89	0.00	0.00	0.00	2,821	3.65	0.67	0.00	0.00	0.00
UEIB-20/UEIB-56[13]	1,786	2.77	2,093	10.25	1.88	0.00	0.00	3,021	7.25	1.33	0.00	0.00	3,235	7.46	1.37	0.00	0.00	0.00	3,466	4.65	0.85	0.00	0.00	0.00	4,827	12.85	2.36	0.00	0.00	0.00
UEIB-21	1,453	2.16	1,672	7.94	1.46	0.00	0.00	2,863	10.45	1.92	0.00	0.00	3,179	10.89	2.00	0.00	0.00	0.00	3,883	11.76	2.16	0.00	0.00	0.00	3,908	N/A	N/A	0.00	0.00	N/A
UEIB-22	559	0.33	619	1.53	0.28	0.00	0.00	823	2.25	0.41	0.00	0.00	889	2.31	0.42	0.00	0.00	0.00	1,020	2.21	0.41	0.00	0.00	0.00	1,318	2.69	0.49	0.00	0.00	0.00
UEIB-23	420	0.12	429	0.37	0.07	0.00	0.00	478	0.71	0.13	0.00	0.00	490	0.57	0.10	0.00	0.00	0.00	545	1.25	0.23	0.00	0.00	0.00	739	1.75	0.32	0.00	0.00	0.00
UEIB-24	1,185	2.09	1,426	8.78	1.61	0.00	0.00	2,808	10.32	1.89	0.00	0.00	3,100	10.42	1.91	0.00	0.00	0.00	3,559	8.20	1.50	0.00	0.00	0.00	4,188	7.84	1.44	0.00	0.00	0.00
UEIB-25	309	0.83	446	5.47	1.00	0.00	0.00	1,361	3.87	0.71	0.00	0.00	1,486	4.18	0.77	0.00	0.00	0.00	1,732	4.40	0.81	0.00	0.00	0.00	2,194	4.16	0.76	0.00	0.00	0.00
UEIB-26	407	0.55	459	1.95	0.36	0.00	0.00	854	4.53	0.83	0.00	0.00	1,023	5.29	0.97	0.00	0.00	0.00	1,329	5.46	1.00	0.00	0.00	0.00	1,704	3.38	0.62	0.00	0.00	0.00
UEIB-27	738	1.41	883	5.10	0.94	0.00	0.00	1,494	7.91	1.45	0.00	0.00	1,494	0.01	0.00	0.00	0.00	0.00	1,494	0.00	0.00	0.00	0.00	0.00	2,074	7.53	1.38	0.00	0.00	0.00
UEIB-28	809	0.24	834	0.91	0.17	0.00	0.00	1,166	2.78	0.51	0.00	0.00	1,322	5.29	0.97	0.00	0.00	0.00	1,670	6.20	1.14	0.00	0.00	0.00	2,190	4.69	0.86	0.00	0.00	0.00
UEIB-29	1,201	1.77	1,415	7.80	1.43	0.00	0.00	2,232	6.74	1.24	0.00	0.00	2,520	7.72	1.42	0.00	0.00	0.00	3,091	10.19	1.87	0.00	0.00	0.00	3,656	4.36	0.80	0.00	0.00	0.00
UEIB-30	490	0.42	542	1.88	0.35	0.00	0.00	1,304	8.92	1.64	0.00	0.00	1,459	7.25	1.33	0.00	0.00	0.00	1,722	4.71	0.86	0.00	0.00	0.00	2,375	6.01	1.10	0.00	0.00	0.00
UEIB-31/UEIB-55[13]	536	0.62	577	3.35	0.61	0.00	0.00	974	2.98	0.55	0.00	0.00	1,067	3.31	0.61	0.00	0.00	0.00	1,203	2.44	0.45	0.00	0.00	0.00	1,496	2.65	0.49	0.00	0.00	0.00
UEIB-32	1,455	2.02	1,762	8.70	1.60	0.00	0.00	2,105	3.44	0.63	0.00	0.00	2,219	5.09	0.93	0.00	0.00	0.00	2,404	3.31	0.61	9	9.26	0.17	2,679	2.47	0.45	23	13.75	0.12
UEIB-33	1,378	N/A	1,379	0.00	0.00	0.00	0.00	1,379	0.01	0.00	0.00	0.00	1,379	0.00	0.00	0.00	0.00	0.00	1,379	0.00	0.00	0.00	0.00	0.00	1,820	3.97	0.73	0.00	0.00	0.00
UEIB-34	1,097	0.58	1,167	2.34	0.43	0.00	0.00	1,296	1.17	0.21	0.00	0.00	1,401	3.06	0.56	0.00	0.00	0.00	1,618	3.89	0.71	0.00	0.00	0.00	2,257	5.74	1.05	0.00	0.00	0.00
UEIB-35	1,021	1.30	1,171	5.67	1.04	0.00	0.00	1,759	4.20	0.77	0.00	0.00	1,858	3.80	0.70	0.00	0.00	0.00	2,191	5.95	1.09	0.00	0.00	0.00	4,191	18.01	3.30	0.00	0.00	0.00
UEIB-36	656	0.51	722	2.24	0.41	0.00	0.00	937	1.95	0.36	0.00	0.00	1,080	4.29	0.79	0.00	0.00	0.00	1,756	12.08	2.22	0.00	0.00	0.00	2,239	4.35	0.80	0.00	0.00	0.00
UEIB-37[6]	241	0.26	285	1.52	0.28	0.00	0.00	353	0.26	0.05	0.00	0.00	359	0.24	0.04	0.00	0.00	0.00	394	0.75	0.14	0.00	0.00	0.00	721	2.95	0.54	0.00	0.00	0.00
UEIB-38	43	0.03	72	0.87	0.16	0.00	0.00	174	0.97	0.18	0.00	0.00	217	1.77	0.32	0.00	0.00	0.00	312	1.70	0.31	0.00	0.00	0.00	490	1.60	0.29	0.00	0.00	0.00
UEIB-39[6]	359	0.43	420	2.14	0.39	0.00	0.00	627	1.85	0.34	0.00	0.00	702	2.64	0.48	0.00	0.00	0.00	813	1.98	0.36	0.00	0.00	0.00	1,034	1.99	0.36	0.00	0.00	0.00
UEIB-40[6]	151	0.16	176	0.90	0.16	0.00	0.00	402	1.62	0.30	0.00	0.00	483	2.69	0.49	0.00	0.00	0.00	650	2.82	0.52	0.00	0.00	0.00	925	2.48	0.45	0.00	0.00	0.00
UEIB-41[6]	278	0.25	308	1.14	0.21	0.00	0.00	601	3.97	0.73	0.00	0.00	764	6.28	1.15	0.00	0.00	0.00	857	1.63	0.30	0.00	0.00	0.00	1,413	5.06	0.93	0.00	0.00	0.00
UEIB-42[6]	336	0.37	395	2.08	0.38	0.00	0.00	1,377	12.35	2.27	0.00	0.00	1,730	13.89	2.55	0.00	0.00	0.00	2,539	14.45	2.65	0.00	0.00	0.00	3,808	11.44	2.10	0.00	0.00	0.00
UEIB-43	553	1.36	1,085	6.60	1.21	0.00	0.00	1,775	8.47	1.55	0.00	0.00	1,972	8.60	1.58	0.00	0.00	0.00	2,716	14.39	2.64	0.00	0.00	0.00	4,012	12.32	2.26	0.00	0.00	0.00
UEIB-44	456	0.73	548	3.39	0.62	0.00	0.00	800	2.37	0.43	0.00	0.00	883	3.16	0.58	0.00	0.00	0.00	1,045	2.90	0.53	8	8.13	0.15	1,215	1.53	0.28	17	8.49	0.08
UEIB-45[8]	367	2.02	566	9.49	1.74	57	1.39	1,544	8.10	1.49	106	0.46	1,779	9.01	1.65	106	0.00	0.24	2,147	6.56	1.20	106	0.00	0.00	2,878	6.59	1.21	142	36.58	0.33
UEIB-46[9]	37	0.34	69	1.58	0.29	0.00	0.00	185	0.96	0.18	0.00	0.00	247	1.82	0.33	0.00	0.00	0.00	328	1.08	0.20	0.00	0.00	0.00	402	0.67	0.12	7.76	7.76	0.05
Total	36,956	28	40,860	125	22	21,674	2.62	55,867	138	25	21,728	0.51	60,888	166	30	21,728	0	0.24	70,014	163	30	21,818	90	1.19	87,523	168	31	21,907	89	0.91

Notes

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

Abbreviations:

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

TABLE C-1

SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE

PARKLAND BURNABY REFINERY

Extraction Well	September 26, 2013							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	Fluid Extraction Rate[12] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	0.00	N/A	NA
UEIB-2[2]/UEIB-52[13]	210	9	0.08	0.01	1,578	0.00	0.00	0.03
UEIB-3/UEIB-53[13]	506	15	0.13	0.02	4,465	0.00	0.00	0.04
UEIB-4/UEIB-54[13]	319	4	0.04	0.01	154	0.00	0.00	0.01
UEIB-5[8]	358	N/A	N/A	N/A	184	0.00	N/A	NA
UEIB-6[9]	209	N/A	N/A	N/A	6,025	0.00	N/A	NA
UEIB-7/UEIB-47[13]	307	9	0.08	0.01	5,644	0.00	0.00	0.03
UEIB-8/UEIB-48[13]	1,190	10	0.09	0.02	0.00	0.00	0.00	0.03
UEIB-9/UEIB-49[13]	1,811	31	0.27	0.05	0.00	0.00	0.00	0.09
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	0.00	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	0.00	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	86	0	0.00	0.00	825	0.00	0.00	0.00
UEIB-15	2,499	294	2.20	0.40	0.00	0.00	0.00	0.06
UEIB-16	1,731	263	2.31	0.42	0.00	0.00	0.00	0.14
UEIB-17	1,218	147	1.50	0.27	0.00	0.00	0.00	0.14
UEIB-18	1,908	239	2.09	0.38	0.00	0.00	0.00	0.36
UEIB-19	3,091	270	2.39	0.44	0.00	0.00	0.00	0.62
UEIB-20/UEIB-56[13]	5,609	782	6.91	1.27	0.00	0.00	0.00	1.62
UEIB-21	3,988	80	0.60	0.11	0.00	0.00	0.00	0.55
UEIB-22	1,477	158	1.40	0.26	0.00	0.00	0.00	0.36
UEIB-23	1,048	309	2.74	0.50	0.00	0.00	0.00	0.89
UEIB-24	4,402	213	1.18	0.22	0.00	0.00	0.00	0.61
UEIB-25	2,532	338	2.99	0.55	0.00	0.00	0.00	0.10
UEIB-26	1,877	173	1.58	0.29	0.00	0.00	0.00	0.06
UEIB-27	2,598	525	4.64	0.85	0.00	0.00	0.00	0.99
UEIB-28	2,268	78	0.58	0.11	0.00	0.00	0.00	0.21
UEIB-29	4,331	675	5.96	1.09	0.00	0.00	0.00	1.94
UEIB-30	2,612	238	2.10	0.39	0.00	0.00	0.00	0.68
UEIB-31/UEIB-55[13]	1,679	182	1.61	0.30	0.00	0.00	0.00	0.52
UEIB-32	2,786	107	0.93	0.17	23.01	0.00	0.00	1.41
UEIB-33	2,247	427	3.71	0.68	11.23	11.23	0.16	1.70
UEIB-34	2,579	323	2.81	0.52	0.00	0.00	0.00	0.08
UEIB-35	6,057	1,866	16.23	2.98	0.00	0.00	0.00	5.38
UEIB-36	2,870	631	5.49	1.01	0.00	0.00	0.00	0.18
UEIB-37 [6]	1,021	300	2.61	0.48	0.00	0.00	0.00	0.86
UEIB-38	550	60	0.52	0.10	0.00	0.00	0.00	0.02
UEIB-39 [6]	1,197	163	1.47	0.27	0.00	0.00	0.00	0.47
UEIB-40 [6]	1,097	173	1.57	0.29	0.00	0.00	0.00	0.50
UEIB-41 [6]	1,819	405	3.80	0.70	0.00	0.00	0.00	1.17
UEIB-42 [6]	4,493	685	3.97	0.73	0.00	0.00	0.00	1.97
UEIB-43	4,945	933	6.96	1.28	0.00	0.00	0.00	2.69
UEIB-44	1,294	79	0.68	0.13	18.71	2.10	0.03	0.27
UEIB-45 [8]	3,381	503	4.41	0.81	155.86	13.76	0.20	3.50
UEIB-46 [9]	478	76	0.67	0.12	10.17	2.42	0.03	0.54
Total	99,539	12,017	103	19	21,938	31	0.58	31.20

