APECs / AECs	Impacts in Groundwater**
ESI-AEC-2 Former Oil Storage Shed / Former Single-Walled Gravity-Fed Diesel Storage Tank	LEPHw **Fluoranthene** **Pyrene** **Dissolved Aluminum** **Dissolved Arsenic**
ESI-APEC-1 Former Sawmill Operations (Kiln)	None
ESI-APEC-2 Former Green Chain	**Dissolved Aluminum** Dissolved Arsenic Dissolved Titanium
ESI-APEC-3 Imported Fill Materials	**Dissolved Aluminum** Dissolved Arsenic Dissolved Zinc

***Bolded substances** are those that had not been identified in the baseline assessment work, either because testing for those parameters was not completed historically (dissolved metals at ESI-AEC-1 and ESI-AEC-2) or because of current site conditions (PAHs at ESI-AEC-1 and ESI-AEC-2).

**Dissolved iron and dissolved manganese have not been considered as impacts at the Site based on the provincial CSR Stage 8 Amendments, which illustrate that groundwater use standards for these substances only need to be applied if specific Schedule 2 site activities occurred on-Site, which is not the case for this property. Therefore, any impacts for those metals can be presumed to be due to natural background groundwater quality.

With the exception of the impacts identified at ESI-AEC-1 and ESI-AEC-2, of which some may also be associated with historical fill or Fraser River influences (i.e. dissolved metals, some PAHs), the identified impacts in groundwater are suspected to be related to the quality of the historical fill materials at the Site, which are likely variable, and due to the influence of the adjacent Fraser River.

The laboratory data for the new groundwater results presented in this report is presented in the laboratory Certificate of Analysis in **Appendix D**.

5.2 QUALITY ASSURANCE / QUALITY CONTROL RESULTS

To assess the validity of the sampling methodologies implemented at the Site and the ability of the project laboratory to replicate analytical results, Envirochem submitted a blind field duplicate sample for analysis. MW18-1 was taken as the blind field duplicate of MW08-10 as part of Envirochem's Quality Assurance/Quality Control (QA/QC) program.

The relative percent differences (RPDs) between the reported concentrations for the sample pair for the shared analyses were calculated to assess the replicability of the sample results. These calculations are presented in Table Q1 in **Appendix E**. Based on the British Columbia Field Sampling Manual (Clark, 2013), acceptable RPDs for field duplicate samples are as follows:

- RPDs > 20% indicate a possible problem with the sampling program or sample analysis.
- RPDs > 50% indicate a definite problem with the sampling program or sample analysis, most likely either contamination or lack of sample representativeness.
- Within a sample pair, at least one of the two concentrations must be at least five times the minimum detection limit for that parameter in order for the calculated RPD to be valid (because with lower concentrations, even a small difference in concentrations can lead to an RPD value that is out of compliance).

Based on the results presented in **Appendix E**, no RPD values were out of compliance with these guidelines. Therefore, the reported data appears to be reliable and reproducible, and the implemented sampling methodologies appropriate.

6.0 DISCUSSION

6.1 SOIL QUALITY DISCUSSION

Based on the historical soil quality data for the Site, it continues to be apparent that petroleum hydrocarbon impacts are present at ESI-AEC-1 (area outside the distribution warehouse) and ESI-AEC-2 (former oil storage shed area). The impacts are more well-defined at ESI-AEC-1 due to the amount of intrusive investigation completed at that location, but more well-understood in a historical context at ESI-AEC-2 due to there being more definitive evidence of petroleum hydrocarbon sources (drums and tank) observed at that location in the past 30 years.

At ESI-AEC-1, hydrocarbon-impacted soil is present from approximately 1.3 m to 2.3 m below ground surface (e.g. straddling the water table). It is inferred that fluctuations in the elevation of the water table (due to seasonal and tidal variation) has resulted in the potential smearing of this contamination throughout this depth interval. Based on the borehole logs provided in the previous Hemmera environmental report (for MW07-6 to MW08-13), and appended in **Appendix F**, the layer of sand directly beneath the asphalt surface (potential/apparent asphalt sub-base) does not appear to be impacted (no evidence of staining, no odour, low headspace vapour concentrations). All of the impacts appear to be contained within the native silt or sand layer in which the water table is present. The absence of shallow surficial hydrocarbon impacts suggests that a spill did not occur directly at the investigated locations within ESI-AEC-1, but that if one occurred, it was likely to the south of the current monitoring well locations, beyond the current asphalt footprint, or the impacts originated off-site and migrated onto the Site via the groundwater. Envirochem notes that the borehole log for MW06-2 was not included in any of the historical reports made available by the VFPA, so a review of that one specific log could not be completed (but others were available for review).

At ESI-AEC-2, there is limited knowledge of hydrocarbon-impacted soil as only one borehole has been advanced at that location (BV-11BH-07M). No BTEXS, VPHw, or LEPHw impacts were identified in soil in the top 2 m of that borehole, even though field observations identified a slight hydrocarbon odour. While the naphthalene and phenanthrene concentrations in soil were shown to exceed the applied criteria at this location, they were also present at other locations around the Site at comparable concentrations where they are not presumed to represent contamination, so these results may also be unrepresentative of the oil / fuel storage practices at the ground surface at this location.

Based on several observed instances of staining at the surface surrounding the former oil storage shed, and the groundwater results discussed below, it is likely that undetected hydrocarbon impacted soil is still present at this location, and likely corroborates that the source of the impacts in groundwater was from surficial storage of these petroleum products at this location.

6.2 GROUNDWATER QUALITY DISCUSSION

Based on the current / latest groundwater quality data for the Site, it continues to be apparent that petroleum hydrocarbon impacts are present at ESI-AEC-1 and ESI-AEC-2. A comparison of the 2012 (or older) to 2018 groundwater quality results at these AECs showed an increase in measured hydrocarbon concentrations relative to the previous sampling events, particularly for LEPHw and PAHs. However, based on the findings of the Phase I ESA (under separate cover), there were no above ground petroleum hydrocarbon sources (e.g. tanks, drums) at these two AECs between 2012 and 2018, and sources that had existed pre-2012 had been absent for some time (e.g. the oil storage shed was removed in 2010). Therefore, it is unlikely that the reported hydrocarbon concentrations increased in groundwater due to the introduction of any new impacts since 2012, but that the concentrations may have increased due to various hydrogeological or geochemical factors related to plume migration or desorption of the contamination known to be present in soil at these locations, changing water levels, etc.

At the other APECs, it was difficult to assess trends in groundwater quality as many of the previous monitoring wells could not be found to be re-sampled (likely buried or removed by the previous tenant) or had not been sampled for dissolved metals in the past. Based on the latest groundwater data at the other APECs, there does not appear to be sufficient evidence to warrant identification of any of those APECs as AECs. The reported dissolved metals concentrations which exceed the applied criteria (dissolved aluminum, dissolved arsenic, dissolved titanium, dissolved zinc) are not believed to be related to historical site activities, as previously stated by Envirochem and others.

Envirochem notes that the majority of the identified impacts (excluding metals) in groundwater at the Site are based on application of Federal guidelines and that very few substances exceed the applied Provincial criteria [only LEPHw and select PAHs at BV-11BH-07M, MW06-2, and MW07-7 (destroyed)]. Therefore, based on provincial criteria, there only appear to be concerns with the groundwater quality at ESI-AEC-1 and ESI-AEC-2.

6.3 GENERAL ASSESSMENT OF APECS / AECS

As indicated in the Phase I ESA, two AECs and three APECs were identified as being present at the Site. Through the baseline environmental assessment and the recent groundwater sampling work completed by Envirochem, it is our opinion that soil and groundwater quality has been characterized sufficiently at all of the APECs with respect to the current project objectives and that it is unnecessary to complete soil vapour sampling at those APECs for the current purpose based on the reported soil and groundwater quality results.

At the two AECs, additional soil and groundwater quality sampling may be required to laterally and vertically delineate the extent of the identified impacts before proceeding with any remediation or risk assessment of those areas, if that is the goal of the VFPA or other involved parties.

A soil vapour assessment of those two areas may also be warranted as well, either prior to or following any completed remediation work. The expectations for what could be required at each location could also be influenced by the future tenant's intended use of the Site, which has not been communicated to Envirochem.

7.0 CONCLUSIONS

The following conclusions are made:

ESI-AEC-1 (Outside the Distribution Warehouse)

Review of Environmental Conditions:

- **The petroleum hydrocarbon impacts identified in soil and groundwater on-Site were identified at depth (approximately 1.35 m and deeper) and not immediately at the surface in the borehole logs reviewed.** The general surficial geology at ESI-AEC-1 appears to include a paved asphalt surface and approximately 1 m of 'clean' brown sand (fill) above a grey silt (native soil). Although there was no specific testing of the 'clean' brown sand by others, there was no indication of impact in this material (based on apparent low headspace readings, visual or olfactory observations, etc.).

Updated Groundwater Quality Investigation:

- **In groundwater monitoring wells able to be sampled, petroleum hydrocarbon impacts in groundwater were identified to still exist including LEPHw and various PAHs.** Although concentrations may vary (e.g. 8,170 µg/L LEPHw measured by Envirochem vs. up to 3,000 µg/L LEPHw measured by Hemmera at monitoring well MW06-2), and increased in some cases compared to 2012, this variance could be a result of various factors (water level fluctuations, etc.). Based on the findings of the Phase I ESA Update, there have been no sources of petroleum hydrocarbons at this location since the wells were last sampled in 2012, so increasing concentrations are not believed to be attributed to the addition of any new contamination in the past seven years.
- **Select dissolved metals concentrations in groundwater were also identified as impacts as they relate to some water uses.** Although groundwater quality concentrations of some select dissolved metals exceed some of the assessment tool criteria applied (which may or may not actually be applicable), these results appear to be representative of the historical infilling of the Site.

ESI-AEC-2 (Former Oil Storage Shed)

Review of Environmental Conditions:

- **Environmental investigations by others conducted in 2006, 2008, and 2012, confirmed the presence of petroleum hydrocarbon impacts in the area of the former oil storage shed (removed by Mill & Timber in 2010).** Impacts were identified in soil (PAHs) and groundwater (LEPHw and PAHs) to a known depth of 2 m below ground surface.

Updated Groundwater Quality Investigation:

- **In the one groundwater monitoring well at the former oil storage shed area (BV-11BH-07M), petroleum hydrocarbon impacts in groundwater were identified to still exist.** Envirochem identified impacts from LEPHw and pyrene in groundwater. Although concentrations may vary from historical concentrations measured, and increased in some cases compared to 2012, this variance could be a result of various factors (water level fluctuations, etc.). Based on the findings of the Phase I ESA Update, there have been no sources of petroleum hydrocarbons at this location since the well was last sampled in 2012, so increasing concentrations are not believed to be attributed to the addition of any new contamination in the past seven years.
- **Select dissolved metals concentrations in groundwater were also identified as impacts as they relate to some water uses.** Although groundwater quality concentrations of some select dissolved metals exceed some of the assessment tool criteria applied (which may or may not actually be applicable), these results appear to be representative of the historical infilling of the Site (as suspected by others as well).

At the two AECs, additional soil and groundwater quality sampling could potentially be required to laterally and vertically delineate the extent of the identified impacts before proceeding with any remediation or risk assessment of those areas, if that is the goal of the VFPA. A soil vapour assessment of those two areas may be warranted as well, either prior to or following any proposed remediation work. The expectations for what could be required at each location, if anything at this time, would also be influenced by the goals of VFPA and/or a future tenant's intended use of the Site, which has not been communicated to Envirochem.

8.0 PARTICIPANTS AND QUALIFICATIONS

A summary of qualifications of Envirochem's assessors who conducted the fieldwork and reporting are as follows:

- Mr. Steven Hait, EIT, has 8 years of environmental consulting experience in site investigations and remediation in northern British Columbia and the Lower Mainland. He has conducted various aspects of project delivery including project coordination, project management, site investigations, remedial implementation, data analysis and interpretation, and technical reporting. He is registered as an Engineer in Training (EIT) in British Columbia and has a Bachelor of Applied Science degree in Mechanical Engineering and a Bachelor of Technology degree in Environmental Engineering.
- Mr. Eric Choi, P. Eng., holds an undergraduate degree in Geological Engineering (Environmental Option) and has approximately 20 years of experience in environmental site assessment and remediation. He has conducted various aspects of project delivery including project planning, site investigations, remedial implementation, data analysis and interpretation, technical reporting, and project management. He is a licensed Professional Engineer within British Columbia and has obtained numerous BC Ministry of Environment approvals for various sites.
- Mr. Michael Chao, EIT, has 7 years of environmental consulting experience in site investigations and field sampling programs, including groundwater sampling programs. He is registered as an EIT in British Columbia has a Bachelor of Applied Science degree in Environmental Engineering.
- Mr. Bryan Tsai, EIT, holds a Bachelor of Science in Engineering in Engineering Chemistry and has completed numerous Environmental Engineering courses at BCIT. He has been trained to conduct Phase I ESAs and has additional experience in research, report writing and environmental sampling and monitoring.

Based in British Columbia, Envirochem Services Inc. (Envirochem) has provided environmental consulting and management services since 1984. Envirochem's environmental management and consulting services range from up-front environmental project planning, assessment, and permitting, to air quality management and greenhouse gas reporting, to hazardous material management, to comprehensive out-sourced environmental and sustainability management, just to name a few.

Envirochem personnel have completed numerous contaminated sites investigation, remediation, and risk assessments projects, several with approval from the provincial Ministry of Environment and Climate Change Strategy (BC ENV) including obtaining legal instruments (such as Certificates-of-Compliance, Determinations, etc.), and several environmental projects (past and ongoing) with VFPA approval, including a dredging project for Pacific Coast Terminals in Port Moody, numerous projects at Neptune Bulk Terminals in North Vancouver including an ongoing major coal expansion project, and other permitting driven contaminated sites or construction management projects for Port-managed properties. Envirochem's team has extensive history working on industrial waterfront sites and also with Mill & Timber for Port-regulated sites including involvement at the subject site dating back to 1999.

9.0 CLOSURE

We trust this report meets your requirements at this time. If you have any questions or comments regarding this report, please contact the undersigned.

Yours truly,

Envirochem Services Inc.

Steve Hait, EIT
Technical Project Manager

Eric Choi, P.Eng.
Senior Environmental Engineer

Contributions by: Michael Chao and Bryan Tsai

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11.0 LIMITATIONS

This Report is intended for the sole and exclusive use of **Mill & Timber Products Ltd. (the Client) and the Vancouver Fraser Port Authority (representative of the Owner)**. This report is not for the benefit of any third party and may not be distributed to, disclosed in any form to, used by, or relied upon by, any third party without the prior written consent of Envirochem Services Inc. (Envirochem). Any other third-party recipient of this report or user of any content contained herein uses this report and its contents at its sole risk, and by acceptance or use releases Envirochem, its affiliates, officers, employees and subcontractors from any liability for direct, indirect, incidental, consequential or special loss or damage or other liability of any nature arising from its use of the report or reliance upon any of its content.

This is a technical report and is not a legal representation or interpretation of environmental laws, rules, regulations, or policies of government agencies. With respect to regulatory compliance issues, please note that regulatory statutes and the interpretation of regulatory statutes are subject to change over time.

This report has been prepared in accordance with accepted environmental and/or engineering practices for a Phase I ESA (CSA Standard Z768-01). The role of the site assessor is to document evidence of contamination and not to judge the acceptability of risks associated with contamination (Clause 0.2.7 of CSA Z768-01). No other warranties, either expressed or implied, are made as to the professional services provided under the terms of the Phase I ESA and included in this report. To further reduce or eliminate uncertainty would require a Phase II ESA.

Achieving the objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing the information obtained and in the formulation of the conclusions. Site observations were only made on the subject site in accessible areas. Neighbouring properties were only observed from the subject site and public areas.

Envirochem expressly disclaims any and all warranties in connection with this report. This disclaimer of warranty includes, without limitation, any warranty that this report and the associated site investigation work has uncovered all potential environmental liabilities associated with the property. Envirochem believes this report to be accurate; however, Envirochem disclaims any warranty of the completeness or accuracy of information supplied to Envirochem that was relied upon in the preparation of this report.