Extraction Well	December 20, 2013							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	Fluid Extraction Rate[12] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	NA	N/A	NA
UEIB-2[2]/UEIB-52[13]	219	9	0.14	0.03	1,578	0.00	0.00	0.03
UEIB-3/UEIB-53[13]	525	18	0.26	0.05	4,465	0.00	0.00	0.91
UEIB-4/UEIB-54[13]	321	1	0.03	0.01	154	0.00	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	NA	N/A	NA
UEIB-6[9]	209	N/A	N/A	N/A	6,025	NA	N/A	NA
UEIB-7/UEIB-47[13]	307	0	0.00	0.00	5,644	0.00	0.00	0.00
UEIB-8/UEIB-48[13]	1,190	0	0.00	0.00	0.00	0.00	0.00	0.00
UEIB-9/UEIB-49[13]	1,836	24	0.24	0.04	0.00	0.00	0.00	0.07
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	0.00	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	0.00	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	86	0	0.00	0.00	825	0.00	0.00	0.00
UEIB-15	2,816	317	4.03	0.74	0.00	0.00	0.00	0.06
UEIB-16	2,076	346	4.40	0.81	0.00	0.00	0.00	0.19
UEIB-17	1,531	313	4.20	0.77	0.00	0.00	0.00	0.31
UEIB-18	2,235	327	8.63	1.58	0.00	0.00	0.00	3.39
UEIB-19	3,149	59	0.01	0.00	0.00	0.00	0.00	7.27
UEIB-20/UEIB-56[13]	6,199	589	11.53	2.12	0.00	0.00	0.00	12.82
UEIB-21	4,410	423	11.12	2.04	0.00	0.00	0.00	30.56
UEIB-22	1,670	193	2.44	0.45	0.00	0.00	0.00	3.82
UEIB-23	1,088	40	0.52	0.09	0.00	0.00	0.00	3.13
UEIB-24	5,069	667	7.61	1.40	0.00	0.00	0.00	14.60
UEIB-25	2,883	351	4.96	0.91	0.00	0.00	0.00	0.84
UEIB-26	2,074	197	2.48	0.45	0.00	0.00	0.00	0.75
UEIB-27	3,057	459	7.25	1.33	0.00	0.00	0.00	5.74
UEIB-28	2,293	25	0.05	0.01	0.00	0.00	0.00	6.19
UEIB-29	4,925	594	6.53	1.20	0.00	0.00	0.00	14.17
UEIB-30	2,914	302	4.52	0.83	0.00	0.00	0.00	8.39
UEIB-31/UEIB-55[13]	1,849	170	1.92	0.35	0.00	0.00	0.00	5.32
UEIB-32	2,875	89	1.11	0.20	28.40	5.39	0.05	37.77
UEIB-33	3,038	791	10.44	1.92	54.26	43.03	0.38	12.11
UEIB-34	2,803	224	2.72	0.50	0.00	0.00	0.00	0.73
UEIB-35	7,304	1,247	13.70	2.51	0.00	0.00	0.00	21.00
UEIB-36	3,023	153	1.76	0.32	0.00	0.00	0.00	0.84
UEIB-37 [6]	1,438	417	4.98	0.91	0.00	0.00	0.00	4.14
UEIB-38	618	68	0.88	0.16	0.00	0.00	0.00	0.19
UEIB-39 [6]	1,321	124	1.55	0.28	0.00	0.00	0.00	3.80
UEIB-40 [6]	1,295	197	2.58	0.47	0.00	0.00	0.00	3.73
UEIB-41 [6]	2,406	588	6.95	1.27	0.00	0.00	0.00	6.92
UEIB-42 [6]	4,493	0	0.00	0.00	0.00	0.00	0.00	12.93
UEIB-43	5,197	253	4.06	0.74	0.00	0.00	0.00	14.95
UEIB-44	1,359	65	0.79	0.14	23.17	4.46	0.04	4.73
UEIB-45 [8]	3,910	529	6.53	1.20	188.11	32.25	0.28	27.15
UEIB-46 [9]	533	55	0.76	0.14	10.17	0.00	0.00	3.81
Total	109,942	10,403	136	25	22,025	88	0.84	281.21

Extraction Well	March 26, 2014							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	Fluid Extraction Rate[12] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	NA
UEIB-2[2]/UEIB-52[13]	234	14	0.16	0.03	1,578	0.00	0.00	0.04
UEIB-3/UEIB-53[13]	561	36	0.38	0.07	4,465	0.00	0.00	0.10
UEIB-4/UEIB-54[13]	334	13	0.17	0.03	154	0.00	0.00	0.04
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	NA
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	NA
UEIB-7/UEIB-47[13]	311	4	0.04	0.01	5,644	0.00	0.00	0.01
UEIB-8/UEIB-48[13]	1,220	30	0.31	0.06	0.00	0.00	0.00	0.09
UEIB-9/UEIB-49[13]	1,904	68	0.78	0.14	0.00	0.00	0.00	0.20
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	86	1	0.01	0.00	825	0.00	0.00	0.00
UEIB-15	3,033	217	1.12	0.21	0.00	0.00	0.00	0.04
UEIB-16	3,536	1,460	18.42	3.38	0.00	0.00	0.00	0.80
UEIB-17	1,869	338	2.94	0.54	0.00	0.00	0.00	0.33
UEIB-18	2,593	357	2.42	0.44	0.00	0.00	0.00	0.54
UEIB-19	3,519	370	3.17	0.58	0.00	0.00	0.00	0.85
UEIB-20/UEIB-56[13]	6,510	312	2.52	0.46	0.00	0.00	0.00	0.65
UEIB-21	5,065	655	8.26	1.52	0.00	0.00	0.00	4.54
UEIB-22	1,979	309	3.14	0.58	0.00	0.00	0.00	0.71
UEIB-23	1,465	376	4.72	0.87	0.00	0.00	0.00	1.08
UEIB-24	5,429	360	3.72	0.68	0.00	0.00	0.00	1.04
UEIB-25	3,317	434	3.99	0.73	0.00	0.00	0.00	0.13
UEIB-26	4,486	2,413	32.98	6.05	0.00	0.00	0.00	0.87
UEIB-27	3,563	506	4.96	0.91	0.00	0.00	0.00	0.95
UEIB-28	2,307	14	0.20	0.04	0.00	0.00	0.00	0.04
UEIB-29	5,604	679	7.07	1.30	0.00	0.00	0.00	1.96
UEIB-30	3,162	248	2.60	0.48	0.00	0.00	0.00	0.71
UEIB-31/UEIB-55[13]	2,157	308	4.68	0.86	0.00	0.00	0.00	0.89
UEIB-32	2,966	91	0.79	0.14	39.34	10.94	0.13	1.19
UEIB-33	3,792	753	7.34	1.35	54.26	0.00	0.00	3.01
UEIB-34	3,057	253	2.70	0.49	0.00	0.00	0.00	0.07
UEIB-35	7,997	692	6.66	1.22	0.00	0.00	0.00	1.99
UEIB-36	3,264	242	2.75	0.50	0.00	0.00	0.00	0.07
UEIB-37 [6]	1,892	454	4.83	0.89	0.00	0.00	0.00	1.31
UEIB-38	713	96	1.00	0.18	0.00	0.00	0.00	0.03
UEIB-39 [6]	1,572	251	2.80	0.51	0.00	0.00	0.00	0.72
UEIB-40 [6]	1,617	322	3.53	0.65	0.00	0.00	0.00	0.93
UEIB-41 [6]	2,871	464	5.14	0.94	0.00	0.00	0.00	1.34
UEIB-42 [6]	4,577	83	1.19	0.22	0.00	0.00	0.00	0.24
UEIB-43	6,242	1,044	10.87	1.99	0.00	0.00	0.00	3.01
UEIB-44	1,432	73	0.67	0.12	23.87	0.69	0.01	0.25
UEIB-45 [8]	4,713	803	8.40	1.54	255.22	67.10	0.80	5.58
UEIB-46 [9]	662	129	1.44	0.26	10.17	0.00	0.00	0.93
Total	125,755	15,813	174	32	22,127	102	1.14	38.55

Extraction Well	June 24-25 and July 7, 2014							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	Fluid Extraction Rate[12] (gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	NA
UEIB-2[2]/UEIB-52[13]	248	15	0.15	0.03	1,578	0.00	0.00	5.49
UEIB-3/UEIB-53[13]	595	34	0.38	0.07	4,465	0.00	0.00	12.80
UEIB-4/UEIB-54[13]	346	12	0.13	0.02	153.92	0.00	0.00	4.58
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	NA
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	NA
UEIB-7/UEIB-47[13]	315	4	0.05	0.01	5,644	0.00	0.00	1.64
UEIB-8/UEIB-48[13]	1,274	54	0.59	0.11	0.00	0.00	0.00	0.05
UEIB-9/UEIB-49[13]	1,970	66	0.96	0.18	0.00	0.00	0.00	24.78
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	90	4	0.04	0.01	825	0.00	0.00	1.51
UEIB-15	3,152	119	0.84	0.15	0.00	0.00	0.00	0.10
UEIB-16	4,053	516	4.68	0.86	0.00	0.00	0.00	0.18
UEIB-17	2,057	188	0.72	0.13	0.00	0.00	0.00	0.11
UEIB-18	2,826	233	2.31	0.42	0.00	0.00	0.00	87.34
UEIB-19	4,013	493	5.02	0.92	0.00	0.00	0.00	0.63
UEIB-20/UEIB-56[13]	6,667	157	1.70	0.31	0.00	0.00	0.00	0.12
UEIB-21	6,581	1,516	4.12	0.76	0.00	0.00	0.00	10.51
UEIB-22	2,293	315	2.94	0.54	0.00	0.00	0.00	0.18
UEIB-23	1,946	482	4.54	0.83	0.00	0.00	0.00	0.51
UEIB-24	5,439	10	0.10	0.02	0.00	0.00	0.00	0.04
UEIB-25	3,317	0	0.76	0.14	0.00	0.00	0.00	0.00
UEIB-26	4,783	297	3.32	0.61	0.00	0.00	0.00	0.64
UEIB-27	3,918	355	3.48	0.64	0.00	0.00	0.00	1.44
UEIB-28	2,428	121	1.64	0.30	0.00	0.00	0.00	0.26
UEIB-29	5,937	334	2.57	0.47	0.00	0.00	0.00	125.08
UEIB-30	3,167	5	0.96	0.18	0.00	0.00	0.00	0.02
UEIB-31/UEIB-55[13]	2,545	388	3.97	0.73	0.00	0.00	0.00	145.55
UEIB-32	3,071	105	1.17	0.21	44.62	5.27	0.04	2.65
UEIB-33	3,792	0	0.16	0.03	54.26	0.00	0.00	0.00
UEIB-34	3,472	415	4.28	0.79	0.00	0.00	0.00	0.73
UEIB-35	8,328	331	3.68	0.67	0.00	0.00	0.00	0.39
UEIB-36	3,498	234	2.60	0.48	0.00	0.00	0.00	87.70
UEIB-37 [6]	2,207	315	3.49	0.64	0.00	0.00	0.00	118.09
UEIB-38	802	89	0.81	0.15	0.00	0.00	0.00	33.34
UEIB-39 [6]	1,750	178	1.97	0.36	0.00	0.00	0.00	66.76
UEIB-40 [6]	1,904	288	3.19	0.59	0.00	0.00	0.00	107.96
UEIB-41 [6]	3,100	229	2.80	0.51	0.00	0.00	0.00	85.86
UEIB-42 [6]	4,843	266	2.96	0.54	0.00	0.00	0.00	99.85
UEIB-43	6,533	291	8.10	1.49	0.00	0.00	0.00	109.31
UEIB-44	1,584	153	1.69	0.31	30.01	6.14	0.05	0.78
UEIB-45 [8]	5,294	581	5.23	0.96	337.72	82.50	1.33	4535.09
UEIB-46 [9]	812	150	1.65	0.30	10.17	0.00	0.00	0.75
Total	135,456	9,700	95	17	22,222	94	1.43	5737.47

Notes

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

Abbreviations:

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

TABLE C-1

SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE

PARKLAND BURNABY REFINERY

Extraction Well	September 29-30, 2014								December 15-17, 2014								February 24-25, 2015								May 26-28, 2015							
	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate[12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate[12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate[12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate[12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)
	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	NA	78	N/A	N/A	N/A	2,680	N/A	N/A	NA	78	N/A	N/A	N/A	2,680	N/A	N/A	NA	78	N/A	N/A	N/A	2,680	N/A	N/A	NA
UEIB-2[2]/UEIB-52[13]	256	8	0.05	0.01	1,578	0.00	0.00	1.84	280	24.3	0.34	0.06	1,578	0.00	0.00	0.12	303	23.1	0.25	0.05	1,578	0.00	0.00	0.07	317	13.5	0.09	0.02	1,578	0.00	0.00	0.65
UEIB-3/UEIB-53[13]	605	10	0.07	0.01	4,465	0.00	0.00	2.37	633	27.5	0.38	0.07	4,465	0.00	0.00	0.46	648	15.0	0.13	0.02	4,465	0.00	0.00	0.05	653	4.9	0.00	0.00	4,465	0.00	0.00	0.24
UEIB-4/UEIB-54[13]	353	6	0.02	0.00	153.92	0.00	0.00	1.56	383	30.4	0.47	0.09	153.92	0.00	0.00	1.38	390	6.8	0.06	0.01	153.92	0.00	0.00	0.02	391	0.7	0.00	0.00	153.92	0.00	0.00	0.03
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	NA	358	N/A	N/A	N/A	184	N/A	N/A	NA	358	N/A	N/A	N/A	184	N/A	N/A	NA	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	NA	209	N/A	N/A	N/A	6,025	N/A	N/A	NA	209	N/A	N/A	N/A	6,025	N/A	N/A	NA	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	316	0.2	0.00	0.00	5,644	0.00	0.00	0.06	320	4.7	0.07	0.01	5,644	0.00	0.00	0.14	323	3.2	0.04	0.01	5,644	0.00	0.00	0.01	324	0.9	0.00	0.00	5,644	0.00	0.00	0.04
UEIB-8/UEIB-48[13]	1,299	25	0.01	0.00	0.00	0.00	0.00	6.00	1,345	46.3	0.58	0.11	2.83	2.83	0.04	0.13	1,431	85.8	1.03	0.19	6.80	3.97	0.07	0.14	1,467	36.1	0.20	0.04	6.80	0.00	0.00	1.75
UEIB-9/UEIB-49[13]	2,020	50	0.44	0.08	0.00	0.00	0.00	0.03	2,104	84.3	1.05	0.19	0.00	0.00	0.00	0.02	2,159	55.0	0.58	0.11	0.00	0.00	0.00	0.01	2,222	63.3	0.57	0.10	0.00	0.00	0.00	0.02
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	91	0.3	0.00	0.00	825	0.00	0.00	0.07	92	1.1	0.02	0.00	825	0.00	0.00	0.13	93	1.7	0.02	0.00	825	0.00	0.00	0.01	94	0.5	0.00	0.00	825	0.00	0.00	0.02
UEIB-15	3,616	464	2.05	0.38	0.00	0.00	0.00	0.23	4,442	826.0	11.46	2.10	0.00	0.00	0.00	0.74	5,558	1,116.2	8.90	1.63	0.00	0.00	0.00	0.68	6,305	747.3	7.69	1.41	0.00	0.00	0.00	0.28
UEIB-16	4,679	626	1.65	0.30	0.00	0.00	0.00	153.36	5,294	615.0	9.58	1.76	0.00	0.00	0.00	0.63	5,298	4.4	0.01	0.00	0.00	0.00	0.00	0.00	5,299	0.3	0.01	0.00	0.00	0.00	0.00	0.00
UEIB-17	2,257	200	2.57	0.47	0.00	0.00	0.00	49.04	2,444	187.0	2.02	0.37	0.00	0.00	0.00	0.15	2,819	375.0	2.18	0.40	0.00	0.00	0.00	1.17	2,873	53.7	0.73	0.13	0.00	0.00	0.00	2.61
UEIB-18	3,002	177	1.93	0.35	0.00	0.00	0.00	0.50	3,374	371.9	4.25	0.78	0.00	0.00	0.00	0.30	3,788	413.9	5.72	1.05	0.00	0.00	0.00	0.96	4,272	483.9	5.71	1.05	0.00	0.00	0.00	0.20
UEIB-19	4,301	288	0.99	0.18	0.00	0.00	0.00	70.61	4,308	7.3	0.13	0.02	0.00	0.00	0.00	0.02	4,343	34.8	0.44	0.08	0.00	0.00	0.00	0.05	4,355	12.1	0.21	0.04	0.00	0.00	0.00	0.59
UEIB-20/UEIB-56[13]	7,003	336	4.09	0.75	0.00	0.00	0.00	0.28	7,584	581.4	4.32	0.79	0.00	0.00	0.00	0.51	8,094	510.0	6.01	1.10	0.00	0.00	0.00	0.40	8,837	743.0	6.33	1.16	0.00	0.00	0.00	0.77
UEIB-21	6,924	343	5.70	1.05	0.00	0.00	0.00	83.85	7,647	723.5	8.90	1.63	0.00	0.00	0.00	3.51	8,362	714.7	6.83	1.25	0.00	0.00	0.00	4.29	8,850	488.3	6.69	1.23	0.00	0.00	0.00	2.52
UEIB-22	2,557	264	2.70	0.49	0.00	0.00	0.00	0.37	3,322	764.7	9.77	1.79	0.00	0.00	0.00	2.41	3,477	155.0	1.92	0.35	0.00	0.00	0.00	0.48	3,824	347.6	3.99	0.73	0.00	0.00	0.00	0.55
UEIB-23	2,453	507	6.03	1.11	0.00	0.00	0.00	0.22	4,145	1,692.0	24.26	4.45	0.00	0.00	0.00	2.93	4,598	452.7	5.76	1.06	0.00	0.00	0.00	0.64	4,942	344.2	4.88	0.90	0.00	0.00	0.00	0.15
UEIB-24	5,548	109	1.37	0.25	0.00	0.00	0.00	0.02	5,820	272.1	2.48	0.46	0.00	0.00	0.00	0.19	5,979	158.4	11.55	2.12	0.00	0.00	0.00	0.10	6,894	915.1	8.88	1.63	0.00	0.00	0.00	44.50
UEIB-25	3,598	281	3.75	0.69	0.00	0.00	0.00	68.80	4,126	527.8	7.16	1.31	0.00	0.00	0.00	0.55	4,672	546.5	3.69	0.68	0.00	0.00	0.00	0.78	4,965	293.0	3.21	0.59	0.00	0.00	0.00	0.35
UEIB-26	4,961	178	1.97	0.36	0.00	0.00	0.00	43.56	5,425	463.4	0.67	0.12	0.00	0.00	0.00	0.90	5,524	99.1	4.68	0.86	0.00	0.00	0.00	0.38	8,175	2,651.4	46.00	8.44	0.00	0.00	0.00	128.95
UEIB-27	4,412	493	8.08	1.48	0.00	0.00	0.00	0.93	5,512	1,100.7	12.45	2.28	0.00	0.00	0.00	7.02	6,042	529.4	1.41	0.26	0.00	0.00	0.00	3.07	6,540	498.7	4.46	0.82	0.00	0.00	0.00	1.34
UEIB-28	2,547	119	1.97	0.36	0.00	0.00	0.00	29.13	2,864	317.3	3.98	0.73	0.00	0.00	0.00	0.75	3,191	326.5	10.18	1.87	0.00	0.00	0.00	1.00	3,494	303.3	2.31	0.42	0.00	0.00	0.00	0.15
UEIB-29	6,185	248	2.95	0.54	0.00	0.00	0.00	60.68	6,621	435.6	3.30	0.60	0.00	0.00	0.00	0.22	7,007	386.4	3.88	0.71	0.00	0.00	0.00	0.10	7,706	698.6	5.00	0.92	0.00	0.00	0.00	0.24
UEIB-30	3,409	242	3.37	0.62	0.00	0.00	0.00	0.06	3,844	434.7	4.89	0.90	0.00	0.00	0.00	0.31	4,403	559.4	7.80	1.43	0.00	0.00	0.00	0.29	4,750	346.8	2.90	0.53	0.00	0.00	0.00	0.21
UEIB-31/UEIB-55[13]	3,942	1,397	21.77	3.99	0.00	0.00	0.00	341.95	3,947	5.2	0.03	0.01	0.00	0.00	0.00	0.16	3,993	46.2	3.10	0.57	0.00	0.00	0.00	0.01	4,160	167.0	0.09	0.02	0.00	0.00	0.00	8.12
UEIB-32	3,177	105	1.04	0.19	44.62	0.00	0.00	0.66	3,315	138.2	1.53	0.28	44.62	0.00	0.00	1.14	3,442	127.5	1.46	0.27	44.62	0.00	0.00	1.03	3,544	102.0	1.06	0.19	44.62	0.00	0.00	0.57
UEIB-33	3,808	16	0.28	0.05	54.26	0.00	0.00	0.12	3,968	160.7	2.07	0.38	54.26	0.00	0.00	0.74	4,276	307.4	3.46	0.63	54.26	0.00	0.00	1.87	4,458	182.5	1.40	0.26	54.26	0.00	0.00	0.76
UEIB-34	3,952	480	4.48	0.82	24.02	24.02	0.26	0.13	4,337	385.2	3.40	0.62	40.07	16.06	0.20	2.68	4,703	365.8	4.35	0.80	40.07	0.00	0.00	0.56	4,970	266.4	2.75	0.50	40.07	0.00	0.00	0.04
UEIB-35	8,401	74	0.02	0.00	0.00	0.00	0.00	4.87	8,891	489.3	7.17	1.31	0.00	0.00	0.00	14.86	9,479	588.5	6.57	1.21	0.00	0.00	0.00	0.33	9,896	416.5	3.77	0.69	0.00	0.00	0.00	20.26
UEIB-36	3,833	335	3.51	0.64	16.77	16.77	0.23	82.08	4,193	359.6	3.04	0.56	33.16	16.39	0.20	0.11	4,326	132.7	1.57	0.29	33.16	0.00	0.00	0.04	4,392	66.4	1.07	0.20	33.16	0.00	0.00	3.23
UEIB-37[6]	3,359	1,152	17.29	3.17	0.00	0.00	0.00	282.08	3,926	566.8	5.70	1.05	0.00	0.00	0.00	6.35	4,443	517.1	5.87	1.08	0.00	0.00	0.00	0.74	4,521	77.2	0.72	0.13	0.00	0.00	0.00	3.76
UEIB-38	810	8	0.09	0.02	0.00	0.00	0.00	1.98	810	-	0.08	0.01	0.00	0.00	0.00	0.00	810	0.0	0.00	0.00	0.00	0.00	0.00	0.00	810	0.0	0.00	0.00	0.00	0.00	0.00	0.00
UEIB-39[6]	1,921	171	1.58	0.29	0.00	0.00	0.00	0.09	2,142	221.0	2.60	0.48	0.00	0.00	0.00	0.11	2,396	254.2	2.96	0.54	0.00	0.00	0.00	0.47	2,518	121.5	1.34	0.25	0.00	0.00	0.00	0.02
UEIB-40[6]	2,168	264	3.68	0.67	0.00	0.00	0.00	0.13	2,493	325.2	3.77	0.69	0.00	0.00	0.00	0.10	2,793	299.2	3.33	0.61	0.00	0.00	0.00	0.19	2,946	153.3	1.63	0.30	0.00	0.00	0.00	7.46
UEIB-41[6]	4,721	1,621	3.26	0.60	0.00	0.00	0.00	0.47	5,132	410.7	3.74	0.69	0.00	0.00	0.00	12.47	5,440	308.6	3.54	0.65	0.00	0.00	0.00	0.52	5,653	213.2	2.33	0.43	0.00	0.00	0.00	10.37
UEIB-42[6]	5,083	240	2.53	0.46	0.00	0.00	0.00	0.14	5,666	582.8	6.74	1.24	0.00	0.00	0.00	0.10	6,620	953.8	11.00	2.02	0.00	0.00	0.00	0.24	7,210	590.5	8.12	1.49	0.00	0.00	0.00	28.72
UEIB-43	7,879	1,346	10.70	1.96	0.00	0.00	0.00	329.40	8,870	991.8	9.22	1.69	0.00	0.00	0.00	30.13	9,694	824.1	9.74	1.79	0.00	0.00	0.00	2.57	9,760	65.8	0.00	0.00	0.00	0.00	0.00	3.20
UEIB-44	1,714	130	1.25	0.23	42.96	12.95	0.18	1.77	1,714	0.3	0.00	0.00	42.98	0.01	0.00	0.01	1,732	18.0	0.33	0.06	42.98	0.00	0.00	0.13	1,821	88.5	0.93	0.17	42.98	0.00	0.00	0.29
UEIB-45[8]	6,477	1,182	10.69	1.96	455.95	118.23	1.53	5659.44	7,018	541.4	5.38	0.99	501.07	45.12	0.58	391.41	7,738	719.9	8.87	1.63	557.72	56.65	0.82	19.39	8,450	711.5	7.39	1.35	632.50	74.78	0.95	667.34
UEIB-46[9]	937	124	1.18	0.22	10.17	0.00	0.00	0.59	1,111	174.0	2.27	0.42	10.17	0.00	0.00	1.53	1,232	121.2	1.36	0.25	10.17	0.00	0.00	0.76	1,299	66.8	0.53	0.10	10.17	0.00	0.00	0.40
Total	149,167	13,712	136	25	22,394	172	2.21	7279.78	164,724	15,556	178	33	22,489	95	1.20	499.60	177,362	12,638	157	29	22,550	61	0.89	44.55	190,019	12,657	146	27	22,624	75	0.95	947.83

Notes

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

Abbreviations:

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

TABLE C-1
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE
PARKLAND BURNABY REFINERY

Extraction Well	August 11-13, 2015							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate 12 (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	317	0.1	0.00	0.00	1,578	0.00	0.00	0.00
UEIB-3/UEIB-53[13]	653	0.0	0.00	0.00	4,465	0.00	0.00	0.00
UEIB-4/UEIB-54[13]	391	0.0	0.00	0.00	154	0.00	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	324	0.1	0.00	0.00	5,644	0.00	0.00	0.00
UEIB-8/UEIB-48[13]	1,467	0.2	0.00	0.00	6.80	0.00	0.00	0.01
UEIB-9/UEIB-49[13]	2,255	32.3	0.30	0.06	0.00	0.00	0.00	1.04
UEIB-10[4]/UEIB-50[13]	792	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-11[3]	10	N/A	N/A	N/A	0.00	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	94	0.2	0.00	0.00	825	0.00	0.00	0.01
UEIB-15	7,443	1,137.6	2.62	0.48	0.00	0.00	0.00	0.14
UEIB-16	5,313	14.6	0.23	0.04	0.00	0.00	0.00	0.47
UEIB-17	3,149	276.3	4.87	0.89	0.00	0.00	0.00	9
UEIB-18	4,795	523.2	4.92	0.90	0.00	0.00	0.00	0.20
UEIB-19	5,232	876.8	3.61	0.66	0.00	0.00	0.00	28.16
UEIB-20/UEIB-56[13]	9,712	874.6	8.34	1.53	0.00	0.00	0.00	0.40
UEIB-21	9,623	772.1	8.51	1.56	0.00	0.00	0.00	3.47
UEIB-22	3,981	157.2	1.37	0.25	0.00	0.00	0.00	0.05
UEIB-23	5,381	438.4	4.31	0.79	0.00	0.00	0.00	14.08
UEIB-24	7,546	652.4	3.45	0.63	0.00	0.00	0.00	20.95
UEIB-25	5,177	211.8	2.12	0.39	0.00	0.00	0.00	6.80
UEIB-26	8,339	164.1	1.61	0.30	0.00	0.00	0.00	5.27
UEIB-27	6,739	198.9	2.15	0.40	0.00	0.00	0.00	0.39
UEIB-28	3,594	99.9	1.22	0.22	0.00	0.00	0.00	3.21
UEIB-29	7,983	277.7	1.55	0.28	0.00	0.00	0.00	0.24
UEIB-30	5,006	256.1	3.30	0.61	0.00	0.00	0.00	8.23
UEIB-31/UEIB-55[13]	4,237	76.9	0.74	0.14	0.00	0.00	0.00	2.47
UEIB-32	3,619	74.5	0.75	0.14	44.62	0.00	0.00	0.44
UEIB-33	4,528	69.3	0.69	0.13	54.26	0.00	0.00	0.37
UEIB-34	5,150	180.5	1.62	0.30	40.07	0.00	0.00	0.03
UEIB-35	10,162	266.0	2.64	0.48	0.00	0.00	0.00	8.54
UEIB-36	4,463	71.0	0.82	0.15	33.16	0.00	0.00	2.28
UEIB-37 [6]	4,607	86.3	0.94	0.17	0.00	0.00	0.00	2.77
UEIB-38	814	3.5	0.05	0.01	0.00	0.00	0.00	0.11
UEIB-39 [6]	2,619	101.5	1.02	0.19	0.00	0.00	0.00	3.26
UEIB-40 [6]	3,080	133.8	1.34	0.25	0.00	0.00	0.00	4.30
UEIB-41 [6]	5,872	218.1	2.35	0.43	0.00	0.00	0.00	7.00
UEIB-42 [6]	7,883	673.1	6.75	1.24	0.00	0.00	0.00	21.62
UEIB-43	9,828	67.6	0.89	0.16	0.00	0.00	0.00	2.17
UEIB-44	1,893	71.8	0.69	0.13	42.98	0.00	0.00	0.34
UEIB-45 [8]	8,982	532.4	6.14	1.13	688.13	55.63	0.71	223.96
UEIB-46 [9]	1,354	55.2	0.52	0.10	10.17	0.00	0.00	0.17
Total	199,824	9,805	84	15	22,680	56	0.71	381.84