APPENDIX A

Analytical Tables

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

						Borehole ID	MW06-2	MW06-3		MW07-6		MW07-7			MW07-8		MW07-9	
						Sample ID	MW06-2-3	MW06-3-1	MW06-3-3	MW07-6-4	MW07-6-7	MW07-7-5	MW600	MW07-7-9	MW07-8-5	MW07-8-7	MW07-9-3	MW07-9-5
						Sampled By	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera
						Laboratory ID	-	-	-	-	-	-	-	-	-	-	-	-
						Analyzed By	Unknown	Unknown	Unknown	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST
						Date Sampled	2006-JUN-29	2006-JUN-29	2006-JUN-29	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15
						Sample Depth (m bgs)	1.83 - 2.44	0.30 - 0.91	1.53 - 1.98	1.83 - 2.29	3.20 - 3.66	1.83 - 2.29	1.83 - 2.29	4.11 - 4.57	2.29 - 2.74	3.20 - 3.66	1.70 - 2.29	2.67 - 3.05
						AECs / APECs Assessed	AEC-1, APEC-3	APEC-3	APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1	AEC-1
						Soil Type	Fine	Unknown	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine
Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units							Duplicate of MW07-7-5						
Volatile Hydrocarbons																		
Benzene																		
intake of contaminated soil	6,500	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater used for drinking water	0.035	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
toxicity to soil invertebrates and plants	250	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
major microbial functional impairment	nc	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater flow to surface water used by aquatic life (freshwater)	2.5	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater flow to surface water used by aquatic life (marine)	6.5	0.03	0.0068	-	mg/kg	<0.03	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Ethylbenzene																		
intake of contaminated soil	700,000	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater used for drinking water	15	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
toxicity to soil invertebrates and plants	650	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
major microbial functional impairment	nc	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (freshwater)	200	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (marine)	200	0.082	0.018	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methyl tert-butyl ether (MTBE)																		
standard to protect human health	20,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene																		
standard to protect human health	1,000,000	50	50	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
standard to protect ecological health	50	50	50	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene																		
intake of contaminated soil	550,000	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater used for drinking water	6	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
toxicity to soil invertebrates and plants	450	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
major microbial functional impairment	nc	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (freshwater)	0.5	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (marine)	200	0.37	0.08	-	mg/kg	<0.03	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes																		
intake of contaminated soil	1,000,000	11	2.4	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
groundwater used for drinking water	6.5	11	2.4	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
toxicity to soil invertebrates and plants	600	11	2.4	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
major microbial functional impairment	nc	11	2.4	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
groundwater flow to surface water used by aquatic life	20	11	2.4	-	mg/kg	<0.03	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C6 to C10)																		
standard to protect human health	nc	240	170	-	mg/kg	**960**[K]	-	-	**960**[K]	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	240	170	-	mg/kg	**960**[K]	-	-	**960**[K]	-	-	-	-	-	-	-	-	-
Volatile Hydrocarbons (VH)																		
standard to protect human health	nc	nc	nc	-	mg/kg	960	-	-	960	110	<100	<100	<100	110	<100	<100	<100	<100
standard to protect ecological health	nc	nc	nc	-	mg/kg	960	-	-	960	110	<100	<100	<100	110	<100	<100	<100	<100
VPHs																		
standard to protect human health	200	nc	nc	-	mg/kg	**960**	-	-	**960**	110	<100	<100	<100	110	<100	<100	<100	<100
standard to protect ecological health	200	nc	nc	-	mg/kg	**960**	-	-	**960**	110	<100	<100	<100	110	<100	<100	<100	<100
Extractable Petroleum Hydrocarbons																		
EPH10-19																		
standard to protect human health	nc	nc	nc	-	mg/kg	970	<250	<250	770	-	390	-	-	<250	-	<250	-	
standard to protect ecological health	nc	nc	nc	-	mg/kg	970	<250	<250	770	-	390	-	-	<250	-	<250	-	
EPH19-32																		
standard to protect human health	nc	nc	nc	-	mg/kg	<250	<250	<250	<250	-	<250	-	-	<250	-	<250	-	
standard to protect ecological health	nc	nc	nc	-	mg/kg	<250	<250	<250	<250	-	<250	-	-	<250	-	<250	-	
LEPHs																		
standard to protect human health	2,000	nc	nc	-	mg/kg	970	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	2,000	nc	nc	-	mg/kg	970	-	-	-	-	-	-	-	-	-	-	-	-
HEPHs																		
standard to protect human health	5,000	nc	nc	-	mg/kg	<250	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	5,000	nc	nc	-	mg/kg	<250	-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)																		
standard to protect human health	nc	260	230	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	260	230	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
F3 (C16 to C34)																		
standard to protect human health	nc	1,700	2,500	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	1,700	2,500	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
F4 (C35+)																		
standard to protect human health	nc	3,300	6,600	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	3,300	6,600	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																		
Acenaphthene																		
standard to protect human health	15,000	0.28	0.28	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	0.28	0.28	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene																		
standard to protect human health	nc	320	320	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	320	320	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

					Borehole ID	MW06-2	MW06-3		MW07-6		MW07-7			MW07-8		MW07-9	
					Sample ID	MW06-2-3	MW06-3-1	MW06-3-3	MW07-6-4	MW07-6-7	MW07-7-5	MW600	MW07-7-9	MW07-8-5	MW07-8-7	MW07-9-3	MW07-9-5
					Sampled By	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera
					Laboratory ID	-	-	-	-	-	-	-	-	-	-	-	-
					Analyzed By	Unknown	Unknown	Unknown	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST
					Date Sampled	2006-JUN-29	2006-JUN-29	2006-JUN-29	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15	2007-AUG-15
					Sample Depth (m bgs)	1.83 - 2.44	0.30 - 0.91	1.53 - 1.98	1.83 - 2.29	3.20 - 3.66	1.83 - 2.29	1.83 - 2.29	4.11 - 4.57	2.29 - 2.74	3.20 - 3.66	1.70 - 2.29	2.67 - 3.05
					AECs / APECs Assessed	AEC-1, APEC-3	APEC-3	APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1	AEC-1
					Soil Type	Fine	Unknown	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine	Fine
Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units							Duplicate of MW07-7-5					
Anthracene																	
intake of contaminated soil	1,000,000	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater used for drinking water	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
toxicity to soil invertebrates and plants	30	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
major microbial functional impairment	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater flow to surface water used by aquatic life	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene																	
intake of contaminated soil	50	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater used for drinking water	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
toxicity to soil invertebrates and plants	70	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
major microbial functional impairment	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater flow to surface water used by aquatic life	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene																	
standard to protect human health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j+k)fluoranthene																	
standard to protect human health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene																	
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene																	
standard to protect human health	4,500	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene																	
standard to protect human health	50	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene																	
intake of contaminated soil	300,000	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater used for drinking water	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
toxicity to soil invertebrates and plants	200	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
major microbial functional impairment	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater flow to surface water used by aquatic life	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene																	
standard to protect human health	9,500	0.25	0.25	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	0.25	0.25	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene																	
standard to protect human health	1,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene																	
standard to protect human health	950	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene																	
intake of contaminated soil	150,000	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater used for drinking water	100	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
toxicity to soil invertebrates and plants	20	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
major microbial functional impairment	nc	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater flow to surface water used by aquatic life	75	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene																	
standard to protect human health	300,000	0.046	0.046	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	50	0.046	0.046	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene																	
standard to protect human health	200,000	100	100	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	100	100	100	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Quinoline																	
standard to protect human health	10	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Index of Additive Cancer Risk (IACR)	nc	1	1	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
PAH Toxicity Equivalence (TEQ)	nc	5.3	5.3	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
Criteria	CSR Schedule 3.1, Parts 1 to 3: Soil Standards for Industrial Land Use and CCME-CEQG for Industrial Land Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Industrial Land Use
Result	Analytical result exceeds CCME guideline for Industrial Land Use based on correct application of fine and coarse-grained soil
Result	Analytical result exceeds CSR standard and CCME guideline for Industrial Land Use
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units	Borehole ID	MW08-10		MW08-11		BH08-12			MW08-13		
						Sample ID	MW08-10.3	MW08-10.4	MW08-11.2	MW08-11.4	BH08-12.3	BH08-12.5	BH08-12.4	MW08-13.2	MW08-13.4	MW08-13.5
						Sampled By	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera
						Laboratory ID	-	-	-	-	-	-	-	-	-	-
						Analyzed By	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST
						Date Sampled	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16
						Sample Depth (m bgs)	2.12 - 2.43	2.87 - 3.35	1.50 - 2.00	2.75 - 3.04	1.35 - 1.70	1.35 - 1.70	1.70 - 2.31	0.92 - 1.53	1.83 - 2.44	3.35 - 3.97
						AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
						Soil Type	Coarse	Fine	Coarse	Fine	Coarse	Coarse	Coarse	Coarse	Fine	Fine
Volatile Hydrocarbons																
Benzene																
intake of contaminated soil	6,500	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater used for drinking water	0.035	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
toxicity to soil invertebrates and plants	250	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
major microbial functional impairment	nc	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater flow to surface water used by aquatic life (freshwater)	2.5	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
groundwater flow to surface water used by aquatic life (marine)	6.5	0.03	0.0068	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Ethylbenzene																
intake of contaminated soil	700,000	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater used for drinking water	15	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
toxicity to soil invertebrates and plants	650	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
major microbial functional impairment	nc	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (freshwater)	200	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (marine)	200	0.082	0.018	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methyl tert-butyl ether (MTBE)																
standard to protect human health	20,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
Styrene																
standard to protect human health	1,000,000	50	50	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
standard to protect ecological health	50	50	50	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene																
intake of contaminated soil	550,000	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater used for drinking water	6	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
toxicity to soil invertebrates and plants	450	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
major microbial functional impairment	nc	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (freshwater)	0.5	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
groundwater flow to surface water used by aquatic life (marine)	200	0.37	0.08	-	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes																
intake of contaminated soil	1,000,000	11	2.4	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
groundwater used for drinking water	6.5	11	2.4	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
toxicity to soil invertebrates and plants	600	11	2.4	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
major microbial functional impairment	nc	11	2.4	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
groundwater flow to surface water used by aquatic life	20	11	2.4	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
F1 (C6 to C10)																
standard to protect human health	nc	240	170	-	mg/kg	-	-	-	-	1,200[K]	3,000[K]	-	-	-	-
standard to protect ecological health	nc	240	170	-	mg/kg	-	-	-	-	1,200[K]	3,000[K]	-	-	-	-
Volatile Hydrocarbons (VH)																
standard to protect human health	nc	nc	nc	-	mg/kg	<100	<100	<100	<100	1,200	3,000	170	<100	<100	<100
standard to protect ecological health	nc	nc	nc	-	mg/kg	<100	<100	<100	<100	1,200	3,000	170	<100	<100	<100
VPHs																
standard to protect human health	200	nc	nc	-	mg/kg	<100	<100	<100	<100	1,200	3,000	170	<100	<100	<100
standard to protect ecological health	200	nc	nc	-	mg/kg	<100	<100	<100	<100	1,200	3,000	170	<100	<100	<100
Extractable Petroleum Hydrocarbons																
EPH10-19																
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
EPH19-32																
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
LEPHs																
standard to protect human health	2,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	2,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
HEPHs																
standard to protect human health	5,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	5,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)																
standard to protect human health	nc	260	230	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	260	230	-	mg/kg	-	-	-	-	-	-	-	-	-	-
F3 (C16 to C34)																
standard to protect human health	nc	1,700	2,500	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	1,700	2,500	-	mg/kg	-	-	-	-	-	-	-	-	-	-
F4 (C35+)																
standard to protect human health	nc	3,300	6,600	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	3,300	6,600	-	mg/kg	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																
Acenaphthene																
standard to protect human health	15,000	0.28	0.28	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	0.28	0.28	-	mg/kg	-	-	-	-	-	-	-	-	-	-
Acenaphthylene																
standard to protect human health	nc	320	320	-	mg/kg	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	320	320	-	mg/kg	-	-	-	-	-	-	-	-	-	-

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

						Borehole ID	MW08-10		MW08-11		BH08-12			MW08-13			
						Sample ID	MW08-10.3	MW08-10.4	MW08-11.2	MW08-11.4	BH08-12.3	BH08-12.5	BH08-12.4	MW08-13.2	MW08-13.4	MW08-13.5	
						Sampled By	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	Hemmera	
						Laboratory ID	-	-	-	-	-	-	-	-	-	-	
						Analyzed By	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	CANTEST	
						Date Sampled	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	2008-SEP-16	
						Sample Depth (m bgs)	2.12 - 2.43	2.87 - 3.35	1.50 - 2.00	2.75 - 3.04	1.35 - 1.70	1.35 - 1.70	1.70 - 2.31	0.92 - 1.53	1.83 - 2.44	3.35 - 3.97	
						AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	
						Soil Type	Coarse	Fine	Coarse	Fine	Coarse	Coarse	Coarse	Coarse	Fine	Fine	
Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units						Duplicate of BH08-12.3						
	-	-	-	-													
Anthracene																	
intake of contaminated soil	1,000,000	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater used for drinking water	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
toxicity to soil invertebrates and plants	30	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
major microbial functional impairment	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater flow to surface water used by aquatic life	nc	32	32	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benz(a)anthracene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(a)pyrene																	
intake of contaminated soil	50	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater used for drinking water	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
toxicity to soil invertebrates and plants	70	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
major microbial functional impairment	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater flow to surface water used by aquatic life	nc	72	72	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(b)fluoranthene																	
standard to protect human health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(b+j)fluoranthene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(b+j+k)fluoranthene																	
standard to protect human health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(k)fluoranthene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Benzo(g,h,i)perylene																	
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Chrysene																	
standard to protect human health	4,500	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Dibenz(a,h)anthracene																	
standard to protect human health	50	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Fluoranthene																	
intake of contaminated soil	300,000	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater used for drinking water	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
toxicity to soil invertebrates and plants	200	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
major microbial functional impairment	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater flow to surface water used by aquatic life	nc	180	180	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Fluorene																	
standard to protect human health	9,500	0.25	0.25	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	0.25	0.25	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Indeno(1,2,3-cd)pyrene																	
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
1-Methylnaphthalene																	
standard to protect human health	1,000	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
2-Methylnaphthalene																	
standard to protect human health	950	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Naphthalene																	
intake of contaminated soil	150,000	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater used for drinking water	100	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
toxicity to soil invertebrates and plants	20	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
major microbial functional impairment	nc	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
groundwater flow to surface water used by aquatic life	75	0.013	0.013	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Phenanthrene																	
standard to protect human health	300,000	0.046	0.046	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	50	0.046	0.046	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Pyrene																	
standard to protect human health	200,000	100	100	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	100	100	100	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Quinoline																	
standard to protect human health	10	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
Index of Additive Cancer Risk (IACR)	nc	1	1	-	mg/kg	-	-	-	-	-	-	-	-	-	-		
PAH Toxicity Equivalence (TEQ)	nc	5.3	5.3	-	mg/kg	-	-	-	-	-	-	-	-	-	-		

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
Criteria	CSR Schedule 3.1, Parts 1 to 3: Soil Standards for Industrial Land Use and CCME-CEQG for Industrial Land Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Industrial Land Use
Result	Analytical result exceeds CCME guideline for Industrial Land Use based on correct application of fine and coarse-grained soil
Result	Analytical result exceeds CSR standard and CCME guideline for Industrial Land Use
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units	BV-11BH-01M		BV-11BH-02M		BV-11BH-03M		BV-11BH-04M		BV-11BH-07M			BV-11BH-08M		BV-11BH-09M	
Sample ID						BV-11BH-01M-2	BV-11BH-01M-5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-11BH-07M-2	BV-Dup8	BV-11BH-07M-3	BV-11BH-08M-1	BV-11BH-08M-4	BV-11BH-09M-1	BV-11BH-09M-5
Sampled By						Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz
Laboratory ID						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Analyzed By						AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Date Sampled						2011-DEC-14	2011-DEC-14	2011-DEC-16	2011-DEC-16	2011-DEC-15	2011-DEC-15	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-16	2011-DEC-16	2011-DEC-14	2011-DEC-14
Sample Depth (m bgs)						0.50 - 1.00	3.00 - 4.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	2.00 - 3.00	0.00 - 0.50	1.50 - 2.00	0.50 - 1.00	0.50 - 1.00	1.50 - 2.00	0.35 - 0.50	2.00 - 3.00	0.00 - 0.50	3.00 - 4.00
AECs / APECs Assessed						APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	AEC-2	AEC-2	AEC-2	APEC-1	APEC-1	APEC-2	APEC-2
Soil Type						Coarse	Fine	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Fine	Coarse	Fine
Volatile Hydrocarbons																				
Benzene																				
intake of contaminated soil	6,500	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
groundwater used for drinking water	0.035	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
toxicity to soil invertebrates and plants	250	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
major microbial functional impairment	nc	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
groundwater flow to surface water used by aquatic life (freshwater)	2.5	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
groundwater flow to surface water used by aquatic life (marine)	6.5	0.03	0.0068	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Ethylbenzene																				
intake of contaminated soil	700,000	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
groundwater used for drinking water	15	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
toxicity to soil invertebrates and plants	650	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
major microbial functional impairment	nc	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
groundwater flow to surface water used by aquatic life (freshwater)	200	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
groundwater flow to surface water used by aquatic life (marine)	200	0.082	0.018	-	mg/kg	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Methyl tert-butyl ether (MTBE)																				
standard to protect human health	20,000	nc	nc	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-
Styrene																				
standard to protect human health	1,000,000	50	50	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
standard to protect ecological health	50	50	50	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
Toluene																				
intake of contaminated soil	550,000	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
groundwater used for drinking water	6	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
toxicity to soil invertebrates and plants	450	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
major microbial functional impairment	nc	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
groundwater flow to surface water used by aquatic life (freshwater)	0.5	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
groundwater flow to surface water used by aquatic life (marine)	200	0.37	0.08	-	mg/kg	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
Xylenes																				
intake of contaminated soil	1,000,000	11	2.4	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
groundwater used for drinking water	6.5	11	2.4	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
toxicity to soil invertebrates and plants	600	11	2.4	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
major microbial functional impairment	nc	11	2.4	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
groundwater flow to surface water used by aquatic life	20	11	2.4	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
F1 (C6 to C10)																				
standard to protect human health	nc	240	170	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-
standard to protect ecological health	nc	240	170	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-
Volatile Hydrocarbons (VH)																				
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VPHs																				
standard to protect human health	200	nc	nc	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-
standard to protect ecological health	200	nc	nc	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-	-
Extractable Petroleum Hydrocarbons																				
EPH10-19																				
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPH19-32																				
standard to protect human health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LEPHs																				
standard to protect human health	2,000	nc	nc	-	mg/kg	<25	<25	<25	<25	<25	<25	<25	<25	30	<25	43	<25	<25	41	<25
standard to protect ecological health	2,000	nc	nc	-	mg/kg	<25	<25	<25	<25	<25	<25	<25	<25	30	<25	43	<25	<25	41	<25
HEPHs																				
standard to protect human health	5,000	nc	nc	-	mg/kg	<25	79	64	27	<25	71	170	<25	110	33	220	<25	<25	600	60
standard to protect ecological health	5,000	nc	nc	-	mg/kg	<25	79	64	27	<25	71	170	<25	110	33	220	<25	<25	600	60
F2 (C10 to C16)																				
standard to protect human health	nc	260	230	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	29	13	17	<10	<10	<10	<10
standard to protect ecological health	nc	260	230	-	mg/kg	<10	<10	<10	<10	<10	<10	<10	<10	29	13	17	<10	<10	<10	<10
F3 (C16 to C34)																				
standard to protect human health	nc	1,700	2,500	-	mg/kg	<10	97	108	20	<10	<10	314	<10	206	136	150	<10	<10	494	12
standard to protect ecological health	nc	1,700	2,500	-	mg/kg	<10	97	108	20	<10	<10	314	<10	206	136	150	<10	<10	494	12
F4 (C35+)																				
standard to protect human health	nc	3,300	6,600	-	mg/kg	<10	39	412	65	<10	<10	205	19	92	80	112	<10	35	344	<10
standard to protect ecological health	nc	3,300	6,600	-	mg/kg	<10	39	412	65	<10	<10	205	19	92	80	112	<10	35	344	<10
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene																				
standard to protect human health	15,000	0.28	0.28	-	mg/kg	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
standard to protect ecological health	nc	0.28	0.28	-	mg/kg	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene																				
standard to protect human health	nc	320	320	-	mg/kg	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01
standard to protect ecological health	nc	320	320	-	mg/kg	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01