Extraction Well	November 16-19, 2015							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate 12 (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	326	9.3	0.12	0.02	1,578	0.00	0.00	0.18
UEIB-3/UEIB-53[13]	660	7.5	0.12	0.02	4,465	0.00	0.00	0.15
UEIB-4/UEIB-54[13]	391	0.4	0.01	0.00	154	0.00	0.00	0.01
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	327	2.8	0.04	0.01	5,644	0.00	0.00	0.05
UEIB-8/UEIB-48[13]	1,512	45.0	0.40	0.07	6.80	0.00	0.00	0.09
UEIB-9/UEIB-49[13]	2,337	82.8	1.02	0.19	0.00	0.00	0.00	0.01
UEIB-10[4]/UEIB-50[13]	793	1.5	0.00	0.00	0.00	0.00	0.00	0.03
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	0.8	0.01	0.00	825	0.00	0.00	0.02
UEIB-15	7,540	97.5	2.31	0.42	0.00	0.00	0.00	0.08
UEIB-16	5,379	65.2	0.54	0.10	0.00	0.00	0.00	1.25
UEIB-17	3,524	375.0	2.62	0.48	0.00	0.00	0.00	7.21
UEIB-18	5,147	352.1	4.67	0.86	0.00	0.00	0.00	6.77
UEIB-19	5,589	356.8	1.34	0.25	0.00	0.00	0.00	0.40
UEIB-20/UEIB-56[13]	10,734	1,022.7	10.62	1.95	0.00	0.00	0.00	1.12
UEIB-21	10,243	620.2	7.15	1.31	0.00	0.00	0.00	1.62
UEIB-22	4,203	221.1	2.58	0.47	0.00	0.00	0.00	0.27
UEIB-23	5,609	228.5	2.26	0.41	0.00	0.00	0.00	4.39
UEIB-24	7,974	428.2	4.91	0.90	0.00	0.00	0.00	8.24
UEIB-25	5,377	199.5	2.35	0.43	0.00	0.00	0.00	3.84
UEIB-26	8,628	289.1	3.78	0.69	0.00	0.00	0.00	5.56
UEIB-27	7,005	265.4	3.18	0.58	0.00	0.00	0.00	0.68
UEIB-28	3,749	155.2	2.24	0.41	0.00	0.00	0.00	2.98
UEIB-29	8,405	421.1	4.56	0.84	0.00	0.00	0.00	0.16
UEIB-30	5,011	5.3	0.01	0.00	0.00	0.00	0.00	0.06
UEIB-31/UEIB-55[13]	4,455	218.1	2.52	0.46	0.00	0.00	0.00	4.19
UEIB-32	3,695	76.6	0.92	0.17	44.62	0.00	0.00	0.52
UEIB-33	4,718	190.0	2.70	0.50	54.26	0.00	0.00	0.67
UEIB-34	5,270	119.9	0.98	0.18	40.07	0.00	0.00	0.01
UEIB-35	10,419	257.1	3.24	0.59	0.00	0.00	0.00	0.04
UEIB-36	4,579	115.5	1.19	0.22	33.16	0.00	0.00	2.22
UEIB-37 [6]	4,664	56.8	0.66	0.12	0.00	0.00	0.00	1.09
UEIB-38	852	37.7	0.42	0.08	0.00	0.00	0.00	0.73
UEIB-39 [6]	2,700	80.6	1.01	0.19	0.00	0.00	0.00	1.55
UEIB-40 [6]	3,213	133.7	1.60	0.29	0.00	0.00	0.00	2.57
UEIB-41 [6]	6,090	218.2	2.61	0.48	0.00	0.00	0.00	4.20
UEIB-42 [6]	8,471	587.8	7.03	1.29	0.00	0.00	0.00	11.31
UEIB-43	10,403	575.5	5.22	0.96	0.00	0.00	0.00	11.07
UEIB-44	1,942	49.0	0.53	0.10	42.98	0.00	0.00	0.94
UEIB-45 [8]	9,386	403.6	4.46	0.82	728.20	40.07	0.42	116.51
UEIB-46 [9]	1,437	83.2	0.93	0.17	10.17	0.00	0.00	0.39
Total	208,643	8,819	98	18	22,728	48	0.64	203.83

Extraction Well	February 1-3, 2016							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate 12 (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	340	14.0	0.17	0.03	1,578	0.00	0.00	0.20
UEIB-3/UEIB-53[13]	672	11.4	0.14	0.03	4,465	0.00	0.00	0.16
UEIB-4/UEIB-54[13]	392	1.1	0.01	0.00	154	0.00	0.00	0.02
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	329	1.6	0.02	0.00	5,644	0.00	0.00	0.01
UEIB-8/UEIB-48[13]	1,618	106.3	1.27	0.23	6.80	0.00	0.00	1.53
UEIB-9/UEIB-49[13]	2,419	81.3	0.89	0.16	0.00	0.00	0.00	2.69
UEIB-10[4]/UEIB-50[13]	803	10.1	0.11	0.02	0.00	0.00	0.00	0.14
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	7,709	168.7	2.42	0.44	0.00	0.00	0.00	0.03
UEIB-16	5,707	328.6	4.00	0.73	0.00	0.00	0.00	4.63
UEIB-17	3,875	350.9	3.83	0.70	0.00	0.00	0.00	4.95
UEIB-18	5,568	420.7	4.48	0.82	0.00	0.00	0.00	5.93
UEIB-19	5,798	209.0	2.63	0.48	0.00	0.00	0.00	0.19
UEIB-20/UEIB-56[13]	11,244	510.1	5.17	0.95	0.00	0.00	0.00	0.44
UEIB-21	10,371	128.1	2.21	0.40	0.00	0.00	0.00	0.16
UEIB-22	4,494	291.4	3.12	0.57	0.00	0.00	0.00	0.47
UEIB-23	5,948	339.3	4.08	0.75	0.00	0.00	0.00	4.79
UEIB-24	8,325	351.2	3.37	0.62	0.00	0.00	0.00	4.95
UEIB-25	5,733	356.8	4.59	0.84	0.00	0.00	0.00	5.03
UEIB-26	9,030	401.3	4.41	0.81	0.00	0.00	0.00	5.66
UEIB-27	7,381	376.4	3.16	0.58	0.00	0.00	0.00	1.60
UEIB-28	4,111	361.8	4.74	0.87	0.00	0.00	0.00	0.31
UEIB-29	8,665	260.7	2.21	0.40	0.00	0.00	0.00	3.68
UEIB-30	5,024	12.4	0.18	0.03	0.00	0.00	0.00	0.00
UEIB-31/UEIB-55[13]	4,667	211.4	2.29	0.42	0.00	0.00	0.00	2.98
UEIB-32	3,803	107.7	1.24	0.23	44.62	0.00	0.00	0.57
UEIB-33	5,039	321.2	3.76	0.69	54.26	0.00	0.00	0.91
UEIB-34	5,376	106.1	1.19	0.22	40.07	0.00	0.00	0.02
UEIB-35	10,964	545.2	6.42	1.18	0.00	0.00	0.00	7.69
UEIB-36	4,591	12.3	0.16	0.03	33.16	0.00	0.00	0.17
UEIB-37 [6]	4,747	82.9	0.93	0.17	0.00	0.00	0.00	1.17
UEIB-38	901	49.5	0.56	0.10	0.00	0.00	0.00	0.70
UEIB-39 [6]	2,867	166.9	2.00	0.37	0.00	0.00	0.00	2.35
UEIB-40 [6]	3,345	131.5	1.44	0.26	0.00	0.00	0.00	1.85
UEIB-41 [6]	6,398	308.5	3.59	0.66	0.00	0.00	0.00	4.35
UEIB-42 [6]	9,225	754.2	8.40	1.54	0.00	0.00	0.00	10.64
UEIB-43	10,700	296.7	3.70	0.68	0.00	0.00	0.00	4.18
UEIB-44	1,992	50.2	0.59	0.11	42.98	0.00	0.00	0.16
UEIB-45 [8]	9,820	434.1	4.89	0.90	762.56	34.36	0.45	70.45
UEIB-46 [9]	1,550	112.8	1.23	0.23	10.17	0.00	0.00	0.52
Total	218,278	9,635	107	20	22,762	34	0.45	164.89

Extraction Well	May 30,31 June 8, 9, and 15, 2016							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate 12 (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	350	9.6	0.09	0.02	1,578	0.00	0.00	0.16
UEIB-3/UEIB-53[13]	675	3.0	0.01	0.00	4,465	0.00	0.00	0.05
UEIB-4/UEIB-54[13]	393	0.5	0.00	0.00	154	0.00	0.00	0.01
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	330	0.8	0.01	0.00	5,644	0.00	0.00	0.01
UEIB-8/UEIB-48[13]	1,713	95.0	0.97	0.18	6.80	0.00	0.00	0.08
UEIB-9/UEIB-49[13]	2,483	64.5	0.64	0.12	0.00	0.00	0.00	0.07
UEIB-10[4]/UEIB-50[13]	811	7.7	0.09	0.02	0.00	0.00	0.00	0.13
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	7,891	182.0	1.37	0.25	0.00	0.00	0.00	0.03
UEIB-16	5,951	243.9	2.11	0.39	0.00	0.00	0.00	4.13
UEIB-17	4,000	125.0	1.63	0.30	0.00	0.00	0.00	2.12
UEIB-18	5,939	370.8	3.55	0.65	0.00	0.00	0.00	6.28
UEIB-19	6,053	254.9	2.55	0.47	0.00	0.00	0.00	0.18
UEIB-20/UEIB-56[13]	11,766	521.6	5.87	1.08	0.00	0.00	0.00	0.07
UEIB-21	10,371	0.0	0.00	0.00	0.00	0.00	0.00	0
UEIB-22	4,735	240.7	2.30	0.42	0.00	0.00	0.00	0.37
UEIB-23	6,100	151.3	1.38	0.25	0.00	0.00	0.00	2.56
UEIB-24	8,617	291.7	3.22	0.59	0.00	0.00	0.00	4.94
UEIB-25	6,134	401.0	4.11	0.75	0.00	0.00	0.00	6.79
UEIB-26	9,304	274.3	2.79	0.51	0.00	0.00	0.00	4.65
UEIB-27	7,570	188.4	1.86	0.34	0.00	0.00	0.00	0.57
UEIB-28	4,472	360.7	3.80	0.70	0.00	0.00	0.00	6
UEIB-29	8,840	174.4	1.96	0.36	0.00	0.00	0.00	2.95
UEIB-30	5,113	89.1	0.97	0.18	0.00	0.00	0.00	2
UEIB-31/UEIB-55[13]	4,667	0.0	0.00	0.00	0.00	0.00	0.00	0.00
UEIB-32	3,901	97.8	1.07	0.20	44.62	0.00	0.00	0.41
UEIB-33	5,228	188.9	1.82	0.33	54.26	0.00	0.00	0.64
UEIB-34	5,447	71.1	0.71	0.13	40.07	0.00	0.00	1
UEIB-35	11,335	371.5	3.74	0.69	0.00	0.00	0.00	6.29
UEIB-36	4,591	0.0	0.00	0.00	33.16	0.00	0.00	0.00
UEIB-37 [6]	4,797	50.2	0.49	0.09	0.00	0.00	0.00	0.85
UEIB-38	942	40.5	0.42	0.08	0.00	0.00	0.00	0.69
UEIB-39 [6]	2,980	113.6	1.13	0.21	0.00	0.00	0.00	1.92
UEIB-40 [6]	3,501	155.9	2.02	0.37	0.00	0.00	0.00	0.03
UEIB-41 [6]	6,404	5.5	0.06	0.01	0.00	0.00	0.00	0.09
UEIB-42 [6]	9,958	732.2	8.04	1.48	0.00	0.00	0.00	12.40
UEIB-43	11,035	334.6	2.78	0.51	0.00	0.00	0.00	5.67
UEIB-44	2,041	49.4	0.54	0.10	42.98	0.00	0.00	0.15
UEIB-45 [8]	10,240	420.6	4.53	0.83	817.36	54.80	6.87	79.88
UEIB-46 [9]	1,600	49.8	0.35	0.06	10.17	0.00	0.00	0.61
Total	225,178	6,900	71	13	22,848	86	7.41	154.85