TABLE S1 - ANALYTICAL RESULTS FOR HYDROCARBONS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units	BV-11BH-01M BV-11BH-01M-2 2011-DEC-14 0.50 - 1.00 APEC-3 Coarse	BV-11BH-01M BV-11BH-01M-5 Franz 2011-DEC-14 3.00 - 4.00 APEC-3 Fine	BV-11BH-02M BV-11BH-02M-2 Franz 2011-DEC-16 0.50 - 1.00 APEC-3 Coarse	BV-11BH-02M BV-11BH-02M-3 Franz 2011-DEC-16 1.50 - 2.00 APEC-3 Coarse	BV-11BH-03M BV-11BH-03M-1 Franz 2011-DEC-15 0.50 - 1.00 APEC-3 Coarse	BV-11BH-03M BV-11BH-03M-3 Franz 2011-DEC-15 2.00 - 3.00 APEC-3 Coarse	BV-11BH-04M BV-11BH-04M-1 Franz 2011-DEC-17 0.00 - 0.50 APEC-3 Coarse	BV-11BH-04M BV-11BH-04M-3 Franz 2011-DEC-17 1.50 - 2.00 APEC-3 Coarse	BV-11BH-07M BV-11BH-07M-2 Franz 2011-DEC-17 0.50 - 1.00 AEC-2 Coarse	BV-11BH-07M BV-Dup8 Franz 2011-DEC-17 0.50 - 1.00 AEC-2 Coarse Duplicate of BV-11BH-07M-2	BV-11BH-07M BV-11BH-07M-3 Franz 2011-DEC-17 1.50 - 2.00 AEC-2 Coarse	BV-11BH-08M BV-11BH-08M-1 Franz 2011-DEC-16 0.35 - 0.50 APEC-1 Coarse	BV-11BH-08M BV-11BH-08M-4 Franz 2011-DEC-16 2.00 - 3.00 APEC-1 Fine	BV-11BH-09M BV-11BH-09M-1 Franz 2011-DEC-14 0.00 - 0.50 APEC-2 Coarse	BV-11BH-09M BV-11BH-09M-5 Franz 2011-DEC-14 3.00 - 4.00 APEC-2 Fine
Anthracene																					
intake of contaminated soil	1,000,000	32	32	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
groundwater used for drinking water	nc	32	32	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
toxicity to soil invertebrates and plants	30	32	32	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
major microbial functional impairment	nc	32	32	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
groundwater flow to surface water used by aquatic life	nc	32	32	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benz(a)anthracene																					
standard to protect human health	500	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.29	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	10	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.29	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(a)pyrene																					
intake of contaminated soil	50	72	72	-	mg/kg	<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
groundwater used for drinking water	nc	72	72	-	mg/kg	<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
toxicity to soil invertebrates and plants	70	72	72	-	mg/kg	<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
major microbial functional impairment	nc	72	72	-	mg/kg	<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
groundwater flow to surface water used by aquatic life	nc	72	72	-	mg/kg	<0.05	<0.05	<0.05	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b)fluoranthene																					
standard to protect human health	nc	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.30	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	nc	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.30	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(b+j)fluoranthene																					
standard to protect human health	500	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	10	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j+k)fluoranthene																					
standard to protect human health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc	10	10	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene																					
standard to protect human health	500	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.17	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	10	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.17	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(g,h,i)perylene																					
standard to protect human health	nc	nc	nc	-	mg/kg	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.05	<0.05	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene																					
standard to protect human health	4,500	nc	nc	-	mg/kg	<0.05	<0.05	<0.05	0.37	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.05	<0.05	<0.05	0.37	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene																					
standard to protect human health	50	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	10	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluoranthene																					
intake of contaminated soil	300,000	180	180	-	mg/kg	<0.05	<0.05	<0.05	0.59	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
groundwater used for drinking water	nc	180	180	-	mg/kg	<0.05	<0.05	<0.05	0.59	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
toxicity to soil invertebrates and plants	200	180	180	-	mg/kg	<0.05	<0.05	<0.05	0.59	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
major microbial functional impairment	nc	180	180	-	mg/kg	<0.05	<0.05	<0.05	0.59	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
groundwater flow to surface water used by aquatic life	nc	180	180	-	mg/kg	<0.05	<0.05	<0.05	0.59	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene																					
standard to protect human health	9,500	0.25	0.25	-	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	nc	0.25	0.25	-	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Indeno(1,2,3-cd)pyrene																					
standard to protect human health	500	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.18	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
standard to protect ecological health	10	10	10	-	mg/kg	<0.02	<0.02	<0.02	0.18	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
1-Methylnaphthalene																					
standard to protect human health	1,000	nc	nc	-	mg/kg	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.09	0.08	0.03	<0.01	<0.01	0.02	<0.01	
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.09	0.08	0.03	<0.01	<0.01	0.02	<0.01	
2-Methylnaphthalene																					
standard to protect human health	950	nc	nc	-	mg/kg	<0.01	<0.01	0.03	0.01	<0.01	<0.01	0.01	<0.01	0.14	0.14	0.05	<0.01	<0.01	0.04	<0.01	
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.01	<0.01	0.03	0.01	<0.01	<0.01	0.01	<0.01	0.14	0.14	0.05	<0.01	<0.01	0.04	<0.01	
Naphthalene																					
intake of contaminated soil	150,000	0.013	0.013	-	mg/kg	<0.01	**0.03**	**0.02**	**0.10**	<0.01	0.01	**0.02**	<0.01	**0.02**	**0.02**	**0.07**	<0.01	<0.01	**0.09**	0.01	
groundwater used for drinking water	100	0.013	0.013	-	mg/kg	<0.01	**0.03**	**0.02**	**0.10**	<0.01	0.01	**0.02**	<0.01	**0.02**	**0.02**	**0.07**	<0.01	<0.01	**0.09**	0.01	
toxicity to soil invertebrates and plants	20	0.013	0.013	-	mg/kg	<0.01	**0.03**	**0.02**	**0.10**	<0.01	0.01	**0.02**	<0.01	**0.02**	**0.02**	**0.07**	<0.01	<0.01	**0.09**	0.01	
major microbial functional impairment	nc	0.013	0.013	-	mg/kg	<0.01	**0.03**	**0.02**	**0.10**	<0.01	0.01	**0.02**	<0.01	**0.02**	**0.02**	**0.07**	<0.01	<0.01	**0.09**	0.01	
groundwater flow to surface water used by aquatic life	75	0.013	0.013	-	mg/kg	<0.01	**0.03**	**0.02**	**0.10**	<0.01	0.01	**0.02**	<0.01	**0.02**	**0.02**	**0.07**	<0.01	<0.01	**0.09**	0.01	
Phenanthrene																					
standard to protect human health	300,000	0.046	0.046	-	mg/kg	<0.02	0.04	0.02	**0.17**	0.02	<0.02	0.04	<0.02	**0.07**	**0.07**	**0.05**	<0.02	<0.02	0.02	0.03	
standard to protect ecological health	50	0.046	0.046	-	mg/kg	<0.02	0.04	0.02	**0.17**	0.02	<0.02	0.04	<0.02	**0.07**	**0.07**	**0.05**	<0.02	<0.02	0.02	0.03	
Pyrene																					
standard to protect human health	200,000	100	100	-	mg/kg	<0.02	0.04	<0.02	0.63	<0.02	<0.02	0.06	<0.02	<0.02	0.02	0.04	<0.02	<0.02	0.03	0.03	
standard to protect ecological health	100	100	100	-	mg/kg	<0.02	0.04	<0.02	0.63	<0.02	<0.02	0.06	<0.02	<0.02	0.02	0.04	<0.02	<0.02	0.03	0.03	
Quinoline																					
standard to protect human health	10	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
standard to protect ecological health	nc	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Index of Additive Cancer Risk (IACR)	nc	1	1	-	mg/kg	0.569	0.569	0.569	**3.271**	0.569	0.569	0.579	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	
PAH Toxicity Equivalence (TEQ)	nc	5.3	5.3	-	mg/kg	0.115	0.115	0.115	0.943	0.115	0.115	0.125	0.115	0.115	0.115	0.115	0.115	0.115	0.115	0.115	

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
Criteria	CSR Schedule 3.1, Parts 1 to 3: Soil Standards for Industrial Land Use and CCME-CEQG for Industrial Land Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Industrial Land Use
Result	Analytical result exceeds CCME guideline for Industrial Land Use based on correct application of fine and coarse-grained soil
Result	Analytical result exceeds CSR standard and CCME guideline for Industrial Land Use
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.

ENVIROCHEM SERVICES INC.

TABLE S2 - ANALYTICAL RESULTS FOR METALS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	Notes	CCME-CEQG Industrial Land Use (IL) Guidelines	CCME-CEQG Industrial Land Use (IL) Guidelines	Reportable Detection Limit	Units	BV-11BH-01M			BV-11BH-02M		BV-11BH-03M		BV-11BH-04M			BV-11BH-09M	
Borehole ID							BV-11BH-01M			BV-11BH-02M		BV-11BH-03M		BV-11BH-04M			BV-11BH-09M	
Sample ID							BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9	BV-11BH-09M-1	BV-11BH-09M-5
Sampled By							Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz
Laboratory ID							-	-	-	-	-	-	-	-	-	-	-	-
Analyzed By							AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Date Sampled							2011-DEC-14	2011-DEC-14	2011-DEC-14	2011-DEC-16	2011-DEC-16	2011-DEC-15	2011-DEC-15	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-14	2011-DEC-14
Sample Depth (m bgs)							0.50 - 1.00	3.00 - 4.00	3.00 - 4.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	2.00 - 3.00	0.00 - 0.50	1.50 - 2.00	1.50 - 2.00	0.00 - 0.50	3.00 - 4.00
AECs / APECs Assessed							APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2	APEC-2
Soil Type							Coarse	Fine	Fine	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Fine
Physical Tests																		
pH	nc		6 to 8	6 to 8	-	mg/kg	7.5	7.6	7.5	7.3	6.6	7.5	7.1	6.9	7.0	7.1	7.2	7.3
Metals																		
Aluminum (Al)																		
standard to protect human health	250,000		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Antimony (Sb)																		
standard to protect human health	40,000		40	40	-	mg/kg	0.31	0.56	0.64	0.19	0.52	0.39	0.82	0.56	0.66	0.29	2.05	0.49
standard to protect ecological health	40		40	40	-	mg/kg	0.31	0.56	0.64	0.19	0.52	0.39	0.82	0.56	0.66	0.29	2.05	0.49
Arsenic (As)																		
intake of contaminated soil	400		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
groundwater used for drinking water	10		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
toxicity to soil invertebrates and plants	40		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
major microbial functional impairment	nc		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
groundwater flow to surface water used by aquatic life (freshwater)	10		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
groundwater flow to surface water used by aquatic life (marine)	10		12	12	-	mg/kg	3.6	17.2	17.5	2.8	7.9	4.3	10.0	4.4	7.0	5.4	4.5	6.2
Barium (Ba)																		
intake of contaminated soil	1,000,000		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
groundwater used for drinking water	350		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
toxicity to soil invertebrates and plants	1,500		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
major microbial functional impairment	nc		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
groundwater flow to surface water used by aquatic life (freshwater)	3,500		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
groundwater flow to surface water used by aquatic life (marine)	1,500		2,000	2,000	-	mg/kg	57.9	87.7	86.9	49.0	97.1	74.7	83.8	80.5	57.0	54.7	174	93.3
Beryllium (Be)																		
intake of contaminated soil	15,000		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
groundwater used for drinking water																		
pH < 5.5	1		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 5.5 - < 6.0	1.5		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 6.0 - < 6.5	4		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 6.5 - < 7.0	20		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.0 - < 7.5	150		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.5 - < 8.0	1,000		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH ≥ 8.0	2,500		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
toxicity to soil invertebrates and plants	350		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
major microbial functional impairment	nc		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 6.5	1		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 6.5 - < 7.0	4		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.0 - < 7.5	30		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.5 - < 8.0	250		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH ≥ 8.0	500		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
groundwater flow to surface water used by aquatic life (marine)																		
pH < 5.0	85		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 5.0 - < 5.5	100		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 5.5 - < 6.0	200		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 6.0 - < 6.5	550		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 6.5 - < 7.0	2,500		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.0 - < 7.5	20,000		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH 7.5 - < 8.0	150,000		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
pH ≥ 8.0	350,000		8	8	-	mg/kg	0.21	0.34	0.31	0.17	0.34	0.21	0.24	0.24	0.20	0.18	0.26	0.32
Boron (B)																		
standard to protect human health	1,000,000		nc	nc	-	mg/kg	0.1	0.4	0.4	<0.1	1.4	0.2	0.2	1.2	0.2	0.2	1.5	0.8
standard to protect ecological health	nc		nc	nc	-	mg/kg	0.1	0.4	0.4	<0.1	1.4	0.2	0.2	1.2	0.2	0.2	1.5	0.8
Cadmium (Cd)																		
intake of contaminated soil	3,500		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
groundwater used for drinking water																		
pH < 7.0	1		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.0 - < 7.5	4.5		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.5 - < 8.0	30		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH ≥ 8.0	70		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
toxicity to soil invertebrates and plants	75		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
major microbial functional impairment	nc		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 7.0	1	*A*	22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.0 - < 7.5	3	*A*	22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.5 - < 8.0	20	*A*	22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH ≥ 8.0	50	*A*	22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
groundwater flow to surface water used by aquatic life (marine)																		
pH < 5.5	1		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 5.5 - < 6.0	1.5		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 6.0 - < 6.5	2		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 6.5 - < 7.0	3.5		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.0 - < 7.5	15		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH 7.5 - < 8.0	95		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
pH ≥ 8.0	200		22	22	-	mg/kg	0.12	0.31	0.31	0.12	0.26	0.14	0.22	0.37	0.12	0.12	0.25	0.27
Chromium (total-Cr)																		
intake of contaminated soil	20,000		87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34
groundwater used for drinking water	60	*C*	87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34
toxicity to soil invertebrates and plants	250		87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34
major microbial functional impairment	nc		87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34
groundwater flow to surface water used by aquatic life (freshwater)	60	*C*	87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34
groundwater flow to surface water used by aquatic life (marine)	60	*C*	87	87	-	mg/kg	25	43	40	27	43	27	29	37	30	28	38	34

TABLE S2 - ANALYTICAL RESULTS FOR METALS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	Notes	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units	BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5 Duplicate of BV-11BH-01M-5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9 Duplicate of BV-11BH-04M-3	BV-11BH-09M-1	BV-11BH-09M-5
Borehole ID							BV-11BH-01M			BV-11BH-02M		BV-11BH-03M		BV-11BH-04M			BV-11BH-09M	
Sample ID							BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9	BV-11BH-09M-1	BV-11BH-09M-5
Sampled By							Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz
Laboratory ID							-	-	-	-	-	-	-	-	-	-	-	-
Analyzed By							AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Date Sampled							2011-DEC-14	2011-DEC-14	2011-DEC-14	2011-DEC-16	2011-DEC-16	2011-DEC-15	2011-DEC-15	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-14	2011-DEC-14
Sample Depth (m bgs)							0.50 - 1.00	3.00 - 4.00	3.00 - 4.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	2.00 - 3.00	0.00 - 0.50	1.50 - 2.00	1.50 - 2.00	0.00 - 0.50	3.00 - 4.00
AECs / APECs Assessed							APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2	APEC-2
Soil Type							Coarse	Fine	Fine	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Fine
Physical Tests																		
pH	nc		6 to 8	6 to 8	-	mg/kg	7.5	7.6	7.5	7.3	6.6	7.5	7.1	6.9	7.0	7.1	7.2	7.3
Metals																		
Cobalt (Co)																		
intake of contaminated soil	2,000		300	300	-	mg/kg	7.2	11.4	11.0	7.5	12.4	8.6	9.6	8.5	8.2	7.9	7.5	11.6
groundwater used for drinking water	25		300	300	-	mg/kg	7.2	11.4	11.0	7.5	12.4	8.6	9.6	8.5	8.2	7.9	7.5	11.6
toxicity to soil invertebrates and plants	200		300	300	-	mg/kg	7.2	11.4	11.0	7.5	12.4	8.6	9.6	8.5	8.2	7.9	7.5	11.6
major microbial functional impairment	nc		300	300	-	mg/kg	7.2	11.4	11.0	7.5	12.4	8.6	9.6	8.5	8.2	7.9	7.5	11.6
groundwater flow to surface water used by aquatic life	25		300	300	-	mg/kg	7.2	11.4	11.0	7.5	12.4	8.6	9.6	8.5	8.2	7.9	7.5	11.6
Copper (Cu)																		
intake of contaminated soil	700,000		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
groundwater used for drinking water																		
pH < 5.0	250		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 5.0 - < 5.5	500		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 5.5 - < 6.0	2,000		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.0 - < 6.5	10,000		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.5 - < 7.0	50,000		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH ≥ 7.0	100,000		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
toxicity to soil invertebrates and plants	300		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
major microbial functional impairment	nc		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 5.5	75	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 5.5 - < 6.0	100	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.0 - < 6.5	700	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.5 - < 7.0	3,000	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 7.0 - < 7.5	6,500	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH ≥ 7.5	7,500	*E*	91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
groundwater flow to surface water used by aquatic life (marine)																		
pH < 6.0	75		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.0 - < 6.5	150		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH 6.5 - < 7.0	650		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
pH ≥ 7.0	1,500		91	91	-	mg/kg	18.0	30.7	30.3	14.4	29.5	37.3	22.6	27.3	16.7	15.2	31.1	29.8
Iron (Fe)																		
standard to protect human health	150,000		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Lead (Pb)																		
intake of contaminated soil	4,000		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
groundwater used for drinking water																		
pH < 5.5	120		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 5.5 - < 6.0	150		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.0 - < 6.5	800		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.5 - < 7.0	3,500		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 7.0 - < 7.5	7,500		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH ≥ 7.5	8,500		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
toxicity to soil invertebrates and plants	1,000		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
major microbial functional impairment	nc		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 5.0	200	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 5.0 - < 5.5	350	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 5.5 - < 6.0	1,500	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.0 - < 6.5	8,500	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.5 - < 7.0	35,000	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 7.0 - < 7.5	80,000	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH ≥ 7.5	90,000	*F*	600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
groundwater flow to surface water used by aquatic life (marine)																		
pH < 5.5	120		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 5.5 - < 6.0	300		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.0 - < 6.5	1,500		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH 6.5 - < 7.0	6,500		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
pH ≥ 7.0	15,000		600	600	-	mg/kg	3.30	7.65	7.39	2.75	8.09	3.62	7.24	18.6	3.24	2.89	18.1	7.47
Lithium (Li)																		
standard to protect human health	450		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Manganese (Mn)																		
intake of contaminated soil	1,000,000		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater used for drinking water	2,000	*G, H*	nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
toxicity to soil invertebrates and plants	2,000		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
major microbial functional impairment	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
groundwater flow to surface water used by aquatic life	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (Inorganic Hg)																		
intake of contaminated soil	2,000		50	50	-	mg/kg	0.02	0.06	0.06	0.02	0.07	0.03	0.04	0.05	0.03	0.02	0.03	0.06
groundwater used for drinking water	nc		50	50	-	mg/kg	0.02	0.06	0.06	0.02	0.07	0.03	0.04	0.05	0.03	0.02	0.03	0.06
toxicity to soil invertebrates and plants	75		50	50	-	mg/kg	0.02	0.06	0.06	0.02	0.07	0.03	0.04	0.05	0.03	0.02	0.03	0.06
major microbial functional impairment	nc		50	50	-	mg/kg	0.02	0.06	0.06	0.02	0.07	0.03	0.04	0.05	0.03	0.02	0.03	0.06
groundwater flow to surface water used by aquatic life	nc		50	50	-	mg/kg	0.02	0.06	0.06	0.02	0.07	0.03	0.04	0.05	0.03	0.02	0.03	0.06
Molybdenum (Mo)																		
intake of contaminated soil	35,000		40	40	-	mg/kg	0.72	0.81	0.80	0.33	0.72	0.60	0.94	2.24	0.47	0.42	2.14	0.69
groundwater used for drinking water	15		40	40	-	mg/kg	0.72	0.81	0.80	0.33	0.72	0.60	0.94	2.24	0.47	0.42	2.14	0.69
toxicity to soil invertebrates and plants	150		40	40	-	mg/kg	0.72	0.81	0.80	0.33	0.72	0.60	0.94	2.24	0.47	0.42	2.14	0.69
major microbial functional impairment	nc		40	40	-	mg/kg	0.72	0.81	0.80	0.33	0.72	0.60	0.94	2.24	0.47	0.42	2.14	0.69
groundwater flow to surface water used by aquatic life	650		40	40	-	mg/kg	0.72	0.81	0.80	0.33	0.72	0.60	0.94	2.24	0.47	0.42	2.14	0.69

TABLE S2 - ANALYTICAL RESULTS FOR METALS IN SOIL

Parameter	BC CSR Industrial Land Use (IL) Standards	Notes	CCME-CEQG Industrial Land Use (IL) Guidelines Coarse-Grained	CCME-CEQG Industrial Land Use (IL) Guidelines Fine-Grained	Reportable Detection Limit	Units	BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5 Duplicate of BV-11BH-01M-5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9 Duplicate of BV-11BH-04M-3	BV-11BH-09M-1	BV-11BH-09M-5
Borehole ID							BV-11BH-01M			BV-11BH-02M		BV-11BH-03M		BV-11BH-04M			BV-11BH-09M	
Sample ID							BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9	BV-11BH-09M-1	BV-11BH-09M-5
Sampled By							Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz
Laboratory ID							-	-	-	-	-	-	-	-	-	-	-	-
Analyzed By							AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
Date Sampled							2011-DEC-14	2011-DEC-14	2011-DEC-14	2011-DEC-16	2011-DEC-16	2011-DEC-15	2011-DEC-15	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-14	2011-DEC-14
Sample Depth (m bgs)							0.50 - 1.00	3.00 - 4.00	3.00 - 4.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	2.00 - 3.00	0.00 - 0.50	1.50 - 2.00	1.50 - 2.00	0.00 - 0.50	3.00 - 4.00
AECs / APECs Assessed							APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2	APEC-2
Soil Type							Coarse	Fine	Fine	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Fine
Physical Tests																		
pH	nc		6 to 8	6 to 8	-	mg/kg	7.5	7.6	7.5	7.3	6.6	7.5	7.1	6.9	7.0	7.1	7.2	7.3
Metals																		
Nickel (Ni)																		
intake of contaminated soil	80,000		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
groundwater used for drinking water																		
pH < 7.5	70		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 7.5 - < 8.0	250		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH ≥ 8.0	500		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
toxicity to soil invertebrates and plants	250		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
major microbial functional impairment	nc		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 5.0	90	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 5.0 - < 5.5	100	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 5.5 - < 6.0	150	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 6.0 - < 6.5	200	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 6.5 - < 7.0	300	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 7.0 - < 7.5	900	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 7.5 - < 8.0	5,000	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH ≥ 8.0	9,500	/	50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
groundwater flow to surface water used by aquatic life (marine)																		
pH < 7.5	70		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH 7.5 - < 8.0	250		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
pH ≥ 8.0	500		50	50	-	mg/kg	30.1	37.8	37.5	31.9	47.3	30.0	34.9	31.1	32.0	31.2	29.0	38.6
Selenium (Se)																		
intake of contaminated soil	35,000		2.9	2.9	-	mg/kg	0.2	0.6	0.6	0.1	0.5	0.3	0.4	0.4	0.2	0.3	0.3	0.6
groundwater used for drinking water	1		2.9	2.9	-	mg/kg	0.2	0.6	0.6	0.1	0.5	0.3	0.4	0.4	0.2	0.3	0.3	0.6
toxicity to soil invertebrates and plants	2		2.9	2.9	-	mg/kg	0.2	0.6	0.6	0.1	0.5	0.3	0.4	0.4	0.2	0.3	0.3	0.6
major microbial functional impairment	nc		2.9	2.9	-	mg/kg	0.2	0.6	0.6	0.1	0.5	0.3	0.4	0.4	0.2	0.3	0.3	0.6
groundwater flow to surface water used by aquatic life	1		2.9	2.9	-	mg/kg	0.2	0.6	0.6	0.1	0.5	0.3	0.4	0.4	0.2	0.3	0.3	0.6
Silver (Ag)																		
standard to protect human health	35,000		40	40	-	mg/kg	<0.05	0.10	0.10	<0.05	0.09	0.05	0.07	0.09	0.06	<0.05	0.08	0.09
standard to protect ecological health	40		40	40	-	mg/kg	<0.05	0.10	0.10	<0.05	0.09	0.05	0.07	0.09	0.06	<0.05	0.08	0.09
Strontium (Sr)																		
standard to protect human health	150,000		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (Tl)																		
standard to protect human health	nc		1	1	-	mg/kg	<0.05	0.09	0.09	<0.05	0.09	0.06	0.08	0.07	0.06	<0.05	<0.05	0.08
standard to protect ecological health	25		1	1	-	mg/kg	<0.05	0.09	0.09	<0.05	0.09	0.06	0.08	0.07	0.06	<0.05	<0.05	0.08
Tin (Sn)																		
standard to protect human health	1,000,000		300	300	-	mg/kg	0.28	0.70	0.93	0.45	0.82	0.29	0.48	1.30	0.32	0.35	3.92	1.70
standard to protect ecological health	300		300	300	-	mg/kg	0.28	0.70	0.93	0.45	0.82	0.29	0.48	1.30	0.32	0.35	3.92	1.70
Tungsten (W)																		
standard to protect human health	200		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
standard to protect ecological health	nc		nc	nc	-	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (U)																		
intake of contaminated soil	20,000		300	300	-	mg/kg	0.38	0.70	0.69	0.26	0.60	0.39	0.55	0.54	0.39	0.33	0.84	0.67
groundwater used for drinking water	30		300	300	-	mg/kg	0.38	0.70	0.69	0.26	0.60	0.39	0.55	0.54	0.39	0.33	0.84	0.67
toxicity to soil invertebrates and plants	2,000		300	300	-	mg/kg	0.38	0.70	0.69	0.26	0.60	0.39	0.55	0.54	0.39	0.33	0.84	0.67
major microbial functional impairment	nc		300	300	-	mg/kg	0.38	0.70	0.69	0.26	0.60	0.39	0.55	0.54	0.39	0.33	0.84	0.67
groundwater flow to surface water used by aquatic life	150		300	300	-	mg/kg	0.38	0.70	0.69	0.26	0.60	0.39	0.55	0.54	0.39	0.33	0.84	0.67
Vanadium (V)																		
intake of contaminated soil	35,000		130	130	-	mg/kg	36	44	43	42	50	37	39	40	41	40	40	47
groundwater used for drinking water	100		130	130	-	mg/kg	36	44	43	42	50	37	39	40	41	40	40	47
toxicity to soil invertebrates and plants	300		130	130	-	mg/kg	36	44	43	42	50	37	39	40	41	40	40	47
major microbial functional impairment	nc		130	130	-	mg/kg	36	44	43	42	50	37	39	40	41	40	40	47
groundwater flow to surface water used by aquatic life	nc		130	130	-	mg/kg	36	44	43	42	50	37	39	40	41	40	40	47
Zinc (Zn)																		
intake of contaminated soil	1,000,000		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
groundwater used for drinking water																		
pH < 5.0	200		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 5.0 - < 5.5	250		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 5.5 - < 6.0	300		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 6.0 - < 6.5	450		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 6.5 - < 7.0	600		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 7.0 - < 7.5	1,000		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 7.5 - < 8.0	3,000		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH ≥ 8.0	5,500		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
toxicity to soil invertebrates and plants	450		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
major microbial functional impairment	nc		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
groundwater flow to surface water used by aquatic life (freshwater)																		
pH < 6.0	150		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 6.0 - < 6.5	250		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 6.5 - < 7.0	350		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 7.0 - < 7.5	600		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH 7.5 - < 8.0	1,500		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH ≥ 8.0	3,000		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
groundwater flow to surface water used by aquatic life (marine)																		
pH < 8.0	150		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64
pH > 8.0	200		360	360	-	mg/kg	39	66	64	36	67	47	48	108	40	41	80	64

TABLE S2 - ANALYTICAL RESULTS FOR METALS IN SOIL

Borehole ID							**BV-11BH-01M**			**BV-11BH-02M**		**BV-11BH-03M**		**BV-11BH-04M**			**BV-11BH-09M**	
Sample ID							**BV-11BH-01M-2**	**BV-11BH-01M-5**	**BV-Dup5**	**BV-11BH-02M-2**	**BV-11BH-02M-3**	**BV-11BH-03M-1**	**BV-11BH-03M-3**	**BV-11BH-04M-1**	**BV-11BH-04M-3**	**BV-Dup9**	**BV-11BH-09M-1**	**BV-11BH-09M-5**
Sampled By							**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**	**Franz**
Laboratory ID							**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Analyzed By							**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**	**AGAT**
Date Sampled							**2011-DEC-14**	**2011-DEC-14**	**2011-DEC-14**	**2011-DEC-16**	**2011-DEC-16**	**2011-DEC-15**	**2011-DEC-15**	**2011-DEC-17**	**2011-DEC-17**	**2011-DEC-17**	**2011-DEC-14**	**2011-DEC-14**
Sample Depth (m bgs)							**0.50 - 1.00**	**3.00 - 4.00**	**3.00 - 4.00**	**0.50 - 1.00**	**1.50 - 2.00**	**0.50 - 1.00**	**2.00 - 3.00**	**0.00 - 0.50**	**1.50 - 2.00**	**1.50 - 2.00**	**0.00 - 0.50**	**3.00 - 4.00**
AECs / APECs Assessed							**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-3**	**APEC-2**	**APEC-2**
Soil Type							**Coarse**	**Fine**	**Fine**	**Coarse**	**Coarse**	**Coarse**	**Coarse**	**Coarse**	**Coarse**	**Coarse**	**Coarse**	**Fine**
Parameter	**BC CSR Industrial Land Use (IL) Standards**	**Notes**	**CCME-CEQG Industrial Land Use (IL) Guidelines**	**CCME-CEQG Industrial Land Use (IL) Guidelines**	**Reportable Detection Limit**	**Units**			**Duplicate of BV-11BH-01M-5**							**Duplicate of BV-11BH-04M-3**		
	-		**Coarse-Grained**	**Fine-Grained**														
Physical Tests																		
pH	nc		6 to 8	6 to 8	-	mg/kg	7.5	7.6	7.5	7.3	6.6	7.5	7.1	6.9	7.0	7.1	7.2	7.3
Metals																		

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
Criteria	CSR Schedule 3.1, Parts 1 to 3: Soil Standards for Industrial Land Use and CCME-CEQG for Industrial Land Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Industrial Land Use
Result	Analytical result exceeds CCME guideline for Industrial Land Use based on correct application of fine and coarse-grained soil
Result	Analytical result exceeds CSR standard and CCME guideline for Industrial Land Use
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.

A. Standard varies with receiving water hardness (H). H = 150 to < 210 mg/L as CaCO3 is assumed.
C. Standard is for chromium, hexavalent.
E. Standard varies with receiving water hardness (H). H ≥ 200 mg/L as CaCO3 is assumed.
F. Standard varies with receiving water hardness (H). H = 200 to < 300 mg/L as CaCO3 is assumed.
G. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item B1, C1, C3, C4, D2, D3, D5, D6, E4, H3 or H14.
H. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item H11 or H20 but only if the site was used for that purpose or activity in conjunction with or as a result of the site also being used for at least one of the purposes or activities set out in Note G.
I. Standard varies with receiving water hardness (H). H > 180 mg/L as CaCO3 is assumed.