Notes

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

Abbreviations:

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

TABLE C-1
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE
PARKLAND BURNABY REFINERY

Extraction Well	August 29-31, 2016								November 14, 16, and 17, 2016								Feburary 20, 21, and 22, 2017								June 12, 13 and 14, 2017							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate[12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	356	5.9	0.05	0.01	1,578	0.00	0.00	0.04	365	9.8	0.14	0.03	1,578	0.00	0.00	0.04	380	14.1	0.15	0.03	1,578	0.00	0.00	0.05	392	12.5	0.11	0.02	1,578	0.00	0.00	0.08
UEIB-3/UEIB-53[13]	675	NA	0.01	0.00	4,465	N/A	N/A	N/A	675	NA	0.01	0.00	4,465	N/A	N/A	N/A	675	NA	0.01	0.00	4,465	N/A	N/A	N/A	675	NA	NA	NA	4,465	N/A	N/A	N/A
UEIB-4/UEIB-54[13]	394	1.2	0.02	0.00	154	0.00	0.00	0.01	399	5.4	0.07	0.01	154	0.00	0.00	0.02	408	8.8	0.06	0.01	154	0.00	0.00	0.03	413	5.2	0.02	0.00	154	0.00	0.00	0.03
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	330	0.7	0.01	0.00	5,644	0.00	0.00	0.00	332	1.5	0.02	0.00	5,644	0.00	0.00	0.00	333	0.9	0.01	0.00	5,644	0.00	0.00	0.00	335	1.8	0.02	0.00	5,644	0.00	0.00	0.01
UEIB-8/UEIB-48[13]	1,742	28.8	0.09	0.02	6.80	0.00	0.00	0.19	1,793	50.4	0.79	0.14	6.80	0.00	0.00	0.01	1,889	96.0	1.07	0.20	6.80	0.00	0.00	0.10	1,976	87.8	0.75	0.14	6.80	0.00	0.00	0.04
UEIB-9/UEIB-49[13]	2,530	46.3	0.45	0.08	0.00	0.00	0.00	0.05	2,574	44.7	0.59	0.11	0.00	0.00	0.00	0.19	2,621	46.5	0.48	0.09	0.00	0.00	0.00	0.15	2,675	54.3	0.50	0.09	0.00	0.00	0.00	0.34
UEIB-10[4]/UEIB-50[13]	819	8.5	0.10	0.02	0.00	0.00	0.00	0.06	831	11.9	0.16	0.03	0.00	0.00	0.00	0.05	846	14.7	0.16	0.03	0.00	0.00	0.00	0.05	867	20.6	0.19	0.03	0.00	0.00	0.00	0.13
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	N/A	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	8,671	780.1	12.38	2.27	0.00	0.00	0.00	0.15	9,013	342.0	4.28	0.79	0.00	0.00	0.00	0.13	9,479	465.7	5.43	1.00	0.00	0.00	0.00	0.20	10,223	743.9	7.19	1.32	0.00	0.00	0.00	0.13
UEIB-16	6,163	211.8	2.58	0.47	0.00	0.00	0.00	1.37	6,430	267.4	2.97	0.55	0.00	0.00	0.00	1.15	6,996	565.5	5.50	1.01	0.00	0.00	0.00	1.82	7,093	97.7	0.85	0.16	0.00	0.00	0.00	0.62
UEIB-17	4,131	130.8	1.18	0.22	0.00	0.00	0.00	0.85	4,686	555.5	8.65	1.59	0.00	0.00	0.00	2.38	5,168	481.8	3.76	0.69	0.00	0.00	0.00	1.55	5,390	222.0	3.09	0.57	0.00	0.00	0.00	1.40
UEIB-18	6,201	262.2	2.90	0.53	0.00	0.00	0.00	1.69	6,568	367.4	4.66	0.86	0.00	0.00	0.00	0.25	7,015	446.2	4.87	0.89	0.00	0.00	0.00	1.44	7,482	467.9	4.21	0.77	0.00	0.00	0.00	2.96
UEIB-19	6,422	369.2	4.74	0.87	0.00	0.00	0.00	0.19	6,574	152.4	0.54	0.10	0.00	0.00	0.00	0.65	7,097	522.3	5.44	1.00	0.00	0.00	0.00	1.68	7,550	453.1	4.30	0.79	0.00	0.00	0.00	0.35
UEIB-20/UEIB-56[13]	12,223	457.3	4.66	0.86	0.00	0.00	0.00	2.96	12,384	160.3	-	0.00	0.00	0.00	0.00	0.69	12,384	-	-	0.00	0.00	0.00	0.00	0.00	12,384	-	-	0.00	0.00	0.00	0.00	0.00
UEIB-21	10,633	262.3	6.36	1.17	0.00	0.00	0.00	1.70	11,282	649.1	9.14	1.68	0.00	0.00	0.00	2.43	12,218	935.4	8.50	1.56	0.00	0.00	0.00	1.13	12,837	619.7	6.79	1.25	0.00	0.00	0.00	0.60
UEIB-22	4,794	59.8	0.28	0.05	0.00	0.00	0.00	0.35	5,009	214.7	3.43	0.63	0.00	0.00	0.00	0.36	5,254	245.0	2.95	0.54	0.00	0.00	0.00	0.30	7,155	1,900.6	2.40	0.44	0.00	0.00	0.00	1.94
UEIB-23	6,150	50.1	0.36	0.07	0.00	0.00	0.00	0.32	6,268	118.4	1.78	0.33	0.00	0.00	0.00	0.51	6,562	294.1	3.76	0.69	0.00	0.00	0.00	0.95	6,789	227.0	1.42	0.26	0.00	0.00	0.00	1.44
UEIB-24	9,061	443.7	5.45	1.00	0.00	0.00	0.00	2.87	9,339	278.3	2.83	0.52	0.00	0.00	0.00	1.19	9,414	74.9	0.07	0.01	0.00	0.00	0.00	0.02	9,504	90.3	1.27	0.23	0.00	0.00	0.00	0.57
UEIB-25	6,379	244.4	2.15	0.39	0.00	0.00	0.00	1.58	6,578	199.7	2.43	0.45	0.00	0.00	0.00	0.86	6,815	236.2	2.54	0.47	0.00	0.00	0.00	0.76	7,078	263.7	2.64	0.48	0.00	0.00	0.00	1.67
UEIB-26	9,522	218.1	2.23	0.41	0.00	0.00	0.00	1.41	9,857	334.9	4.94	0.91	0.00	0.00	0.00	0.15	10,400	543.6	5.46	1.00	0.00	0.00	0.00	0.24	10,725	324.1	2.87	0.53	0.00	0.00	0.00	0.04
UEIB-27	8,076	506.7	7.09	1.30	0.00	0.00	0.00	1.54	8,225	148.5	0.06	0.01	0.00	0.00	0.00	0.22	8,451	226.1	2.69	0.49	0.00	0.00	0.00	0.71	9,086	635.5	8.85	1.62	0.00	0.00	0.00	1.38
UEIB-28	4,706	234.1	2.07	0.38	0.00	0.00	0.00	1.51	4,978	272.3	2.72	0.50	0.00	0.00	0.00	0.30	5,157	178.9	1.48	0.27	0.00	0.00	0.00	0.09	5,333	175.9	1.05	0.19	0.00	0.00	0.00	0.48
UEIB-29	9,642	802.4	10.53	1.93	0.00	0.00	0.00	5.19	10,612	969.7	12.47	2.29	0.00	0.00	0.00	4.16	11,376	764.6	5.47	1.00	0.00	0.00	0.00	2.46	11,636	259.5	3.41	0.63	0.00	0.00	0.00	1.64
UEIB-30	5,160	46.8	0.42	0.08	0.00	0.00	0.00	0.30	5,445	285.6	4.10	0.75	0.00	0.00	0.00	1.22	5,983	538.0	6.07	1.11	0.00	0.00	0.00	0.00	6,577	593.4	5.65	1.04	0.00	0.00	0.00	3.75
UEIB-31/UEIB-55[13]	4,667	0.0	0.00	0.00	0.00	0.00	0.00	0.00	4,667	0.0	0.00	0.00	0.00	0.00	0.00	0.00	4,667	-	0.00	0.00	0.00	0.00	0.00	0.00	4,667	-	0.00	0.00	0.00	0.00	0.00	0.00
UEIB-32	3,986	85.4	0.89	0.16	44.62	0.00	0.00	0.38	4,079	93.1	1.28	0.23	44.62	0.00	0.00	0.80	4,160	80.6	0.75	0.14	44.62	0.00	0.00	0.46	4,281	120.5	1.10	0.20	44.62	0.00	0.00	0.84
UEIB-33	5,341	113.7	0.99	0.18	54.26	0.00	0.00	0.41	5,489	148.1	1.97	0.36	54.26	0.00	0.00	0.40	5,809	320.1	3.36	0.62	54.26	0.00	0.00	0.84	6,078	268.8	2.31	0.42	54.26	0.00	0.00	3.72
UEIB-34	5,521	74.0	0.93	0.17	40.07	0.00	0.00	0.48	5,618	96.6	1.24	0.23	40.07	0.00	0.00	0.01	5,646	28.4	0.38	0.07	40.07	0.00	0.00	0.01	5,694	48.3	0.48	0.09	40.07	0.00	0.00	0.03
UEIB-35	11,605	269.5	2.75	0.50	0.00	0.00	0.00	1.74	11,914	309.2	4.10	0.75	0.00	0.00	0.00	1.33	12,276	362.0	3.58	0.66	0.00	0.00	0.00	1.16	12,577	300.8	2.83	0.52	0.00	0.00	0.00	0.04
UEIB-36	4,592	1.3	0.02	0.00	33.16	0.00	0.00	0.01	4,689	96.6	1.27	0.23	33.16	0.00	0.00	0.41	4,807	117.8	1.02	0.19	33.16	0.00	0.00	0.38	4,937	130.0	1.04	0.19	33.16	0.00	0.00	0.82
UEIB-37[6]	4,847	50.1	0.57	0.10	0.00	0.00	0.00	0.32	4,908	61.3	0.79	0.14	0.00	0.00	0.00	0.26	4,963	54.5	0.50	0.09	0.00	0.00	0.00	0.18	5,037	74.5	0.59	0.11	0.00	0.00	0.00	0.47
UEIB-38	980	38.4	0.44	0.08	0.00	0.00	0.00	0.25	1,038	58.1	0.79	0.14	0.00	0.00	0.00	0.25	1,067	28.8	0.19	0.04	0.00	0.00	0.00	0.09	1,093	26.2	0.37	0.07	0.00	0.00	0.00	0.17
UEIB-39[6]	3,018	37.7	0.30	0.05	0.00	0.00	0.00	0.24	3,022	3.8	0.05	0.01	0.00	0.00	0.00	0.02	3,530	508.4	7.60	1.39	0.00	0.00	0.00	1.64	3,937	407.0	1.39	0.26	0.00	0.00	0.00	2.57
UEIB-40[6]	3,682	181.4	1.93	0.35	0.00	0.00	0.00	1.17	3,813	131.0	1.50	0.28	0.00	0.00	0.00	0.56	3,953	139.8	1.34	0.25	0.00	0.00	0.00	0.03	4,087	133.8	1.30	0.24	0.00	0.00	0.00	0.85
UEIB-41[6]	6,643	239.5	3.05	0.56	0.00	0.00	0.00	1.55	8,580	1,937.0	4.26	0.78	0.00	0.00	0.00	8.31	8,757	176.5	2.10	0.38	0.00	0.00	0.00	0.57	8,961	203.8	1.89	0.35	0.00	0.00	0.00	1.29
UEIB-42[6]	10,600	642.8	6.81	1.25	0.00	0.00	0.00	4.15	11,114	513.9	6.46	1.19	0.00	0.00	0.00	4.01	11,470	356.1	2.92	0.53	0.00	0.00	0.00	0.07	11,932	461.4	4.73	0.87	0.00	0.00	0.00	0.08
UEIB-43	11,035	0.4	0.01	0.00	0.00	0.00	0.00	0.00	11,071	35.8	0.51	0.09	0.00	0.00	0.00	0.15	11,912	841.3	10.77	1.98	0.00	0.00	0.00	2.71	13,068	1,156.0	11.73	2.15	0.00	0.00	0.00	7.31
UEIB-44	2,082	40.5	0.42	0.08	42.98	0.00	0.00	0.14	2,166	84.6	1.22	0.22	42.98	0.00	0.54	0.41	2,242	75.9	0.51	0.09	42.98	0.00	0.00	0.25	2,317	74.7	0.71	0.13	42.98	0.00	0.00	0.23
UEIB-45[8]	10,695	454.7	2.85	0.52	866.97	49.61	0.54	17.23	10,995	300.0	3.84	0.70	893.55	26.58	0.34	6.63	11,444	449.3	5.13	0.94	933.44	39.89	0.41	11.83	12,038	594.2	5.75	1.06	1,000.33	66.89	0.59	28.44
UEIB-46[9]	1,671	71.0	1.12	0.21	12.47	2.30	0.03	0.32	1,774	103.1	1.37	0.25	16.23	3.76	0.05	1.09	1,891	117.5	1.32	0.24	16.23	0.00	0.00	0.78	2,013	121.7	1.17	0.21	16.23	0.00	0.00	2.46
Total	232,765	7,587	90	17	22,900	52	0.56	52.73	242,650	9,885	103	19	22,930	30	0.93	43.09	253,469	10,819	113	21	22,970	40	0.41	35.63	265,312	11,844	99	18	23,037	67	0.59	67.00