TABLE S3 - ANALYTICAL RESULTS FOR PHENOLS IN SOIL

					Borehole ID	BV-11BH-01M			BV-11BH-02M		BV-11BH-03M		BV-11BH-04M			BV-11BH-09M	
					Sample ID	BV-11BH-01M-2	BV-11BH-01M-5	BV-Dup5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-03M-1	BV-11BH-03M-3	BV-11BH-04M-1	BV-11BH-04M-3	BV-Dup9	BV-11BH-09M-1	BV-11BH-09M-5
					Sampled By	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz	Franz
					Laboratory ID	-	-	-	-	-	-	-	-	-	-	-	-
					Analyzed By	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
					Date Sampled	2011-DEC-14	2011-DEC-14	2011-DEC-14	2011-DEC-16	2011-DEC-16	2011-DEC-15	2011-DEC-15	2011-DEC-17	2011-DEC-17	2011-DEC-17	2011-DEC-14	2011-DEC-14
					Sample Depth (m bgs)	0.50 - 1.00	3.00 - 4.00	3.00 - 4.00	0.50 - 1.00	1.50 - 2.00	0.50 - 1.00	2.00 - 3.00	0.00 - 0.50	1.50 - 2.00	1.50 - 2.00	0.00 - 0.50	3.00 - 4.00
					AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2	APEC-2
					Soil Type	Coarse	Fine	Fine	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Fine
Parameter	BC CSR Industrial Land Use (IL) Standards	CCME-CEQG Industrial Land Use (IL) Guidelines	CCME-CEQG Industrial Land Use (IL) Guidelines	Reportable Detection Limit	Units			Duplicate of BV-11BH-01M-5							Duplicate of BV-11BH-04M-3		
	-	Coarse-Grained	Fine-Grained														
Physical Tests																	
pH	nc	6 to 8	6 to 8	-	mg/kg	7.5	7.6	7.5	7.3	6.6	7.5	7.1	6.9	7.0	7.1	7.2	7.3
Phenols																	
4-Chloro-3-methylphenol																	
standard to protect human health	25,000	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-chlorophenol																	
standard to protect human health	35,000	5	5	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
standard to protect ecological health	5	5	5	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
o-Cresol (2-methylphenol)																	
standard to protect human health	350,000	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
m+p-Cresol (3-methylphenol & 4-methylphenol)																	
standard to protect human health	35,000	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4-dichlorophenol																	
standard to protect human health	20,000	5	5	-	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
standard to protect ecological health	5	5	5	-	mg/kg	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
2,6-dichlorophenol																	
standard to protect human health	20,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4-Dimethylphenol																	
standard to protect human health	150,000	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4-Dinitrophenol																	
standard to protect human health	15,000	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dinoseb (2-4,6-dinitrophenol)																	
standard to protect human health	250	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Methyl-4,6-dinitrophenol																	
standard to protect human health	nc	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	nc	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Nitrophenol																	
standard to protect human health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4-Nitrophenol																	
standard to protect human health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	10	nc	nc	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Pentachlorophenol																	
intake of contaminated soil	900	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
groundwater used for drinking water																	
pH 6.5 - < 7.0	2.5	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
pH ≥ 7.0	1.5	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
toxicity to soil invertebrates and plants	55	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
major microbial functional impairment	nc	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
groundwater flow to surface water used by aquatic life																	
pH ≥ 6.5	0.1	7.6	7.6	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Phenol																	
intake of contaminated soil	1,000,000	3.8	3.8	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
groundwater used for drinking water	7.5	3.8	3.8	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
toxicity to soil invertebrates and plants	200	3.8	3.8	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
major microbial functional impairment	nc	3.8	3.8	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
groundwater flow to surface water used by aquatic life	15	3.8	3.8	-	mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
2,3,4,5-tetrachlorophenol																	
standard to protect human health	20,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,3,4,6-tetrachlorophenol																	
standard to protect human health	200,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,3,5,6-tetrachlorophenol																	
standard to protect human health	20,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,3,4-trichlorophenol																	
standard to protect human health	7,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,3,5-trichlorophenol																	
standard to protect human health	7,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,3,6-trichlorophenol																	
standard to protect human health	7,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4,5-trichlorophenol																	
standard to protect human health	700,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4,6-trichlorophenol																	
standard to protect human health	7,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
3,4,5-trichlorophenol																	
standard to protect human health	7,000	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
standard to protect ecological health	5	5	5	-	mg/kg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
Criteria	CSR Schedule 3.1, Parts 1 to 3: Soil Standards for Industrial Land Use and CCME-CEQG for Industrial Land Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Industrial Land Use
Result	Analytical result exceeds CCME guideline for Industrial Land Use based on correct application of fine and coarse-grained soil
Result	Analytical result exceeds CSR standard and CCME guideline for Industrial Land Use
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.

TABLE W1a - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units	Monitoring Well ID	BV-11BH-02M			BV-11BH-03M	BV-11BH-04M	BV-11BH-07M		BV-11BH-08M		BV-11BH-09M
													Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-02M	BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-07M	BV-11BH-08M	BV-11BH-08M	BV-11BH-09M
													Sampled By	Franz	Franz	Franz	Envirochem	Franz	Franz	Franz	Envirochem	Franz	Envirochem	Franz
													Laboratory ID	-	-	-	L2162381-6	-	-	-	L2162381-7	-	L2162381-8	-
													Analyzed By	AGAT	AGAT	AGAT	ALS	AGAT	AGAT	AGAT	ALS	AGAT	ALS	AGAT
													Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2018-SEP-11	2012-FEB-01	2012-FEB-01	2012-FEB-02	2018-SEP-11	2012-FEB-03	2018-SEP-11	2012-FEB-03
													Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	0.91 - 2.44	0.91 - 2.44	2.29 - 3.81	2.29 - 3.81	2.29 - 3.81
													AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	AEC-2	AEC-2	APEC-1	APEC-1	APEC-2
Volatile Hydrocarbons																								
Benzene	400	C	1,000	D	5		40	110	nc	nc	-	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	2,000	C	2,500	D	140	B	200	250	nc	nc	-	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Methyl tert-butyl ether (MTBE)	34,000	C	4,400	D	95	A, B	3,400	440	nc	nc	-	µg/L		<1	<1	<1	<0.5	<1	<1	<1	<0.5	-	<0.5	-
Styrene	720		720		800		nc	nc	72	nc	-	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	-
Toluene	5	C	2,000	D	60	B	0.5	nc	nc	nc	-	µg/L		<0.5	<0.5	<0.5	<0.45	<0.5	<0.5	<0.5	<0.45	<0.5	<0.45	<0.5
Xylenes	300		300		90		30	nc	nc	nc	-	µg/L		<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	<0.5	<0.75	<0.5	<0.75	4.8
VHw6-10	15,000		15,000		15,000		nc	nc	nc	nc	-	µg/L		<100	<100	<100	<100	<100	<100	200	<100	-	<100	-
VPHw	1,500		1,500		nc		nc	nc	nc	nc	-	µg/L		<100	<100	<100	<100	<100	<100	200	<100	-	<100	-
F1 (C6 to C10)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	<100	<100	-	<100	<100	200	-	-	-	-
Extractable Petroleum Hydrocarbons																								
EPHw10-19	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		140	<100	<100	<250	<100	<100	550	2,210	<100	<250	130
EPHw19-32	nc		nc		nc		nc	nc	nc	nc	-	µg/L		150	<100	<100	<250	<100	<100	390	5,430	<100	<250	140
LEPHw	500		500		nc		nc	nc	nc	nc	-	µg/L		140	<100	<100	<250	<100	<100	**550**	**2,210**	<100	<250	130
HEPHw	nc		nc		nc		nc	nc	nc	nc	-	µg/L		150	<100	<100	<250	<100	<100	390	5,430	<100	<250	140
EPHw10-19 - Silica Gel	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	1,360	-	-	-
EPHw19-32 - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	4,110	-	-	-
LEPHw - Silica Gel	500		500		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	**1,360**	-	-	-
HEPHw - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	4,110	-	-	-
F2 (C10 to C16)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	<100	<100	-	<100	<100	300	-	<100	-	<100
F3 (C16 to C34)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		100	<100	<100	-	<100	<100	100	-	<100	-	<100
F4 (C34 to C50)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	<100	<100	-	<100	<100	<100	-	<100	-	<100
Polycyclic Aromatic Hydrocarbons																								
Acenaphthene	60		60		250		6	6	nc	nc	-	µg/L		3.98	<0.05	<0.05	<0.01	<0.05	<0.05	0.14	0.97	<0.05	<0.01	<0.05
Acenaphthylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.30	<0.05	<0.01	<0.05
Acridine	0.5		0.5		nc		0.05	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.70	<0.05	<0.01	<0.05
Anthracene	1		1		1,000		0.1	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.20	<0.05	<0.01	<0.05
Benz(a)anthracene	1		1		0.07		0.1	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02	<0.05	<0.01	<0.05
Benzo(a)pyrene	0.1		0.1		0.01		0.01	0.01	nc	nc	-	µg/L		<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.01
Benzo(b)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	-	<0.05	-	<0.05
Benzo(b+j)fluoranthene	nc		nc		0.07		nc	nc	nc	nc	-	µg/L		-	-		<0.01	-	-	-	<0.02	-	<0.01	-
Benzo(g,h,i)perylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.04	<0.05	<0.01	<0.05
Benzo(k)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.05
Chrysene	1		1		7		nc	0.1	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.03	<0.05	<0.01	<0.05
Dibenz(a,h)anthracene	nc		nc		0.01		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.01	<0.05	<0.005	<0.05
Fluoranthene	2		2		150		0.2	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	0.117	<0.05	<0.01	<0.05
Fluorene	120		120		150		12	12	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	0.18	1.06	<0.05	<0.01	<0.05
Indeno(1,2,3-cd)pyrene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02	<0.05	<0.01	<0.05
1-methylnaphthalene	nc		nc		5.5		nc	1	nc	nc	-	µg/L		-	-	-	<0.05	-	-	-	0.421	-	<0.05	-
2-methylnaphthalene	nc		nc		15		nc	1	nc	nc	-	µg/L		-	-	-	<0.05	-	-	-	<0.05	-	<0.05	-
Naphthalene	10		10		80		1	1	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.30	<0.05	<0.05	0.49
Phenanthrene	3		3		nc		0.3	nc	nc	nc	-	µg/L		<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	0.11	<0.20	<0.05	<0.02	<0.05
Pyrene	0.2		0.2		100		0.02	nc	nc	nc	-	µg/L		<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	**0.247**	<0.02	<0.01	<0.02
Quinoline	34		34		0.05		nc	nc	3.4	nc	-	µg/L		<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.70	<0.1	<0.05	<0.1

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criteria exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River (see report).

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
C. Standard to protect freshwater aquatic life.
D. Standard to protect marine and estuarine aquatic life.
O. Standard is applicable to all sites, irrespective of water use.
EPH. LEPH and/or HEPH concentrations were not determined, so EPH concentrations have been compared to the standards as a conservative estimate.

TABLE W1a - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units	Monitoring Well ID	MW06-2				MW06-3	MW07-6			
													Sample ID	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-3	MW07-6	MW07-6	MW07-6	MW07-6
													Sampled By	Hemmera	Hemmera	Hemmera	Franz	Envirochem	Hemmera	Hemmera	Hemmera	Franz	Envirochem
													Laboratory ID	-	-	-	-	L2162381-1	-	-	-	-	L2162381-2
													Analyzed By	Unknown	Unknown	CANTEST	AGAT	ALS	Unknown	CANTEST	CANTEST	AGAT	ALS
													Date Sampled	2006-JUL-05	2007-JUL-06	2008-SEP-22	2012-FEB-02	2018-SEP-11	2006-MAY-07	2007-AUG-16	2008-SEP-22	2012-FEB-02	2018-SEP-11
													Screen Depth (m)	Unknown	Unknown	Unknown	Unknown	Unknown	0.60 - 3.00	0.60 - 3.00	0.60 - 3.00	0.60 - 3.00	0.60 - 3.00
													AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
Volatile Hydrocarbons																						
Benzene	400	C	1,000	D	5		40	110	nc	nc	-	µg/L		<0.5	3.0	5.8	<0.5	<0.5	-	<0.5	<0.1	<0.5	<0.5
Ethylbenzene	2,000	C	2,500	D	140	B	200	250	nc	nc	-	µg/L		0.7	1.1	1.1	<0.5	<0.5	-	1.2	<0.1	<0.5	<0.5
Methyl tert-butyl ether (MTBE)	34,000	C	4,400	D	95	A, B	3,400	440	nc	nc	-	µg/L		-	-	-	<1	<0.5	-	-	-	<1	<0.5
Styrene	720		720		800		nc	nc	72	nc	-	µg/L		<0.5	<0.5	<0.1	<0.5	<0.5	-	<0.5	<0.1	<0.5	<0.5
Toluene	5	C	2,000	D	60	B	0.5	nc	nc	nc	-	µg/L		<0.5	3	2.8	<0.5	<0.45	-	<0.5	<0.1	<0.5	<0.45
Xylenes	300		300		90		30	nc	nc	nc	-	µg/L		2.5	2.8	2.9	<0.5	<0.75	-	4.4	<0.1	<0.5	<0.75
VHw6-10	15,000		15,000		15,000		nc	nc	nc	nc	-	µg/L		2,400	2,600	1,000	790	660	-	3,600	1,100	730	<100
VPHw	1,500		1,500		nc		nc	nc	nc	nc	-	µg/L		2,400	2,600	990	790	660	-	3,600	1,100	730	<100
F1 (C6 to C10)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	300	-	-	-	-	200	-
Extractable Petroleum Hydrocarbons																						
EPHw10-19	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		2,900	3,000	870	1,640	8,170	<250	2,300	700	360	320
EPHw19-32	nc		nc		nc		nc	nc	nc	nc	-	µg/L		350	330	<250	140	470	<250	<250	<250	<100	<250
LEPHw	500		500		nc		nc	nc	nc	nc	-	µg/L		2,900	3,000[EPH]	870[EPH]	1,640	8,170	<250	2,300[EPH]	700[EPH]	360	320
HEPHw	nc		nc		nc		nc	nc	nc	nc	-	µg/L		350	330[EPH]	<250[EPH]	140	460	<250	<250[EPH]	<250[EPH]	<100	<250
EPHw10-19 - Silica Gel	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	500		500		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	-	-	800	-	-	-	-	400	-
F3 (C16 to C34)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	-	-	<100	-	-	-	-	<100	-
F4 (C34 to C50)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		<100	-	-	<100	-	-	-	-	<100	-
Polycyclic Aromatic Hydrocarbons																						
Acenaphthene	60		60		250		6	6	nc	nc	-	µg/L		-	-	-	0.05	0.154	-	-	-	<0.05	<0.01
Acenaphthylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.111	-	-	-	<0.05	<0.01
Acridine	0.5		0.5		nc		0.05	nc	nc	nc	-	µg/L		-	-	-	<0.05	<0.03	-	-	-	<0.05	<0.01
Anthracene	1		1		1,000		0.1	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.078	-	-	-	<0.05	<0.01
Benz(a)anthracene	1		1		0.07		0.1	nc	nc	nc	-	µg/L		-	-	-	0.05	0.949	-	-	-	<0.05	<0.01
Benzo(a)pyrene	0.1		0.1		0.01		0.01	0.01	nc	nc	-	µg/L		-	-	-	0.04	1.03	-	-	-	<0.01	<0.005
Benzo(b)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	0.05	-	-	-	-	<0.05	-
Benzo(b+j)fluoranthene	nc		nc		0.07		nc	nc	nc	nc	-	µg/L		-	-	-	-	1.53	-	-	-	-	<0.01
Benzo(g,h,i)perylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.691	-	-	-	<0.05	<0.01
Benzo(k)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.474	-	-	-	<0.05	<0.01
Chrysene	1		1		7		nc	0.1	nc	nc	-	µg/L		-	-	-	0.06	<0.70	-	-	-	<0.05	<0.01
Dibenz(a,h)anthracene	nc		nc		0.01		nc	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.182	-	-	-	<0.05	<0.005
Fluoranthene	2		2		150		0.2	nc	nc	nc	-	µg/L		-	-	-	0.27	2.31	-	-	-	<0.05	<0.01
Fluorene	120		120		150		12	12	nc	nc	-	µg/L		-	-	-	<0.05	0.084	-	-	-	<0.05	<0.01
Indeno(1,2,3-cd)pyrene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.854	-	-	-	<0.05	<0.01
1-methylnaphthalene	nc		nc		5.5		nc	1	nc	nc	-	µg/L		-	-	-	-	0.757	-	-	-	-	<0.20
2-methylnaphthalene	nc		nc		15		nc	1	nc	nc	-	µg/L		-	-	-	-	0.383	-	-	-	-	<0.05
Naphthalene	10		10		80		1	1	nc	nc	-	µg/L		-	-	-	0.07	<2.0	-	-	-	0.07	<0.20
Phenanthrene	3		3		nc		0.3	nc	nc	nc	-	µg/L		-	-	-	<0.05	0.134	-	-	-	<0.05	<0.02
Pyrene	0.2		0.2		100		0.02	nc	nc	nc	-	µg/L		-	-	-	0.29	2.69	-	-	-	<0.02	<0.01
Quinoline	34		34		0.05		nc	nc	3.4	nc	-	µg/L		-	-	-	<0.1	<0.80	-	-	-	<0.1	<0.20