Notes

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

Abbreviations:

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

TABLE C-1
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE
PARKLAND BURNABY REFINERY

September 12, 13 and14, 2017

Extraction Well	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate [12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)
	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	392	0.0	0.00	0.00	1,578	0.00	0.00	0.00
UEIB-3/UEIB-53[13]	675	NA	NA	NA	4,465	N/A	N/A	N/A
UEIB-4/UEIB-54[13]	413	0.0	0.00	0.00	154	0.00	0.00	0.00
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	335	0.1	0.00	0.00	5,644	0.00	0.00	0.00
UEIB-8/UEIB-48[13]	1,976	-	-	0.00	6.80	0.00	0.00	0.00
UEIB-9/UEIB-49[13]	2,695	19.7	0.18	0.03	0.00	0.00	0.00	0.67
UEIB-10[4]/UEIB-50[13]	869	2.1	0.02	0.00	0.00	0.00	0.00	0.07
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	10,385	162.8	2.18	0.40	0.00	0.00	0.00	0.02
UEIB-16	7,356	262.4	3.35	0.61	0.00	0.00	0.00	8.98
UEIB-17	5,514	124.3	1.13	0.21	0.00	0.00	0.00	4.25
UEIB-18	7,738	256.0	2.27	0.42	0.00	0.00	0.00	8.76
UEIB-19	7,724	174.1	1.69	0.31	0.00	0.00	0.00	5.96
UEIB-20/UEIB-56[13]	12,384	N/A	N/A	0.00	0.00	0.00	0.00	N/A
UEIB-21	13,407	569.7	5.53	1.01	0.00	0.00	0.00	0.22
UEIB-22	7,244	89.5	0.86	0.16	0.00	0.00	0.00	3.06
UEIB-23	6,819	29.4	0.34	0.06	0.00	0.00	0.00	1.01
UEIB-24	9,677	172.8	2.07	0.38	0.00	0.00	0.00	5.91
UEIB-25	7,263	184.2	2.12	0.39	0.00	0.00	0.00	6.30
UEIB-26	10,844	119.6	1.34	0.25	0.00	0.00	0.00	4.09
UEIB-27	9,660	574.1	6.72	1.23	0.00	0.00	0.00	1.06
UEIB-28	5,351	17.8	0.24	0.04	0.00	0.00	0.00	0.00
UEIB-29	11,662	25.6	0.29	0.05	0.00	0.00	0.00	0.88
UEIB-30	6,922	345.1	3.91	0.72	0.00	0.00	0.00	11.81
UEIB-31/UEIB-55[13]	4,668	1.1	0.00	0.00	0.00	0.00	0.00	0.04
UEIB-32	4,358	77.0	0.95	0.17	44.62	0.00	0.00	0.50
UEIB-33	6,155	77.0	0.82	0.15	54.26	0.00	0.00	6.17
UEIB-34	5,761	66.7	0.81	0.15	40.07	0.00	0.00	0.05
UEIB-35	12,655	77.7	0.82	0.15	0.00	0.00	0.00	2.66
UEIB-36	5,055	117.8	1.38	0.25	33.16	0.00	0.00	4.03
UEIB-37 [6]	5,071	34.1	0.37	0.07	0.00	0.00	0.00	1.17
UEIB-38	1,127	34.4	0.40	0.07	0.00	0.00	0.00	1.18
UEIB-39 [6]	3,998	60.9	0.66	0.12	0.00	0.00	0.00	2.08
UEIB-40 [6]	4,166	79.0	0.89	0.16	0.00	0.00	0.00	0.01
UEIB-41 [6]	9,091	130.7	1.51	0.28	0.00	0.00	0.00	4.47
UEIB-42 [6]	12,181	249.0	2.96	0.54	0.00	0.00	0.00	0.10
UEIB-43	14,187	1,118.8	13.13	2.41	0.00	0.00	0.00	38.27
UEIB-44	2,356	38.8	0.45	0.08	42.98	0.00	0.00	0.14
UEIB-45 [8]	12,623	584.9	6.90	1.27	1,062.25	61.93	0.69	182.97
UEIB-46 [9]	2,073	59.7	0.60	0.11	16.23	0.00	0.00	0.23
Total	271,354	6,041	68	12	23,099	62	0.69	307.11

December 4, 5, 6 and 7, 2017

Extraction Well	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate [12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)
	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	435	43.1	0.69	0.13	1,578	0.00	0.00	0.30
UEIB-3/UEIB-53[13]	696	21.8	0.33	0.06	4,465	0.00	0.00	1.13
UEIB-4/UEIB-54[13]	457	43.5	0.44	0.08	154	0.00	0.00	1.23
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	340	5.5	0.11	0.02	5,644	0.00	0.00	0.29
UEIB-8/UEIB-48[13]	2,098	121.5	1.80	0.33	6.80	0.00	0.00	0.21
UEIB-9/UEIB-49[13]	2,760	65.1	0.87	0.16	0.00	0.00	0.00	3.38
UEIB-10[4]/UEIB-50[13]	925	56.0	0.89	0.16	0.00	0.00	0.00	0.01
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	10,579	193.3	2.65	0.49	0.00	0.00	0.00	0.03
UEIB-16	7,633	276.7	3.43	0.63	0.00	0.00	0.00	14.38
UEIB-17	5,847	332.5	5.10	0.94	0.00	0.00	0.00	17.28
UEIB-18	8,355	616.0	8.36	1.53	0.00	0.00	0.00	32.03
UEIB-19	7,990	266.7	3.85	0.71	0.00	0.00	0.00	2.26
UEIB-20/UEIB-56[13]	12,384	N/A	N/A	0.00	0.00	0.00	0.00	N/A
UEIB-21	13,889	482.2	6.52	1.20	0.00	0.00	0.00	0.37
UEIB-22	7,413	169.2	2.58	0.47	0.00	0.00	0.00	0.18
UEIB-23	6,855	36.7	0.48	0.09	0.00	0.00	0.00	1.91
UEIB-24	9,942	265.1	3.33	0.61	0.00	0.00	0.00	13.78
UEIB-25	7,441	178.3	2.29	0.42	0.00	0.00	0.00	9.27
UEIB-26	10,991	147.0	2.11	0.39	0.00	0.00	0.00	7.64
UEIB-27	11,202	1,541.7	26.03	4.78	0.00	0.00	0.00	4.46
UEIB-28	5,446	95.4	1.46	0.27	0.00	0.00	0.00	0.12
UEIB-29	11,987	325.3	3.06	0.56	0.00	0.00	0.00	16.91
UEIB-30	6,992	70.2	1.29	0.24	0.00	0.00	0.00	3.65
UEIB-31/UEIB-55[13]	4,733	65.5	0.90	0.16	0.00	0.00	0.00	3.40
UEIB-32	4,423	65.2	0.83	0.15	44.62	0.00	0.00	0.46
UEIB-33	6,275	119.3	1.88	0.34	54.26	0.00	0.00	0.43
UEIB-34	7,599	1,838.0	1.12	0.21	40.07	0.00	0.00	0.42
UEIB-35	12,775	120.5	1.61	0.29	0.00	0.00	0.00	6.27
UEIB-36	5,163	108.9	1.30	0.24	33.16	0.00	0.00	5.66
UEIB-37 [6]	5,103	31.9	0.41	0.08	0.00	0.00	0.00	1.66
UEIB-38	1,168	40.5	0.52	0.10	0.00	0.00	0.00	2.11
UEIB-39 [6]	4,097	98.7	1.36	0.25	0.00	0.00	0.00	5.13
UEIB-40 [6]	4,227	61.1	0.75	0.14	0.00	0.00	0.00	0.02
UEIB-41 [6]	9,250	159.0	2.13	0.39	0.00	0.00	0.00	8.27
UEIB-42 [6]	12,637	456.1	6.16	1.13	0.00	0.00	0.00	0.06
UEIB-43	15,056	869.4	10.95	2.01	0.00	0.00	0.00	45.20
UEIB-44	2,390	34.5	0.43	0.08	42.98	0.00	0.00	0.15
UEIB-45 [8]	13,018	394.3	4.74	0.87	1,103.64	41.39	0.49	360.75
UEIB-46 [9]	2,109	36.4	0.52	0.10	16.23	0.00	0.00	0.19
Total	281,587	10,233	119	22	23,140	41	0.49	583.27

March 26, 27, 28 and 29, 2018

Extraction Well	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate [12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)
	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	538	102.7	1.05	0.19	1,578	0.00	0.00	0.54
UEIB-3/UEIB-53[13]	739	42.2	0.43	0.08	4,468	2.38	0.02	1.80
UEIB-4/UEIB-54[13]	525	68.2	0.61	0.11	158	3.90	0.03	3.01
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	355	14.5	0.15	0.03	5,644	0.00	0.00	0.12
UEIB-8/UEIB-48[13]	2,238	140.4	1.43	0.26	6.80	0.00	0.00	0.09
UEIB-9/UEIB-49[13]	2,862	101.8	1.04	0.19	0.00	0.00	0.00	0.84
UEIB-10[4]/UEIB-50[13]	1,035	109.7	1.13	0.21	0.00	0.00	0.00	0.01
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	N/A	N/A	N/A	825	N/A	N/A	N/A
UEIB-15	11,000	420.9	4.38	0.80	0.00	0.00	0.00	3.49
UEIB-16	8,030	397.0	4.13	0.76	0.00	0.00	0.00	3.29
UEIB-17	6,222	375.4	3.91	0.72	0.00	0.00	0.00	3.11
UEIB-18	8,601	246.9	2.57	0.47	0.00	0.00	0.00	0.09
UEIB-19	8,501	510.4	5.32	0.98	0.00	0.00	0.00	0.48
UEIB-20/UEIB-56[13]	12,384	N/A	N/A	0.00	0.00	0.00	0.00	N/A
UEIB-21	14,419	529.7	5.52	1.01	0.00	0.00	0.00	0.51
UEIB-22	7,759	345.8	3.60	0.66	0.00	0.00	0.00	0.39
UEIB-23	6,946	90.7	0.94	0.17	0.00	0.00	0.00	0.75
UEIB-24	10,343	400.6	4.17	0.77	0.00	0.00	0.00	3.32
UEIB-25	7,680	238.8	2.49	0.46	0.00	0.00	0.00	0.06
UEIB-26	11,321	330.3	3.44	0.63	0.00	0.00	0.00	0.13
UEIB-27	11,615	412.5	4.33	0.80	0.00	0.00	0.00	0.22
UEIB-28	5,770	323.7	3.40	0.62	0.00	0.00	0.00	0.41
UEIB-29	11,992	4.9	0.05	0.01	0.00	0.00	0.00	0.04
UEIB-30	7,329	336.6	3.00	0.55	0.00	0.00	0.00	2.79
UEIB-31/UEIB-55[13]	4,842	108.9	0.97	0.18	0.00	0.00	0.00	0.90
UEIB-32	4,507	84.1	0.86	0.16	44.62	0.00	0.00	0.54
UEIB-33	6,584	309.6	3.16	0.58	54.26	0.00	0.00	1.37
UEIB-34	7,719	120.0	1.22	0.22	40.07	0.00	0.00	0.05
UEIB-35	12,980	204.4	2.08	0.38	0.00	0.00	0.00	0.04
UEIB-36	5,318	154.9	1.58	0.29	33.16	0.00	0.00	1.28
UEIB-37 [6]	5,163	60.1	0.61	0.11	0.00	0.00	0.00	0.50
UEIB-38	1,259	91.5	0.92	0.17	0.00	0.00	0.00	0.76
UEIB-39 [6]	4,310	213.3	2.15	0.40	0.00	0.00	0.00	1.77
UEIB-40 [6]	4,243	15.8	0.16	0.03	0.00	0.00	0.00	0.13
UEIB-41 [6]	9,585	334.9	3.38	0.62	0.00	0.00	0.00	2.77
UEIB-42 [6]	13,233	596.7	6.03	1.11	0.00	0.00	0.00	4.94
UEIB-43	15,949	892.2	9.17	1.68	0.00	0.00	0.00	7.39
UEIB-44	2,439	49.3	0.50	0.09	42.98	0.00	0.00	0.20
UEIB-45 [8]	13,489	471.0	4.81	0.88	1,157.13	53.50	0.48	12.31
UEIB-46 [9]	2,186	76.8	0.78	0.14	20.55	4.32	0.04	1.95
Total	291,356	9,769	100	18	23,204	64	0.57	64.65