Notes

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TABLE W1a - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units	Monitoring Well ID	MW07-7				MW07-8				MW07-9		
													Sample ID	MW07-7	MW900/1000	MW07-7	MW08-12	MW07-7	MW07-8	MW07-8	MW07-8	MW07-8	MW07-9	MW07-9	MW07-9
													Sampled By	Hemmera	Hemmera	Hemmera	Hemmera	Franz	Hemmera	Hemmera	Franz	Envirochem	Hemmera	Hemmera	Franz
													Laboratory ID	-	-	-	-	-	-	-	-	L2162381-9	-	-	-
													Analyzed By	CANTEST	CANTEST	CANTEST	CANTEST	AGAT	CANTEST	CANTEST	AGAT	ALS	CANTEST	CANTEST	AGAT
													Date Sampled	2007-AUG-16	2007-AUG-16	2008-SEP-22	2008-SEP-22	2012-FEB-03	2007-AUG-16	2008-SEP-22	2012-FEB-03	2018-SEP-11	2007-AUG-16	2008-SEP-22	2012-FEB-03
													Screen Depth (m)	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.60 - 2.10	0.60 - 2.10	0.60 - 2.10
													AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1	AEC-1	AEC-1
															Duplicate of MW07-7		Duplicate of MW07-7							
Volatile Hydrocarbons																								
Benzene	400	C	1,000	D	5		40	110	nc	nc	-	µg/L		<1	1.9	1.9	2.1	<0.5	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Ethylbenzene	2,000	C	2,500	D	140	B	200	250	nc	nc	-	µg/L		<1	0.8	0.6	0.6	<0.5	0.4	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Methyl tert-butyl ether (MTBE)	34,000	C	4,400	D	95	A, B	3,400	440	nc	nc	-	µg/L		-	-	-	-	<1	-	-	<1	<0.5	-	-	<1
Styrene	720		720		800		nc	nc	72	nc	-	µg/L		<1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Toluene	5	C	2,000	D	60	B	0.5	nc	nc	nc	-	µg/L		**1.7**	**1.8**	**1.7**	**2.0**	<0.5	0.3	<0.1	<0.5	<0.45	<0.1	<0.1	<0.5
Xylenes	300		300		90		30	nc	nc	nc	-	µg/L		2.9	3.8	2.6	2.7	<0.5	2.0	<0.1	<0.5	<0.75	<0.1	<0.1	-
VHw6-10	15,000		15,000		15,000		nc	nc	nc	nc	-	µg/L		1,700	1,400	600	790	270	590	<100	<100	<100	<100	<100	<100
VPHw	1,500		1,500		nc		nc	nc	nc	nc	-	µg/L		**1,700**	1,400	590	780	270	590	<100	<100	<100	<100	<100	<100
F1 (C6 to C10)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	100	-	-	<100	-	-	-	-
Extractable Petroleum Hydrocarbons																									
EPHw10-19	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		1,700	1,900	1,700	1,900	860	1,400	<250	<100	<250	<250	<250	-
EPHw19-32	nc		nc		nc		nc	nc	nc	nc	-	µg/L		300	<250	<250	<250	130	<250	<250	<100	<250	<250	<250	-
LEPHw	500		500		nc		nc	nc	nc	nc	-	µg/L		**1,700**^{EPH}	**1,900**^{EPH}	**1,700**^{EPH}	**1,900**^{EPH}	**860**	**1,400**^{EPH}	<250^{EPH}	<100	<250	<250^{EPH}	<250^{EPH}	-
HEPHw	nc		nc		nc		nc	nc	nc	nc	-	µg/L		300^{EPH}	<250^{EPH}	<250^{EPH}	<250^{EPH}	130	<250^{EPH}	<250^{EPH}	<100	<250	<250^{EPH}	<250^{EPH}	-
EPHw10-19 - Silica Gel	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	500		500		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	700	-	-	<100	-	-	-	-
F3 (C16 to C34)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	100	-	-	<100	-	-	-	-
F4 (C34 to C50)	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	<100	-	-	<100	-	-	-	-
Polycyclic Aromatic Hydrocarbons																									
Acenaphthene	60		60		250		6	6	nc	nc	-	µg/L		-	-	-	-	5.43	-	-	<0.05	<0.01	-	-	-
Acenaphthylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	0.06	-	-	<0.05	<0.01	-	-	-
Acridine	0.5		0.5		nc		0.05	nc	nc	nc	-	µg/L		-	-	-	-	**0.40**	-	-	<0.05	<0.01	-	-	-
Anthracene	1		1		1,000		0.1	nc	nc	nc	-	µg/L		-	-	-	-	**0.27**	-	-	<0.05	<0.01	-	-	-
Benz(a)anthracene	1		1		0.07		0.1	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.01	-	-	-
Benzo(a)pyrene	0.1		0.1		0.01		0.01	0.01	nc	nc	-	µg/L		-	-	-	-	<0.01	-	-	<0.01	<0.005	-	-	-
Benzo(b)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	-	-	-	-
Benzo(b+j)fluoranthene	nc		nc		0.07		nc	nc	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	<0.01	-	-	-
Benzo(g,h,i)perylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.01	-	-	-
Benzo(k)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.01	-	-	-
Chrysene	1		1		7		nc	0.1	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.01	-	-	-
Dibenz(a,h)anthracene	nc		nc		0.01		nc	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.005	-	-	-
Fluoranthene	2		2		150		0.2	nc	nc	nc	-	µg/L		-	-	-	-	**1.06**	-	-	<0.05	<0.01	-	-	-
Fluorene	120		120		150		12	12	nc	nc	-	µg/L		-	-	-	-	3.89	-	-	<0.05	<0.01	-	-	-
Indeno(1,2,3-cd)pyrene	nc		nc		nc		nc	nc	nc	nc	-	µg/L		-	-	-	-	<0.05	-	-	<0.05	<0.01	-	-	-
1-methylnaphthalene	nc		nc		5.5		nc	1	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	<0.05	-	-	-
2-methylnaphthalene	nc		nc		15		nc	1	nc	nc	-	µg/L		-	-	-	-	-	-	-	-	<0.05	-	-	-
Naphthalene	10		10		80		1	1	nc	nc	-	µg/L		-	-	-	-	**1.08**	-	-	<0.05	<0.05	-	-	-
Phenanthrene	3		3		nc		0.3	nc	nc	nc	-	µg/L		-	-	-	-	**5.65**	-	-	<0.05	<0.02	-	-	-
Pyrene	0.2		0.2		100		0.02	nc	nc	nc	-	µg/L		-	-	-	-	**0.52**	-	-	<0.02	<0.01	-	-	-
Quinoline	34		34		0.05		nc	nc	3.4	nc	-	µg/L		-	-	-	-	0.2	-	-	<0.1	<0.20	-	-	-

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criteria exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River (see report).

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
C. Standard to protect freshwater aquatic life.
D. Standard to protect marine and estuarine aquatic life.
O. Standard is applicable to all sites, irrespective of water use.
EPH. LEPH and/or HEPH concentrations were not determined, so EPH concentrations have been compared to the standards as a conservative estimate.

TABLE W1a - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units	MW08-10	MW08-10	MW08-10	MW18-1	MW08-11	MW08-11	MW08-13	MW08-13	MW08-13
Monitoring Well ID													MW08-10	MW08-10	MW08-10	MW18-1	MW08-11	MW08-11	MW08-13	MW08-13	MW08-13
Sample ID													MW08-10	MW08-10	MW08-10	MW18-1	MW08-11	MW08-11	MW08-13	MW08-13	MW08-13
Sampled By													Hemmera	Franz	Envirochem	Envirochem	Hemmera	Envirochem	Hemmera	Franz	Envirochem
Laboratory ID													-	-	L2162381-3	L2162381-10	-	L2162381-4	-	-	L2162381-5
Analyzed By													CANTEST	AGAT	ALS	ALS	CANTEST	ALS	CANTEST	AGAT	ALS
Date Sampled													2008-SEP-22	2012-FEB-02	2018-SEP-11	2018-SEP-11	2008-SEP-22	2018-SEP-11	2008-SEP-22	2012-FEB-13	2018-SEP-11
Screen Depth (m)													0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80
AECs / APECs Assessed													AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
Volatile Hydrocarbons																					
Benzene	400	C	1,000	D	5		40	110	nc	nc	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Ethylbenzene	2,000	C	2,500	D	140	B	200	250	nc	nc	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Methyl tert-butyl ether (MTBE)	34,000	C	4,400	D	95	A, B	3,400	440	nc	nc	-	µg/L	-	<1	<0.5	<0.5	-	<0.5	-	<1	<0.5
Styrene	720		720		800		nc	nc	72	nc	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Toluene	5	C	2,000	D	60	B	0.5	nc	nc	nc	-	µg/L	<0.1	<0.5	<0.45	<0.45	<0.1	<0.45	<0.1	<0.5	<0.45
Xylenes	300		300		90		30	nc	nc	nc	-	µg/L	<0.1	-	<0.75	<0.75	<0.1	<0.75	<0.1	<0.5	<0.75
VHw6-10	15,000		15,000		15,000		nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100
VPHw	1,500		1,500		nc		nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100
F1 (C6 to C10)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
Extractable Petroleum Hydrocarbons																					
EPHw10-19	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L	<250	-	<250	<250	<250	<250	<250	110	<250
EPHw19-32	nc		nc		nc		nc	nc	nc	nc	-	µg/L	<250	-	<250	<250	<250	<250	<250	<100	<250
LEPHw	500		500		nc		nc	nc	nc	nc	-	µg/L	<250[EPH]	-	<250	<250	<250[EPH]	<250	<250[EPH]	110	<250
HEPHw	nc		nc		nc		nc	nc	nc	nc	-	µg/L	<250[EPH]	-	<250	<250	<250[EPH]	<250	<250[EPH]	<100	<250
EPHw10-19 - Silica Gel	5,000	O	5,000	O	5,000	O	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	500		500		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
F3 (C16 to C34)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
F4 (C34 to C50)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
Polycyclic Aromatic Hydrocarbons																					
Acenaphthene	60		60		250		6	6	nc	nc	-	µg/L	-	-	0.021	0.025	-	0.716	-	<0.05	0.014
Acenaphthylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Acridine	0.5		0.5		nc		0.05	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Anthracene	1		1		1,000		0.1	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benz(a)anthracene	1		1		0.07		0.1	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benzo(a)pyrene	0.1		0.1		0.01		0.01	0.01	nc	nc	-	µg/L	-	-	<0.005	<0.005	-	<0.005	-	<0.01	<0.005
Benzo(b)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<0.05	-
Benzo(b+j)fluoranthene	nc		nc		0.07		nc	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	-	<0.01
Benzo(g,h,i)perylene	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benzo(k)fluoranthene	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Chrysene	1		1		7		nc	0.1	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Dibenz(a,h)anthracene	nc		nc		0.01		nc	nc	nc	nc	-	µg/L	-	-	<0.005	<0.005	-	<0.005	-	<0.05	<0.005
Fluoranthene	2		2		150		0.2	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Fluorene	120		120		150		12	12	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Indeno(1,2,3-cd)pyrene	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
1-methylnaphthalene	nc		nc		5.5		nc	1	nc	nc	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	-	<0.05
2-methylnaphthalene	nc		nc		15		nc	1	nc	nc	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	-	<0.05
Naphthalene	10		10		80		1	1	nc	nc	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	0.05	<0.05
Phenanthrene	3		3		nc		0.3	nc	nc	nc	-	µg/L	-	-	<0.02	<0.02	-	<0.02	-	<0.05	<0.02
Pyrene	0.2		0.2		100		0.02	nc	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.02	<0.01
Quinoline	34		34		0.05		nc	nc	3.4	nc	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	<0.1	<0.08

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criteria exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River (see report).

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
C. Standard to protect freshwater aquatic life.
D. Standard to protect marine and estuarine aquatic life.
O. Standard is applicable to all sites, irrespective of water use.
EPH. LEPH and/or HEPH concentrations were not determined, so EPH concentrations have been compared to the standards as a conservative estimate.

TABLE W1b - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (FEDERAL GUIDELINES)

												Monitoring Well ID	BV-11BH-01M	BV-11BH-02M			BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	
												Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-02M	BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-07M
												Sampled By	Franz	Franz	Franz	Envirochem	Franz	Franz	Franz	Envirochem
												Laboratory ID	-	-	-	L2162381-6	-	-	-	L2162381-7
												Analyzed By	AGAT	AGAT	AGAT	ALS	AGAT	AGAT	AGAT	ALS
												Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2018-SEP-11	2012-FEB-01	2012-FEB-01	2012-FEB-02	2018-SEP-11
												Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	0.91 - 2.44	0.91 - 2.44
												AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	AEC-2	AEC-2
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units			Duplicate of BV-11BH-02M						
Volatile Hydrocarbons																				
Benzene	370	110	5	88	88	33,000	690	9,800	200	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	90	25	1.6	3,200	3,200	nc	41,000	nc	11,000	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Methyl tert-butyl ether (MTBE)	10,000	5,000	15	5,000	340	10,000	10,000	5,000	5,000	-	µg/L	<1	<1	<1	<0.5	<1	<1	<1	<0.5
Styrene	72	nc	nc	72	72	72	72	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	2	215	24	4,900	83	nc	83	nc	8,900	-	µg/L	<0.5	<0.5	<0.5	<0.45	<0.5	<0.5	<0.5	<0.45
Xylenes	nc	nc	20	13,000	3,900	nc	18,000	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.75	<0.5	<0.5	<0.5	<0.75
VPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	200	<100
VHw6-10	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	200	<100
F1 (C6 to C10)	nc	nc	nc	6,500	810	nc	9,800	nc	nc	-	µg/L	<100	<100	<100	-	<100	<100	200	-
Extractable Petroleum Hydrocarbons																				
EPHw10-19	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	140	<100	<100	<250	<100	<100	550	2,210
EPHw19-32	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	150	<100	<100	<250	<100	<100	390	5,430
LEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	140	<100	<100	<250	<100	<100	550	2,210
HEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	150	<100	<100	<250	<100	<100	390	5,430
EPHw10-19 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	1,360
EPHw19-32 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	4,110
LEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	1,360
HEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	4,110
F2 (C10 to C16)	nc	nc	nc	1,800	1,300	nc	1,300	nc	nc	-	µg/L	<100	<100	<100	-	<100	<100	300	-
F3 (C16 to C34)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	100	<100	<100	-	<100	<100	100	-
F4 (C34 to C50)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<100	<100	-	<100	<100	<100	-
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	5.8	nc	nc	5.8	5.8	5.8	5.8	nc	nc	-	µg/L	3.98	<0.05	<0.05	<0.01	<0.05	<0.05	0.14	0.97
Acenaphthylene	nc	nc	nc	46	46	46	46	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.30
Acridine	4.4	nc	nc	0.05	0.05	0.05	0.05	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.70
Anthracene	0.012	nc	nc	0.012	0.012	0.012	0.012	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.20
Benz(a)anthracene	0.018	nc	nc	0.018	0.018	0.018	0.018	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02
Benzo(a)pyrene	0.015	nc	0.04	0.01	0.01	0.017	0.015	nc	nc	-	µg/L	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	-
Benzo(b+j)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	-	<0.01	-	-	-	<0.02
Benzo(g,h,i)perylene	nc	nc	nc	0.21	0.17	0.21	0.17	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.04
Benzo(k)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.01
Chrysene	nc	nc	nc	0.1	0.1	1.4	1.4	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.03
Dibenz(a,h)anthracene	nc	nc	nc	0.28	0.26	0.28	0.26	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.01
Fluoranthene	0.04	nc	nc	0.04	0.04	0.04	0.04	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	0.117
Fluorene	3	nc	nc	3	3	3	3	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	0.18	1.06
Indeno(1,2,3-cd)pyrene	nc	nc	nc	0.23	0.21	0.23	0.21	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02
Naphthalene	1.1	1.4	nc	1.1	1.1	1.1	1.1	1.4	1.4	-	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.30
Phenanthrene	0.4	nc	nc	0.4	0.4	0.4	0.4	nc	nc	-	µg/L	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	0.11	<0.20
Pyrene	0.025	nc	nc	0.025	0.025	0.025	0.025	nc	nc	-	µg/L	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	0.247
Quinoline	3.4	nc	nc	3.4	3.4	3.4	3.4	nc	nc	-	µg/L	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.70

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

TABLE W1b - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (FEDERAL GUIDELINES)