June 12, 13, 14 and18, 2018

Extraction Well	Total Fluids Extracted	Quarter Fluids Extracted	Fluid Extraction Rate [12]		Total NAPL Extracted	NAPL Extracted (quarterly basis)	NAPL Extraction Rate[5]	PHC Mass Extracted (quarterly basis)
	(m^3)	(m^3)	(m^3/day)	(gpm)	(L)	(L)	(L/day)	(Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	609	70.8	0.53	0.10	1,578	0.00	0.00	0.22
UEIB-3/UEIB-53[13]	769	30.1	0.27	0.05	4,470	2.79	0.02	0.28
UEIB-4/UEIB-54[13]	580	54.9	0.32	0.06	163	5.00	0.06	8.54
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	362	7.3	0.06	0.01	5,644	0.00	0.00	1.17
UEIB-8/UEIB-48[13]	2,386	147.8	2.01	0.37	6.80	0.00	0.00	0.02
UEIB-9/UEIB-49[13]	3,390	528.4	0.83	0.15	0.00	0.00	0.00	5.31
UEIB-10[4]/UEIB-50[13]	1,129	94.1	0.90	0.17	0.00	0.00	0.00	15
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	0.0	0.00	0.00	825	0.00	0.00	0.00
UEIB-15	11,320	320.6	2.55	0.47	0.00	0.00	0.00	0
UEIB-16	8,398	368.0	2.69	0.49	0.00	0.00	0.00	59.26
UEIB-17	6,300	77.9	0.67	0.12	0.00	0.00	0.00	13
UEIB-18	8,945	343.5	5.90	1.08	0.00	0.00	0.00	55.31
UEIB-19	8,897	396.5	3.04	0.56	0.00	0.00	0.00	0.18
UEIB-20/UEIB-56[13]	12,439	55.7	1.28	0.24	0.00	0.00	0.00	0.02
UEIB-21	14,914	494.8	2.27	0.42	0.00	0.00	0.00	0.14
UEIB-22	8,012	252.5	0.95	0.17	0.00	0.00	0.00	0.59
UEIB-23	7,053	106.9	1.22	0.22	0.00	0.00	0.00	17.21
UEIB-24	10,941	597.7	7.16	1.31	0.00	0.00	0.00	96.25
UEIB-25	7,915	235.0	1.91	0.35	0.00	0.00	0.00	37.84
UEIB-26	11,491	169.5	1.07	0.20	0.00	0.00	0.00	27.30
UEIB-27	12,052	437.7	3.80	0.70	0.00	0.00	0.00	70.48
UEIB-28	6,026	256.5	1.64	0.30	0.00	0.00	0.00	0.37
UEIB-29	12,141	149.4	3.60	0.66	0.00	0.00	0.00	0.60
UEIB-30	7,576	247.9	0.42	0.08	0.00	0.00	0.00	39.92
UEIB-31/UEIB-55[13]	4,953	111.1	0.70	0.13	0.00	0.00	0.00	17.88
UEIB-32	4,586	79.7	0.55	0.10	44.62	0.00	0.00	0.47
UEIB-33	6,784	200.0	1.25	0.23	54.26	0.00	0.00	4.32
UEIB-34	7,747	27.4	0.13	0.02	40.07	0.00	0.00	4.41
UEIB-35	13,300	320.3	2.92	0.54	0.00	0.00	0.00	0.05
UEIB-36	5,428	109.7	1.09	0.20	33.16	0.00	0.00	17.66
UEIB-37 [6]	5,207	43.8	0.38	0.07	0.00	0.00	0.00	7.05
UEIB-38	1,328	68.3	0.63	0.12	0.00	0.00	0.00	11.00
UEIB-39 [6]	4,452	141.6	1.03	0.19	0.00	0.00	0.00	22.79
UEIB-40 [6]	4,337	94.4	1.65	0.30	0.00	0.00	0.00	15.20
UEIB-41 [6]	9,862	276.4	2.66	0.49	0.00	0.00	0.00	44.51
UEIB-42 [6]	13,705	471.3	4.63	0.85	0.00	0.00	0.00	75.90
UEIB-43	16,779	829.9	11.08	2.03	0.00	0.00	0.00	133.64
UEIB-44	2,499	59.4	0.61	0.11	42.98	0.00	0.00	0.11
UEIB-45 [8]	13,834	345.7	3.95	0.72	1,188.43	31.30	0.38	1033.01
UEIB-46 [9]	2,286	100.2	0.89	0.16	29.92	9.37	0.11	0.34
Total	300,150	8,794	81	15	23,253	48	0.58	1841.44

Notes

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

Abbreviations:

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

TABLE C-1
SUMMARY OF EXTRACTION RATES - PERIMETER EXTRACTION SYSTEM OPERATION AND PREFORMANCE
PARKLAND BURNABY REFINERY

Extraction Well	Sept 4, 5 and 6, 2018								Nov 19, 20 and 21, 2018							
	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)	Total Fluids Extracted (m^3)	Quarter Fluids Extracted (m^3)	Fluid Extraction Rate [12] (m^3/day)	(gpm)	Total NAPL Extracted (L)	NAPL Extracted (quarterly basis) (L)	NAPL Extraction Rate[5] (L/day)	PHC Mass Extracted (quarterly basis) (Kg)
UEIB-1[1]	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A	78	N/A	N/A	N/A	2,680	N/A	N/A	N/A
UEIB-2[2]/UEIB-52[13]	630	21.2	0.21	0.04	1,578	0.00	0.00	0.08	667	36.7	0.59	0.11	1,578	0.00	0.00	0.19
UEIB-3/UEIB-53[13]	785	16.5	0.20	0.04	4,471	0.72	0.01	0.06	804	18.7	0.26	0.05	4,471	0.00	0.00	0.22
UEIB-4/UEIB-54[13]	611	31.1	0.27	0.05	166	2.92	0.04	17.01	651	40.5	0.63	0.12	169	3.04	0.04	80.57
UEIB-5[8]	358	N/A	N/A	N/A	184	N/A	N/A	N/A	358	N/A	N/A	N/A	184	N/A	N/A	N/A
UEIB-6[9]	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A	209	N/A	N/A	N/A	6,025	N/A	N/A	N/A
UEIB-7/UEIB-47[13]	362	0.2	0.00	0.00	5,644	0.00	0.00	0.03	366	4.3	0.06	0.01	5,644	0.00	0.00	0.46
UEIB-8/UEIB-48[13]	2,466	80.3	0.74	0.14	6.80	0.00	0.00	0.02	2,785	318.5	6.78	1.24	6.80	0.00	0.00	34.02
UEIB-9/UEIB-49[13]	3,460	70.4	0.71	0.13	0.00	0.00	0.00	0.02	3,525	64.3	0.81	0.15	0.00	0.00	0.00	0.01
UEIB-10[4]/UEIB-50[13]	1,184	55.8	0.54	0.10	0.00	0.00	0.00	9.50	1,238	53.9	0.67	0.12	0.00	0.00	0.00	5.76
UEIB-11[3]	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UEIB-14[1,4]/UEIB-51[13]	95	0.0	0.00	0.00	825	0.00	0.00	0.00	98	3.0	0.04	0.01	825	0.00	0.00	0.02
UEIB-15	11,399	78.3	0.59	0.11	0.00	0.00	0.00	0.01	11,582	183.6	2.66	0.49	0.00	0.00	0.00	19.61
UEIB-16	8,547	149.0	1.50	0.27	0.00	0.00	0.00	25.38	8,699	152.4	1.91	0.35	0.00	0.00	0.00	16.28
UEIB-17	6,317	16.7	0.23	0.04	0.00	0.00	0.00	2.84	6,483	166.6	2.62	0.48	0.00	0.00	0.00	17.80
UEIB-18	9,191	246.0	2.59	0.47	0.00	0.00	0.00	41.88	9,613	422.5	5.23	0.96	0.00	0.00	0.00	45.13
UEIB-19	9,122	224.6	5.92	1.09	0.00	0.00	0.00	38.25	9,777	655.3	7.57	1.39	0.00	0.00	0.00	0.23
UEIB-20/UEIB-56[13]	12,585	145.4	1.58	0.29	0.00	0.00	0.00	24.75	13,047	462.2	7.03	1.29	0.00	0.00	0.00	0.13
UEIB-21	15,245	331.2	3.50	0.64	0.00	0.00	0.00	56.40	15,708	463.4	6.22	1.14	0.00	0.00	0.00	0.68
UEIB-22	8,049	37.8	0.47	0.09	0.00	0.00	0.00	6.43	8,215	165.7	2.54	0.47	0.00	0.00	0.00	0.38
UEIB-23	7,121	68.2	0.69	0.13	0.00	0.00	0.00	11.62	7,149	28.2	0.39	0.07	0.00	0.00	0.00	3.01
UEIB-24	11,232	291.1	3.17	0.58	0.00	0.00	0.00	49.56	11,525	293.6	3.84	0.70	0.00	0.00	0.00	31.37
UEIB-25	8,079	164.2	1.85	0.34	0.00	0.00	0.00	27.95	8,256	176.9	2.20	0.40	0.00	0.00	0.00	18.90
UEIB-26	11,605	114.1	1.36	0.25	0.00	0.00	0.00	19.42	11,868	263.3	4.12	0.76	0.00	0.00	0.00	0.13
UEIB-27	12,133	80.9	1.13	0.21	0.00	0.00	0.00	0.01	12,909	775.6	12.97	2.38	0.00	0.00	0.00	0.68
UEIB-28	6,134	108.0	1.08	0.20	0.00	0.00	0.00	0.19	6,326	191.8	3.14	0.58	0.00	0.00	0.00	0.05
UEIB-29	12,476	334.7	3.73	0.68	0.00	0.00	0.00	56.99	12,891	415.6	6.07	1.11	0.00	0.00	0.00	44.40
UEIB-30	7,580	3.0	0.00	0.00	0.00	0.00	0.00	0.51	7,664	84.7	1.78	0.33	0.00	0.00	0.00	9.05
UEIB-31/UEIB-55[13]	5,001	48.3	0.74	0.14	0.00	0.00	0.00	0.03	5,108	106.9	1.70	0.31	0.00	0.00	0.00	11.42
UEIB-32	4,656	69.5	0.69	0.13	44.62	0.00	0.00	0.41	4,723	66.8	0.93	0.17	44.62	0.00	0.00	0.47
UEIB-33	6,848	63.9	0.68	0.12	54.26	0.00	0.00	1.01	6,963	114.5	1.88	0.34	54.26	0.00	0.00	1.39
UEIB-34	7,783	36.1	0.01	0.00	40.07	0.00	0.00	6.15	7,802	19.0	0.39	0.07	40.07	0.00	0.00	0.02
UEIB-35	13,548	248.2	2.67	0.49	0.00	0.00	0.00	0.03	13,756	207.5	2.66	0.49	0.00	0.00	0.00	0.05
UEIB-36	5,511	83.2	0.85	0.16	33.16	0.00	0.00	14.17	5,935	423.8	9.33	1.71	33.16	0.00	0.00	45.27
UEIB-37 [6]	5,244	37.2	0.42	0.08	0.00	0.00	0.00	6.33	5,266	21.7	0.21	0.04	0.00	0.00	0.00	2.31
UEIB-38	1,394	65.7	0.81	0.15	0.00	0.00	0.00	0.01	1,435	41.2	0.45	0.08	0.00	0.00	0.00	0.01
UEIB-39 [6]	4,461	9.6	0.00	0.00	0.00	0.00	0.00	1.64	4,514	52.2	1.01	0.19	0.00	0.00	0.00	5.58
UEIB-40 [6]	4,501	163.9	1.85	0.34	0.00	0.00	0.00	0.02	4,638	137.0	1.69	0.31	0.00	0.00	0.00	0.02
UEIB-41 [6]	10,026	164.1	1.70	0.31	0.00	0.00	0.00	27.94	10,171	145.3	1.88	0.35	0.00	0.00	0.00	15.52
UEIB-42 [6]	14,083	378.3	3.50	0.64	0.00	0.00	0.00	64.42	14,305	221.4	2.00	0.37	0.00	0.00	0.00	23.65
UEIB-43	17,560	781.7	8.59	1.58	0.00	0.00	0.00	133.10	18,469	909.1	12.19	2.24	0.00	0.00	0.00	0.32
UEIB-44	2,541	42.7	0.50	0.09	42.98	0.00	0.00	0.11	2,578	36.7	0.41	0.08	42.98	0.00	0.00	0.25
UEIB-45 [8]	14,207	372.6	3.81	0.70	1,222.16	33.73	0.43	920.95	14,439	231.7	2.75	0.50	1,245.63	23.47	0.31	88.50
UEIB-46 [9]	2,345	58.7	0.55	0.10	35.40	5.48	0.07	0.36	2,394	49.4	0.66	0.12	39.87	4.47	0.06	1.34
Total	305,462	5,312	60	11	23,296	43	0.54	1568.51	313,989	8,527	125	23	23,327	31	0.40	557.03

Notes

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

Abbreviations:

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

Appendix D Regulatory Context and SSSLs

1 REGULATORY CONTEXT FOR PERIMETER GROUNDWATER MONITORING PROGRAM

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

1.1 Fisheries Act

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

1.2 Contaminated Sites Regulation

The ENV has established standards for evaluating contamination and associated remediation requirements in the CSR. The CSR came into effect April 1, 1997 and provides a framework to investigate, assess, and remediate contaminated sites in BC. Twelve amendments to the CSR have been completed since 1997, with the most recent being the Stage 12, which came into effect on January 24, 2019.

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

1.3 Soil

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

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

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

1.4 Groundwater

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

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

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

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

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

1.4.1 Applicability of Drinking Water Standards

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

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

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

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

1.4.2 Applicability of Aquatic Life Standards

The nearest surface water downgradient of the Site is Burrard Inlet, located approximately 10 m to the north of Areas 1 and 3, and 40 m north of Area 2. Assessment of the Site's hydrogeology and potential pathways for groundwater contamination, using the available data from numerous soil and groundwater investigations, indicated that CSR standards for the protection of marine aquatic life (AW) are applicable at the Site[7].

1.4.3 Groundwater Site-Specific Screening Levels

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

The Site-Specific Screening Levels (SSSLs) were first introduced in the Report on the 2015 and 2016 Perimeter Monitoring Program and Perimeter Extraction System, Chevron Burnaby Refinery, Burnaby British Columbia (AECOM 2017). SSSLs for select parameters were developed by SLR Consulting Canada Ltd. (SLR), with the support of Parkland and AECOM, to evaluate potential risks resulting from impacted Site groundwater to Burrard Inlet. The SSSLs were based on the CSR Stage 10 Omnibus Amendments in addition to the Updated Screening Levels (USLs) and Risk-Based Management Targets (RBMTs) developed for application along the Foreshore downslope of Area 2 of the Refinery[8]. Upon the release of the Stage 11 and 12 Housekeeping Amendment, the SSSLs were reviewed by AECOM. The CSR AW standards for parameters which have SSSLs did not change between Stage 10. Stage 11 and Stage 12 Amendments; therefore, AECOM does not recommend modifying the existing SSSLs. The measured groundwater concentrations from the monitoring wells investigated during this program were compared against the Site wide SSSLs. In the event an SSSL was not available for a certain parameter, the groundwater concentrations were also compared against the CSR AW (marine). For parameters with SSSLs, the SSSLs were considered the prevailing standard and are recognized as the basis for remedial action by Parkland.