											Monitoring Well ID	BV-11BH-08M		BV-11BH-09M	MW06-2					MW06-3
											Sample ID	BV-11BH-08M	BV-11BH-08M	BV-11BH-09M	MW06-2	MW06-2	MW06-2	MW06-2	MW06-2	MW06-3
											Sampled By	Franz	Envirochem	Franz	Hemmera	Hemmera	Hemmera	Franz	Envirochem	Hemmera
											Laboratory ID	-	L2162381-8	-	-	-	-	-	L2162381-1	-
											Analyzed By	AGAT	ALS	AGAT	Unknown	Unknown	CANTEST	AGAT	ALS	Unknown
											Date Sampled	2012-FEB-03	2018-SEP-11	2012-FEB-03	2006-JUL-05	2007-JUL-06	2008-SEP-22	2012-FEB-02	2018-SEP-11	2006-MAY-07
											Screen Depth (m)	2.29 - 3.81	2.29 - 3.81	2.29 - 3.81	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
											AECs / APECs Assessed	APEC-1	APEC-1	APEC-2	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	APEC-3
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater	CCME-CEQG Aquatic Life (AW) Marine Water	Health Canada Canadian Drinking Water Quality (CDWQ)	FCSAP-FIGQG Tier 1	FCSAP-FIGQG Tier 1	FCSAP-FIGQG Tier 2 - Freshwater	FCSAP-FIGQG Tier 2 - Freshwater	FCSAP-FIGQG Tier 2 - Marine Water	FCSAP-FIGQG Tier 2 - Marine Water	Reportable Detection Limit	Units									
	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines											
	-	-	-	Fine-Grained	Coarse-Grained	Fine-Grained	Coarse-Grained	Fine-Grained	Coarse-Grained											
Volatile Hydrocarbons																				
Benzene	370	110	5	88	88	33,000	690	9,800	200	-	µg/L	<0.5	<0.5	<0.5	<0.5	3.0	**5.8**	<0.5	<0.5	-
Ethylbenzene	90	25	1.6	3,200	3,200	nc	41,000	nc	11,000	-	µg/L	<0.5	<0.5	0.9	0.7	1.1	1.1	<0.5	<0.5	-
Methyl tert-butyl ether (MTBE)	10,000	5,000	15	5,000	340	10,000	10,000	5,000	5,000	-	µg/L	-	<0.5	-	-	-	-	<1	<0.5	-
Styrene	72	nc	nc	72	72	72	72	nc	nc	-	µg/L	-	<0.5	-	<0.5	<0.5	<0.1	<0.5	<0.5	-
Toluene	2	215	24	4,900	83	nc	83	nc	8,900	-	µg/L	<0.5	<0.45	<0.5	<0.5	**3**	**2.8**	<0.5	<0.45	-
Xylenes	nc	nc	20	13,000	3,900	nc	18,000	nc	nc	-	µg/L	<0.5	<0.75	4.8	2.5	2.8	2.9	<0.5	<0.75	-
VPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	<100	-	2,400	2,600	990	790	660	-
VHw6-10	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	<100	-	2,400	2,600	1,000	790	660	-
F1 (C6 to C10)	nc	nc	nc	6,500	810	nc	9,800	nc	nc	-	µg/L	-	-	-	-	-	-	300	-	-
Extractable Petroleum Hydrocarbons																				
EPHw10-19	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<250	130	2,900	3,000	870	1,640	8,170	<250
EPHw19-32	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<250	140	350	330	<250	140	470	<250
LEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<250	130	2,900	-	-	1,640	8,170	<250
HEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<250	140	350	-	-	140	460	<250
EPHw10-19 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc	nc	nc	1,800	1,300	nc	1,300	nc	nc	-	µg/L	<100	-	<100	<100	-	-	800	-	-
F3 (C16 to C34)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	-	<100	<100	-	-	<100	-	-
F4 (C34 to C50)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	-	<100	<100	-	-	<100	-	-
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	5.8	nc	nc	5.8	5.8	5.8	5.8	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	0.05	0.154	-
Acenaphthylene	nc	nc	nc	46	46	46	46	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	0.111	-
Acridine	4.4	nc	nc	0.05	0.05	0.05	0.05	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	<0.03	-
Anthracene	0.012	nc	nc	0.012	0.012	0.012	0.012	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	**0.078**	-
Benz(a)anthracene	0.018	nc	nc	0.018	0.018	0.018	0.018	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	**0.05**	**0.949**	-
Benzo(a)pyrene	0.015	nc	0.04	0.01	0.01	0.017	0.015	nc	nc	-	µg/L	<0.01	<0.005	<0.01	-	-	-	**0.04**	**1.03**	-
Benzo(b)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	<0.05	-	<0.05	-	-	-	0.05	-	-
Benzo(b+j)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	<0.01	-	-	-	-	-	**1.53**	-
Benzo(g,h,i)perylene	nc	nc	nc	0.21	0.17	0.21	0.17	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	**0.691**	-
Benzo(k)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	0.474	-
Chrysene	nc	nc	nc	0.1	0.1	1.4	1.4	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	0.06	<0.70	-
Dibenz(a,h)anthracene	nc	nc	nc	0.28	0.26	0.28	0.26	nc	nc	-	µg/L	<0.05	<0.005	<0.05	-	-	-	<0.05	0.182	-
Fluoranthene	0.04	nc	nc	0.04	0.04	0.04	0.04	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	**0.27**	**2.31**	-
Fluorene	3	nc	nc	3	3	3	3	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	0.084	-
Indeno(1,2,3-cd)pyrene	nc	nc	nc	0.23	0.21	0.23	0.21	nc	nc	-	µg/L	<0.05	<0.01	<0.05	-	-	-	<0.05	**0.854**	-
Naphthalene	1.1	1.4	nc	1.1	1.1	1.1	1.1	1.4	1.4	-	µg/L	<0.05	<0.05	0.49	-	-	-	0.07	<2.0	-
Phenanthrene	0.4	nc	nc	0.4	0.4	0.4	0.4	nc	nc	-	µg/L	<0.05	<0.02	<0.05	-	-	-	<0.05	0.134	-
Pyrene	0.025	nc	nc	0.025	0.025	0.025	0.025	nc	nc	-	µg/L	<0.02	<0.01	<0.02	-	-	-	**0.29**	**2.69**	-
Quinoline	3.4	nc	nc	3.4	3.4	3.4	3.4	nc	nc	-	µg/L	<0.1	<0.05	<0.1	-	-	-	<0.1	<0.80	-

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

TABLE W1b - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (FEDERAL GUIDELINES)

											Monitoring Well ID	MW07-6				MW07-7				
											Sample ID	MW07-6	MW07-6	MW07-6	MW07-6	MW07-7	MW900/1000	MW07-7	MW08-12	MW07-7
											Sampled By	Hemmera	Hemmera	Franz	Envirochem	Hemmera	Hemmera	Hemmera	Hemmera	Franz
											Laboratory ID	-	-	-	L2162381-2	-	-	-	-	-
											Analyzed By	CANTEST	CANTEST	AGAT	ALS	CANTEST	CANTEST	CANTEST	CANTEST	AGAT
											Date Sampled	2007-AUG-16	2008-SEP-22	2012-FEB-02	2018-SEP-11	2007-AUG-16	2007-AUG-16	2008-SEP-22	2008-SEP-22	2012-FEB-03
											Screen Depth (m)	0.60 - 3.00	0.60 - 3.00	0.60 - 3.00	0.60 - 3.00	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50
											AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units						Duplicate of MW07-7		Duplicate of MW07-7	
Volatile Hydrocarbons																				
Benzene	370	110	5	88	88	33,000	690	9,800	200	-	µg/L	<0.5	<0.1	<0.5	<0.5	<1	1.9	1.9	2.1	<0.5
Ethylbenzene	90	25	1.6	3,200	3,200	nc	41,000	nc	11,000	-	µg/L	1.2	<0.1	<0.5	<0.5	<1	0.8	0.6	0.6	<0.5
Methyl tert-butyl ether (MTBE)	10,000	5,000	15	5,000	340	10,000	10,000	5,000	5,000	-	µg/L	-	-	<1	<0.5	-	-	-	-	<1
Styrene	72	nc	nc	72	72	72	72	nc	nc	-	µg/L	<0.5	<0.1	<0.5	<0.5	<1	<0.1	<0.1	<0.1	<0.5
Toluene	2	215	24	4,900	83	nc	83	nc	8,900	-	µg/L	<0.5	<0.1	<0.5	<0.45	1.7	1.8	1.7	2.0	<0.5
Xylenes	nc	nc	20	13,000	3,900	nc	18,000	nc	nc	-	µg/L	4.4	<0.1	<0.5	<0.75	2.9	3.8	2.6	2.7	<0.5
VPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	3,600	1,100	730	<100	1,700	1,400	590	780	270
VHw6-10	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	3,600	1,100	730	<100	1,700	1,400	600	790	270
F1 (C6 to C10)	nc	nc	nc	6,500	810	nc	9,800	nc	nc	-	µg/L	-	-	200	-	-	-	-	-	100
Extractable Petroleum Hydrocarbons																				
EPHw10-19	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	2,300	700	360	320	1,700	1,900	1,700	1,900	860
EPHw19-32	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<250	<250	<100	<250	300	<250	<250	<250	130
LEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	360	320	-	-	-	-	860
HEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	<250	-	-	-	-	130
EPHw10-19 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc	nc	nc	1,800	1,300	nc	1,300	nc	nc	-	µg/L	-	-	400	-	-	-	-	-	700
F3 (C16 to C34)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	-	-	-	-	-	100
F4 (C34 to C50)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	-	-	-	-	-	<100
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	5.8	nc	nc	5.8	5.8	5.8	5.8	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	5.43
Acenaphthylene	nc	nc	nc	46	46	46	46	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	0.06
Acridine	4.4	nc	nc	0.05	0.05	0.05	0.05	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	**0.40**
Anthracene	0.012	nc	nc	0.012	0.012	0.012	0.012	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	**0.27**
Benz(a)anthracene	0.018	nc	nc	0.018	0.018	0.018	0.018	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	<0.05
Benzo(a)pyrene	0.015	nc	0.04	0.01	0.01	0.017	0.015	nc	nc	-	µg/L	-	-	<0.01	<0.005	-	-	-	-	<0.01
Benzo(b)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.05	-	-	-	-	-	<0.05
Benzo(b+j)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	-	<0.01	-	-	-	-	-
Benzo(g,h,i)perylene	nc	nc	nc	0.21	0.17	0.21	0.17	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	<0.05
Benzo(k)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	<0.05
Chrysene	nc	nc	nc	0.1	0.1	1.4	1.4	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	<0.05
Dibenz(a,h)anthracene	nc	nc	nc	0.28	0.26	0.28	0.26	nc	nc	-	µg/L	-	-	<0.05	<0.005	-	-	-	-	<0.05
Fluoranthene	0.04	nc	nc	0.04	0.04	0.04	0.04	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	**1.06**
Fluorene	3	nc	nc	3	3	3	3	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	**3.89**
Indeno(1,2,3-cd)pyrene	nc	nc	nc	0.23	0.21	0.23	0.21	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-	-	<0.05
Naphthalene	1.1	1.4	nc	1.1	1.1	1.1	1.1	1.4	1.4	-	µg/L	-	-	0.07	<0.20	-	-	-	-	1.08
Phenanthrene	0.4	nc	nc	0.4	0.4	0.4	0.4	nc	nc	-	µg/L	-	-	<0.05	<0.02	-	-	-	-	**5.65**
Pyrene	0.025	nc	nc	0.025	0.025	0.025	0.025	nc	nc	-	µg/L	-	-	<0.02	<0.01	-	-	-	-	**0.52**
Quinoline	3.4	nc	nc	3.4	3.4	3.4	3.4	nc	nc	-	µg/L	-	-	<0.1	<0.20	-	-	-	-	0.2

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

TABLE W1b - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (FEDERAL GUIDELINES)

Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units	MW07-8	MW07-8	MW07-8	MW07-8	MW07-9	MW07-9	MW07-9
Monitoring Well ID												MW07-8	MW07-8	MW07-8	MW07-8	MW07-9	MW07-9	MW07-9
Sample ID												MW07-8	MW07-8	MW07-8	MW07-8	MW07-9	MW07-9	MW07-9
Sampled By												Hemmera	Hemmera	Franz	Envirochem	Hemmera	Hemmera	Franz
Laboratory ID												-	-	-	L2162381-9	-	-	-
Analyzed By												CANTEST	CANTEST	AGAT	ALS	CANTEST	CANTEST	AGAT
Date Sampled												2007-AUG-16	2008-SEP-22	2012-FEB-03	2018-SEP-11	2007-AUG-16	2008-SEP-22	2012-FEB-03
Screen Depth (m)												0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.50 - 3.50	0.60 - 2.10	0.60 - 2.10	0.60 - 2.10
AECs / APECs Assessed												AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1	AEC-1	AEC-1
Volatile Hydrocarbons																		
Benzene	370	110	5	88	88	33,000	690	9,800	200	-	µg/L	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Ethylbenzene	90	25	1.6	3,200	3,200	nc	41,000	nc	11,000	-	µg/L	0.4	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Methyl tert-butyl ether (MTBE)	10,000	5,000	15	5,000	340	10,000	10,000	5,000	5,000	-	µg/L	-	-	<1	<0.5	-	-	<1
Styrene	72	nc	nc	72	72	72	72	nc	nc	-	µg/L	<0.1	<0.1	<0.5	<0.5	<0.1	<0.1	<0.5
Toluene	2	215	24	4,900	83	nc	83	nc	8,900	-	µg/L	0.3	<0.1	<0.5	<0.45	<0.1	<0.1	<0.5
Xylenes	nc	nc	20	13,000	3,900	nc	18,000	nc	nc	-	µg/L	2.0	<0.1	<0.5	<0.75	<0.1	<0.1	-
VPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	590	<100	<100	<100	<100	<100	<100
VHw6-10	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	590	<100	<100	<100	<100	<100	<100
F1 (C6 to C10)	nc	nc	nc	6,500	810	nc	9,800	nc	nc	-	µg/L	-	-	<100	-	-	-	-
Extractable Petroleum Hydrocarbons																		
EPHw10-19	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	1,400	<250	<100	<250	<250	<250	-
EPHw19-32	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<250	<250	<100	<250	<250	<250	-
LEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	<250	-	-	-
HEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	<250	-	-	-
EPHw10-19 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-
LEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-
F2 (C10 to C16)	nc	nc	nc	1,800	1,300	nc	1,300	nc	nc	-	µg/L	-	-	<100	-	-	-	-
F3 (C16 to C34)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	-	-	-	-
F4 (C34 to C50)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<100	-	-	-	-
Polycyclic Aromatic Hydrocarbons																		
Acenaphthene	5.8	nc	nc	5.8	5.8	5.8	5.8	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Acenaphthylene	nc	nc	nc	46	46	46	46	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Acridine	4.4	nc	nc	0.05	0.05	0.05	0.05	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Anthracene	0.012	nc	nc	0.012	0.012	0.012	0.012	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Benz(a)anthracene	0.018	nc	nc	0.018	0.018	0.018	0.018	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Benzo(a)pyrene	0.015	nc	0.04	0.01	0.01	0.017	0.015	nc	nc	-	µg/L	-	-	<0.01	<0.005	-	-	-
Benzo(b)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.05	-	-	-	-
Benzo(b+j)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	-	<0.01	-	-	-
Benzo(g,h,i)perylene	nc	nc	nc	0.21	0.17	0.21	0.17	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Benzo(k)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Chrysene	nc	nc	nc	0.1	0.1	1.4	1.4	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Dibenz(a,h)anthracene	nc	nc	nc	0.28	0.26	0.28	0.26	nc	nc	-	µg/L	-	-	<0.05	<0.005	-	-	-
Fluoranthene	0.04	nc	nc	0.04	0.04	0.04	0.04	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Fluorene	3	nc	nc	3	3	3	3	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Indeno(1,2,3-cd)pyrene	nc	nc	nc	0.23	0.21	0.23	0.21	nc	nc	-	µg/L	-	-	<0.05	<0.01	-	-	-
Naphthalene	1.1	1.4	nc	1.1	1.1	1.1	1.1	1.4	1.4	-	µg/L	-	-	<0.05	<0.05	-	-	-
Phenanthrene	0.4	nc	nc	0.4	0.4	0.4	0.4	nc	nc	-	µg/L	-	-	<0.05	<0.02	-	-	-
Pyrene	0.025	nc	nc	0.025	0.025	0.025	0.025	nc	nc	-	µg/L	-	-	<0.02	<0.01	-	-	-
Quinoline	3.4	nc	nc	3.4	3.4	3.4	3.4	nc	nc	-	µg/L	-	-	<0.1	<0.20	-	-	-

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

TABLE W1b - ANALYTICAL RESULTS FOR HYDROCARBONS IN GROUNDWATER (FEDERAL GUIDELINES)