The groundwater SSSLs for the Parkland Refinery monitoring wells located in Areas 1, 2 and 3 are summarized in Table 1 below. The supporting rationale are presented in Section 2.0

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

PCOC Group	PCOC	SSSL (µg/L)	Source	Comment
PHCs	LEPHw	3000	RBMT x 10	
	VPHw	15000	RBMT x 10	
	$EPHw_{(C10-C19)}$	5000	BC CSR AW Standard	
	$VHw_{(C6-C10)}$	15000	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Benzene	21000	RBMT x 10	
	Ethylbenzene	3200	RBMT x 10	
	Styrene	720	BC CSR AW Standard	
	Toluene	7700	RBMT x 10	
	Xylenes	3300	RBMT x 10	
PAHs	Acenaphthene	60	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Acridine	30	USL x 10	
	Anthracene	40	USL x 10	
	Benz[a]anthracene	1	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Benzo[a]pyrene	2.8	RBMT x 10	
	Chrysene	1	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Fluoranthene	40	USL x 10	
	Fluorene	120	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Naphthalene	440	RBMT x 10	
	Phenanthrene	3	USL x 10	BC CSR AW Standard adopted as same value as USL x 10

[8] The SSSLs were partially derived from the Stage 10 Omnibus Amendment. Upon release of the Stage 11 Housekeeping Amendment, these SSSLs were reassessed to determine if any updates were warranted. AECOM concluded no further updates are required at this time.

PCOC Group	PCOC	SSSL (µg/L)	Source	Comment
	Pyrene	40	USL x 10	
	Quinoline	34	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
Metals	Antimony	2500	BC CSR AW Standard	
	Arsenic	125	BC CSR AW Standard	
	Barium	5000	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Beryllium	1000	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Boron	12000	BC CSR AW Standard	
	Cadmium	90	USL x 10	
	Chromium	500	USL x 10	
	Cobalt	1100	USL x 10	
	Copper	62	RBMT x 10	
	Lead	1400	USL x 10	
	Molybdenum	10000	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Nickel	750	USL x 10	
	Selenium	20	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Thallium	3	USL x 10	BC CSR AW Standard adopted as same value as USL x 10
	Uranium	1000	USL x 10	
	Zinc	900	RBMT x 10	

BC CSR refers to the BC CSR, Stage 12 Amendments, Schedule 3.2 – AW Standard for the Protection of Aquatic Life.

2 SITE-SPECIFIC SCREENING LEVEL RATIONALE

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

2.1 Sources of SSSLs

The sources of SSSLs included:

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

2.2 Updated Screening Levels

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

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

2.2.1 Risk-Based Management Targets

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

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

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

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

2.2.2 Regulatory Context for the RBMTs

The CSR under the EMA is the principal regulatory document defining requirements for contaminated sites management in British Columbia. The CSR came into effect on April 1, 1997 and has been amended several times, most recently on January 24, 2019 with the Stage 12 Housekeeping Amendment. The EMA and CSR have provisions for both numerical standards and risk-based standards approaches to managing site contamination.

CSR standards are not available for porewater/groundwater quality assessment for monitoring wells located within 10 m of the high water mark of the aquatic receiving environment. The CSR AW standards apply to porewater/groundwater wells at distances greater or equal to 10 m from the high water mark of receiving environment, based on the assumption that groundwater will be diluted at least 10-fold from its initial concentration in the remaining 10 m before entering the aquatic receiving environment (BC MoE 2013). The BC Water Quality Guidelines (WGQs) apply to high water mark of the aquatic receiving environment.

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

If the CSR AW standards cannot be met at distances greater or equal to 10 m from the high water mark of the receiving environment and the BC WQGs (i.e., USLs for foreshore monitoring in this case) cannot be met for monitoring wells located within 10 m of the high water mark of the aquatic receiving environment, BC MoE, the Technical Guidance 15 – Concentration Limits for the Protection of Aquatic Receiving Environments (BC MoE 2013) allows an alternative risk-based approach which shows that:

- The 10-fold dilution of substance concentrations in groundwater occurs before the water enters the aquatic receiving environment;
- Groundwater quality meets a site-specific risk-based standard with a protection level appropriate for aquatic receiving environments (i.e., EC20); or
- Substance concentrations in groundwater do not represent an unacceptable risk to aquatic life as revealed by a detailed ecological risk assessment.

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

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

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

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

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

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

2.4 Additional SSSLs Development Considerations

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

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

3 DRINKING WATER EXEMPTION ASSESSMENT

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

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

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

Table 2: Drinking Water Use Application in Area 3

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

Table 3: Drinking Water Use Application in Area 1

Protocol 21 Flowchart Question	Answer:
Current Drinking Water Use	
Q1. Is water at or near the site currently used for drinking water?	No. There are no wells located within 500m of the Site. Drinking water in Burnaby, BC is supplied by the municipality.
Future Drinking Water Use	
Q1. Is the site located within filled former marine or estuarine foreshore?	No.
Q2. Is the aquifer confined and protected by a natural confining barrier?	No.
Q3. Does drinking water use apply to an underlying aquifer?	No. See bedrock aquifer table below.
Q4. Does the unconfined aquifer have a bulk hydraulic conductivity > 10-6 m/s or a yield ≥1.3 L/min or is the aquifer mapped in the BC Water Resource Atlas?	No. The unconfined aquifer has a bulk hydraulic conductivity < 10^{-6} m/s based on a pumping test in Area 2. Yes. The yield in Area 2 till is ≥1.3 L/min (URS, 2012). No. The site is not an aquifer mapped in the BC Water Resource Atlas.
Q5. Is the unconfined aquifer comprised only of imported fill or present only seasonally or is the average saturated thickness ≤2m?	Yes, the average saturated thickness in the unconsolidated material (i.e. non-bedrock) is less than 2 meters. To evaluate this, 10 borehole logs and well monitoring data across Area 1 were reviewed. The depth to bedrock ranged from 0.8 to 5 meters below grade. The average depth to water (measured seasonally over more than 10 years) ranged from 0.9 to 4.9 meters below grade. The average saturated thickness in the unconsolidated material ranged from 0 to 3.2 meters with an average saturated thickness over the 10 locations of 1.1 meters[9].
Conclusion	Future DW use does not apply to the unconsolidated non-bedrock groundwater in Area 1.

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

Table 4: Drinking Water Use Application in Area 1 Bedrock

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

4 REFERENCES

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Appendix E Field Program and Methods

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

1. MONITORING WELL PURGING METHOD

The method of groundwater purging and sampling is dependent upon the depth of groundwater table below the ground surface. For depths to groundwater less than 8 meters (m), purging and sampling were conducted using a peristaltic pump. For depths to groundwater greater than 8 m, purging was conducted using a dedicated bailer or Waterra™ tubing and foot valve. Prior to purging, the time of day and tide condition (for Area 3), monitoring well headspace vapour concentration levels, depth to water, and total depth of the monitoring well were recorded at each location. Field observations, field measurements, and other details related to monitoring, well purging, and sampling were recorded by AECOM field staff and presented in Tables A-1 and B-1.

Monitoring well headspace vapour concentration levels were measured using a photoionization detector (RKI Eagle) operated in methane elimination mode immediately after removing the cap from the monitoring well. Depth to water was measured using an oil/water interface meter, which was decontaminated with amended water[10] between monitoring wells to prevent cross contamination.

For monitoring wells where the groundwater table is within 8 m of the ground surface, water was pumped from the monitoring well at a low flow rate (i.e., up to 0.5 litres per minute [L/min]) using a peristaltic pump connected to a well-dedicated length of ¼-inch high/low-density polyethylene tubing. The intake of the tubing was placed in the middle of the screened section of the monitoring well to obtain representative samples and to minimize the disturbance and subsequent entrainment of silt located at the bottom of the monitoring well. During purging, field parameters including pH, temperature, electrical conductivity, total dissolved solids (TDS), salinity, oxidation redox potential, and dissolved oxygen were measured. Purging continued until field parameters stabilized and at least one well volume had been removed[11], or until the well was purged dry.

For monitoring wells where the groundwater table is greater than 8 m from the ground surface, purging was conducted using a dedicated bailer, or Waterra™ tubing equipped with a foot valve. While purging with a bailer/Waterra™, water is removed from near the top of the water column to minimize disturbance of potential sediment located at the bottom of the monitoring well; purging was conducted until at least three well volumes had been removed, or until the monitoring well was dry.

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

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

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

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

13. MONITORING WELL SAMPLING METHOD

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

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

1. $EPHw_{C10-C19}$/$EPHw_{C19-C32}$, LEPHw/HEPHw, and/or PAHs: two 250 millilitre (mL) amber glass bottles, no filtering, sodium bisulphate [$NaH(SO_4)$] preservative;
2. BTEX, VPHw, and/or MTBE: two 40 mL clear glass purge and trap vials, no filtering, and NaH(SO4) preservative; and
3. Dissolved metals: one 125mL plastic container, field filtering, and nitric acid (HNO3) preservative.

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

POTENTIAL TIDAL EFFECTS

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

14. ANALYTICAL TESTING PROGRAM

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

15. QUALITY ASSURANCE

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

Appendix F Laboratory Analytical Data (on USB located on the back cover of the report)

Appendix G Quality Assurance and Quality Control Protocols

Data Quality Assurance/Quality Control (QA/QC)

In order to assure the integrity and defensibility of the data collected, rigorous QA/QC protocols were implemented for the collection, identification, storage, shipment and documentation of the samples. Standard operating procedures (SOPs) for sample collection and storage, equipment decontamination, and sample chain of custody protocols were followed. Groundwater samples were collected using sampling techniques discussed above. The use of these methods confirmed the quality, soundness, and defensibility of the data obtained. The laboratory analytical data, once generated, was also proofed for inconsistencies and anomalies. Field duplicates, trip blanks, and equipment blanks were collected for QA/QC purposes.

During the proofing of the data it was identified that partial analytical for U07-10S was not reported, despite AECOM receiving a sample receipt confirmation (SRC) from the lab communicating that all samples were received. Unfortunately, the hold times on the samples had elapsed by the time the missing data was identified. AECOM reviewed laboratory sample handling, login, and reporting practices and procedures with the project laboratory and requested that the laboratory prepare a corrective action report (attached) documenting the findings of their internal investigation and provide a summary of corrective actions taken.

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 and 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.

Analytical Data Interpretation

To confirm the quality of the laboratory analytical data, precision, accuracy, and completeness were considered.

Precision

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

Analytical precision is a measurement of the variability associated with 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 (MS) duplicate or laboratory duplicate samples.

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

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

$$RPD = \frac{(A - B)}{(\frac{A + B}{2}} * 100\%$$

where:

A = analytical result

B = duplicate result

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

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

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

Accuracy

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

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

$$\%\, REC = \frac{A}{B} * 100\%$$

where:

A = obtained value

B = true value

Analytical accuracy was determined in the laboratory by running MS samples or laboratory control samples. These samples were analyzed at a minimum rate of 5% for each analytical suite.

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:

$$Completness = \frac{A}{B} * 100\%$$

where:

A = number of valid analytical results

B = total number of analytical results

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February 7, 2019

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

Dear Stephen Sumsion,

Re: Missed LEPH/HEPH Analysis for AECOM Project 0015243589; AECOM Job Reference 60569856 WATER ANALYSIS – ALS Work Order Number L2079613; ALS Corrective Action Report (CAR)# 17478

On April 12, 2018 ALS received 6 water samples for the above mentioned work order for a variety of analytical tests including Light and Heavy Extractable Petroleum Hydrocarbons (LEPH/HEPH). ALS received the sample containers required to perform all of the requested analyses for L2079613, however, due to an error at the sample reception stage ALS did not complete the LEPH/HEPH testing for the sample identified as "U07-10S".

A review of the bottle inventory for another AECOM submission (L2079614) received at the same time as L2079613 revealed that the sample identified as "U07-10S" was listed on both submissions. The examination of the L2079614 sample container inventory also revealed that all of the "U07-10S" containers were incorrectly applied to L2079614. This included the LEPH/HEPH containers that were intended for the L2079613 "U07-10S" LEPH/HEPH analysis.

As part of our sample receipt procedure, any missing containers are flagged in a sample integrity form (SIF) in our database and the SIF is automatically listed in the sample integrity section of our SRC. Our sample reception team flagged the perceived missing LEPH/HEPH containers for L2079613 in a SIF, however, the SIF was completed after the sample receipt confirmation (SRC) had already been sent to the AECOM recipients. Thus, the SRC did not include the notice that the LEPH/HEPH containers were not received under L2079613.

In response, ALS has reviewed the details of this issue with the Client Services staff including our entire Login team. We have retrained all staff on the importance of correctly assigning bottles to each submission and the need to resend the SRC with any updated SIF information as soon as the SIF is entered into our database. Resending updated SIF information will result in immediate notification to our clients for any true or apparent sample integrity issues that might affect the data.

ALS sincerely apologizes for the inconvenience that this issue has caused AECOM and your client. We recognize and understand the implications of this type of error and take this issue very seriously.

If you would like more details regarding our corrective actions, or if you have suggestions for further ALS improvements, please do not hesitate to contact either of the undersigned.

Sincerely,

Katherine B. Thomas, B.Sc.
Operations Manager – Vancouver

Jerry Holzbecher, B.Sc.
Client Services Manager – Vancouver