											Monitoring Well ID	MW08-10				MW08-11		MW08-13		
											Sample ID	MW08-10	MW08-10	MW08-10	MW18-1	MW08-11	MW08-11	MW08-13	MW08-13	MW08-13
											Sampled By	Hemmera	Franz	Envirochem	Envirochem	Hemmera	Envirochem	Hemmera	Franz	Envirochem
											Laboratory ID	-	-	L2162381-3	L2162381-10	-	L2162381-4	-	-	L2162381-5
											Analyzed By	CANTEST	AGAT	ALS	ALS	CANTEST	ALS	CANTEST	AGAT	ALS
											Date Sampled	2008-SEP-22	2012-FEB-02	2018-SEP-11	2018-SEP-11	2008-SEP-22	2018-SEP-11	2008-SEP-22	2012-FEB-13	2018-SEP-11
											Screen Depth (m)	0.80-3.80	0.80-3.80	0.80 - 3.80	0.80 - 3.80	0.80-3.80	0.80 - 3.80	0.80-3.80	0.80-3.80	0.80 - 3.80
											AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units				Duplicate of MW08-10					
Volatile Hydrocarbons																				
Benzene	370	110	5	88	88	33,000	690	9,800	200	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Ethylbenzene	90	25	1.6	3,200	3,200	nc	41,000	nc	11,000	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Methyl tert-butyl ether (MTBE)	10,000	5,000	15	5,000	340	10,000	10,000	5,000	5,000	-	µg/L	-	<1	<0.5	<0.5	-	<0.5	-	<1	<0.5
Styrene	72	nc	nc	72	72	72	72	nc	nc	-	µg/L	<0.1	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.5
Toluene	2	215	24	4,900	83	nc	83	nc	8,900	-	µg/L	<0.1	<0.5	<0.45	<0.45	<0.1	<0.45	<0.1	<0.5	<0.45
Xylenes	nc	nc	20	13,000	3,900	nc	18,000	nc	nc	-	µg/L	<0.1	-	<0.75	<0.75	<0.1	<0.75	<0.1	<0.5	<0.75
VPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100
VHw6-10	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100
F1 (C6 to C10)	nc	nc	nc	6,500	810	nc	9,800	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
Extractable Petroleum Hydrocarbons																				
EPHw10-19	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<250	-	<250	<250	<250	<250	<250	110	<250
EPHw19-32	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<250	-	<250	<250	<250	<250	<250	<100	<250
LEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<250	<250	-	<250	-	110	<250
HEPHw	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	<250	<250	-	<250	-	<100	<250
EPHw10-19 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
EPHw19-32 - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
LEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
HEPHw - Silica Gel	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
F2 (C10 to C16)	nc	nc	nc	1,800	1,300	nc	1,300	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
F3 (C16 to C34)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
F4 (C34 to C50)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	-	-	-	-	<100	-
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	5.8	nc	nc	5.8	5.8	5.8	5.8	nc	nc	-	µg/L	-	-	0.021	0.025	-	0.716	-	<0.05	0.014
Acenaphthylene	nc	nc	nc	46	46	46	46	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Acridine	4.4	nc	nc	0.05	0.05	0.05	0.05	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Anthracene	0.012	nc	nc	0.012	0.012	0.012	0.012	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benz(a)anthracene	0.018	nc	nc	0.018	0.018	0.018	0.018	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benzo(a)pyrene	0.015	nc	0.04	0.01	0.01	0.017	0.015	nc	nc	-	µg/L	-	-	<0.005	<0.005	-	<0.005	-	<0.01	<0.005
Benzo(b)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	-	-	-	-	-	<0.05	-
Benzo(b+j)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	-	<0.01
Benzo(g,h,i)perylene	nc	nc	nc	0.21	0.17	0.21	0.17	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Benzo(k)fluoranthene	nc	nc	nc	0.48	0.48	0.48	0.48	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Chrysene	nc	nc	nc	0.1	0.1	1.4	1.4	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Dibenz(a,h)anthracene	nc	nc	nc	0.28	0.26	0.28	0.26	nc	nc	-	µg/L	-	-	<0.005	<0.005	-	<0.005	-	<0.05	<0.005
Fluoranthene	0.04	nc	nc	0.04	0.04	0.04	0.04	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Fluorene	3	nc	nc	3	3	3	3	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Indeno(1,2,3-cd)pyrene	nc	nc	nc	0.23	0.21	0.23	0.21	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.05	<0.01
Naphthalene	1.1	1.4	nc	1.1	1.1	1.1	1.1	1.4	1.4	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	0.05	<0.05
Phenanthrene	0.4	nc	nc	0.4	0.4	0.4	0.4	nc	nc	-	µg/L	-	-	<0.02	<0.02	-	<0.02	-	<0.05	<0.02
Pyrene	0.025	nc	nc	0.025	0.025	0.025	0.025	nc	nc	-	µg/L	-	-	<0.01	<0.01	-	<0.01	-	<0.02	<0.01
Quinoline	3.4	nc	nc	3.4	3.4	3.4	3.4	nc	nc	-	µg/L	-	-	<0.05	<0.05	-	<0.05	-	<0.1	<0.08

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

TABLE W2a - ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

												Monitoring Well ID	BV-11BH-01M	BV-11BH-02M				BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-08M	BV-11BH-09M
												Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-02M	BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-08M	BV-11BH-09M
												Sampled By	Franz	Franz	Franz	Envirochem	Franz	Franz	Envirochem	Envirochem	Franz
												Laboratory ID	-	-	-	L2162381-6	-	-	L2162381-7	L2162381-8	-
												Analyzed By	AGAT	AGAT	AGAT	ALS	AGAT	AGAT	ALS	ALS	AGAT
												Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2018-SEP-11	2012-FEB-01	2012-FEB-01	2018-SEP-11	2018-SEP-11	2012-FEB-03
												Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	0.91 - 2.44	2.29 - 3.81	2.29 - 3.81
												AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	AEC-2	APEC-1	APEC-2
Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units			Duplicate of BV-11BH-02M						
Physical Tests																					
pH (field)	nc		nc		nc		nc	nc	nc	nc	-	pH	6.36	7.16	7.16	6.60	7.12	7.40	6.40	6.84	6.62
Hardness (as mg/L CaCO3)	nc		nc		nc		nc	nc	nc	nc	-	mg/L	193	152	154	103	145	180	147	79.4	533
Total Dissolved Solids	nc		nc		nc		nc	nc	nc	nc	-	mg/L	-	-	-	150	-	-	203	107	-
Dissolved Metals																					
Aluminum (Al)	nc		nc		9,500	A, B	50	nc	nc	nc	-	µg/L	23	4	2	3.8	9	10	21.2	3.9	7
Antimony (Sb)	90	C	2,500	D	6		nc	nc	9	270	-	µg/L	0.14	0.06	<0.05	<0.10	<0.05	0.06	0.25	0.15	0.09
Arsenic (As)	50	C	125	D	10		5	12.5	nc	nc	-	µg/L	**33.3**	**26.0**	**25.9**	**29.8**	2.6	**13.5**	**24.0**	3.21	**28.3**
Barium (Ba)	10,000	C	5,000	D	1,000		nc	nc	1,000	nc	-	µg/L	104	58.1	58.4	42.1	30.0	43.4	108	35.9	234
Beryllium (Be)	1.5	C	1,000	D	8		nc	nc	0.13	100	-	µg/L	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.01
Boron (B)	12,000		12,000		5,000		1,200	1,200	nc	nc	-	µg/L	64	128	129	60	16	57	62	19	243
Cadmium (Cd)																					
H 30 - < 90	1.5	C	15	D	5		0.127	nc	nc	0.12	-	µg/L	-	-	-	-	-	-	-	<0.005	-
H 90 - < 150	2.5	C	15	D	5		0.127	nc	nc	0.12	-	µg/L	-	-	-	<0.005	<0.01	-	<0.005	-	-
H 150 - < 210	3.5	C	15	D	5		0.326	nc	nc	0.12	-	µg/L	<0.01	0.01	<0.01	-	-	<0.01	-	-	-
H ≥ 210	4	C	15	D	5		0.457	nc	nc	0.12	-	µg/L	-	-	-	-	-	-	-	-	0.01
Calcium (Ca)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	58,300	45,600	46,000	29,900	31,500	22,700	47,700	19,700	145,000
Chromium (total-Cr)	10	C	15	D	50		nc	nc	8.9	56	-	µg/L	4.7	1.2	1.2	0.55	1.0	1.4	0.44	0.18	1.5
Cobalt (Co)	40		40		20		4	nc	nc	nc	-	µg/L	1.67	0.15	0.14	0.11	0.85	0.56	0.21	<0.10	3.96
Copper (Cu)																					
H 75 - < 100	40	C	20	D	1,500	A, B	3	2	nc	nc	-	µg/L	-	-	-	-	-	-	-	<0.20	-
H 100 - < 125	50	C	20	D	1,500	A, B	4	2	nc	nc	-	µg/L	-	-	-	<0.20	-	-	-	-	-
H 125 - < 150	60	C	20	D	1,500	A, B	5	2	nc	nc	-	µg/L	-	-	-	-	0.6	-	<0.20	-	-
H 150 - < 175	70	C	20	D	1,500	A, B	6	2	nc	nc	-	µg/L	-	0.4	0.2	-	-	-	-	-	-
H 175 - < 200	80	C	20	D	1,500	A, B	7	2	nc	nc	-	µg/L	0.9	-	-	-	-	0.8	-	-	-
H ≥ 200	90	C	20	D	1,500	A, B	8	2	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	0.6
Iron (Fe)	nc	P, Q	nc	P, Q	6,500	A,B,P,Q	350	nc	nc	nc	-	µg/L	**93,300**	**37,200**	**67,300**	**22,800**	**9,820**	**18,600**	**20,000**	**19,000**	**48,900**
Lead (Pb)																					
H 50 - < 100	50	C	20	D	10		3	2	nc	nc	-	µg/L	-	-	-	-	-	-	-	<0.05	-
H 100 - < 200	60	C	20	D	10		3	2	nc	nc	-	µg/L	0.10	0.03	<0.01	<0.05	0.04	0.25	0.054	-	-
H 200 - < 300	110	C	20	D	10		3	2	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
H ≥ 300	160	C	20	D	10		3	2	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	0.15
Lithium (Li)	nc		nc		8		nc	nc	nc	nc	-	µg/L	3.8	2.1	2.0	2.1	0.7	2.0	1.5	1.2	3.6
Magnesium (Mg)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	11,400	9,370	9,470	6,780	16,200	30,000	6,730	7,330	41,500
Manganese (Mn)	nc	R, S	nc	R, S	1,500	A,B,R,S	700	nc	nc	100	-	µg/L	**2,540**	**1,630**	**1,640**	**1,060**	**122**	**286**	**855**	**689**	**2,070**
Mercury (Inorganic Hg)	0.25		0.25		1		1.25	1.25	nc	nc	-	µg/L	<0.003	<0.003	<0.003	<0.005	<0.003	0.004	<0.005	<0.005	<0.003
Molybdenum (Mo)	10,000		10,000		250		1,000	nc	nc	nc	-	µg/L	0.63	0.57	0.32	0.415	0.62	0.47	4.34	0.458	1.07
Nickel (Ni)																					
H 60 - < 120	650	C	83	D	80		nc	nc	25	8.3	-	µg/L	-	-	-	<0.50	-	-	-	<0.50	-
H 120 - < 180	1,100	C	83	D	80		nc	nc	25	8.3	-	µg/L	-	0.7	0.2	-	2.4	-	1.86	-	-
H ≥ 180	1,500	C	83	D	80		nc	nc	150	8.3	-	µg/L	1.7	-	-	-	-	1.4	-	-	3.9
Phosphorus (P)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	465	-	-	55	117	-
Potassium (K)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	1,580	-	-	4,190	2,170	-
Selenium (Se)	20		20		10		1	1	nc	nc	-	µg/L	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	0.196	<0.05	<0.1
Silicon (Si)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	17,600	-	-	12,200	10,200	-
Silver (Ag)																					
H < 100	0.5	C	15	D	20		0.05	1.5	nc	nc	-	µg/L	-	-	-	-	-	-	-	<0.01	-
H ≥ 100	15	C	15	D	20		1.5	1.5	nc	nc	-	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
Sodium (Na)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	8,860	9,310	9,420	6,550	4,980	5,770	9,250	5,590	71,800
Strontium (Sr)	nc		nc		2,500		nc	nc	nc	nc	-	µg/L	-	-	-	131	-	-	224	90.9	-
Sulfur (S)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	<500	-	-	1,590	<500	-
Thallium (Tl)	3		3		nc		nc	nc	0.8	nc	-	µg/L	0.011	<0.002	<0.002	<0.01	<0.002	<0.002	<0.01	<0.01	0.022
Tin (Sn)	nc		nc		2,500		nc	nc	nc	nc	-	µg/L	-	-	-	<0.10	-	-	<0.10	<0.10	-
Titanium (Ti)	1,000		1,000		nc		nc	nc	nc	nc	-	µg/L	91.7	58.3	58.3	1.06	39.8	30.9	1.24	0.43	178
Uranium (U)	85		85		20		nc	nc	8.5	nc	-	µg/L	0.03	0.01	<0.01	<0.01	0.01	0.06	0.606	0.020	0.30
Vanadium (V)	nc		nc		20		nc	nc	nc	50	-	µg/L	7.7	0.8	0.9	1.14	1.0	2.0	2.08	0.52	1.1
Zinc (Zn)																					
H < 90	75	C	100	D	3,000	A	7.5	10	nc	nc	-	µg/L	-	-	-	-	-	-	-	<1	-
H 100 - < 200	900	C	100	D	3,000	A	15	10	nc	nc	-	µg/L	8	7	2	<1	3	**15**	2.7	-	-
H 200 - < 300	1,650	C	100	D	3,000	A	90	10	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
H 400 - < 500	3,150	C	100	D	3,000	A	240	10	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	-
H ≥ 500	SEE CALC	C, Z	100	D	3,000	A	SEE CALC	10	nc	nc	-	µg/L	-	-	-	-	-	-	-	-	7
Zirconium (Zr)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	-	-	-	<0.30	-	-	<0.30	<0.30	-

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River.
Result	Iron and Manganese standards and guidelines do not apply based on absence of specific CSR Schedule 2 activities.

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
C. Standard to protect freshwater aquatic life.
D. Standard to protect marine and estuarine aquatic life.
P. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item A6, A7, A8, A11, C1, C2, C3, C4, C6, D2, D3, D5, D6, E4 or H14
Q. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item H11 or H20 but only if the site was used for that purpose or activity in conjunction with or as a result of the site also being used for at least one of the purposes or activities set out in Note P.
R. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item B1, C1, C3, C4, D2, D3, D5, D6, E4, H3 or H14.
S. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item H11 or H20 but only if the site was used for that purpose or activity in conjunction with or as a result of the site also being used for at least one of the purposes or activities set out in Note R.
Z. Standard for zinc when H > 500 can be calculated using the following formula: 10 x [7.5 + 0.75 * (Hardness - 90)].

ENVIROCHEM SERVICES INC.

TABLE W2a - ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

												Monitoring Well ID	MW06-2	MW07-6	MW07-8	MW08-10		MW08-11	MW08-13
												Sample ID	MW06-2	MW07-6	MW07-8	MW08-10	MW18-1	MW08-11	MW08-13
												Sampled By	Envirochem	Envirochem	Envirochem	Envirochem	Envirochem	Envirochem	Envirochem
												Laboratory ID	L2162381-1	L2162381-2	L2162381-9	L2162381-3	L2162381-10	L2162381-4	L2162381-5
												Analyzed By	ALS	ALS	ALS	ALS	ALS	ALS	ALS
												Date Sampled	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11
												Screen Depth (m)	Unknown	0.60 - 3.00	0.50 - 3.50	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80
												AECs / APECs Assessed	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units					Duplicate of MW08-10		
Physical Tests																			
pH (field)	nc		nc		nc		nc	nc	nc	nc	-	pH	6.07	6.36	5.90	6.98	6.98	7.07	6.12
Hardness (as mg/L CaCO3)	nc		nc		nc		nc	nc	nc	nc	-	mg/L	270	236	134	250	251	272	75.1
Total Dissolved Solids	nc		nc		nc		nc	nc	nc	nc	-	mg/L	360	297	180	292	317	270	130
Dissolved Metals																			
Aluminum (Al)	nc		nc		9,500	*A, B*	50	nc	nc	nc	-	µg/L	**112**	14.5	8.2	3.3	2.7	1.4	41.6
Antimony (Sb)	90	*C*	2,500	*D*	6		nc	nc	9	270	-	µg/L	0.61	0.47	0.33	<0.10	<0.10	<0.10	0.70
Arsenic (As)	50	*C*	125	*D*	10		5	12.5	nc	nc	-	µg/L	**38.6**	**7.98**	1.36	6.73	7.08	3.99	**12.7**
Barium (Ba)	10,000	*C*	5,000	*D*	1,000		nc	nc	1,000	nc	-	µg/L	131	74.0	92.3	561	568	82.9	51.9
Beryllium (Be)	1.5	*C*	1,000	*D*	8		nc	nc	0.13	100	-	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron (B)	12,000		12,000		5,000		1,200	1,200	nc	nc	-	µg/L	37	44	30	93	92	58	23
Cadmium (Cd)																			
H 30 - < 90	1.5	*C*	15	*D*	5		0.127	nc	nc	0.12	-	µg/L	-	-	-	-	-	-	0.0217
H 90 - < 150	2.5	*C*	15	*D*	5		0.127	nc	nc	0.12	-	µg/L	-	-	0.115	-	-	-	-
H 150 - < 210	3.5	*C*	15	*D*	5		0.326	nc	nc	0.12	-	µg/L	-	-	-	-	-	-	-
H ≥ 210	4	*C*	15	*D*	5		0.457	nc	nc	0.12	-	µg/L	0.0128	<0.005	-	<0.005	<0.005	<0.005	-
Calcium (Ca)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	69,200	71,500	38,000	56,400	56,200	57,600	17,200
Chromium (total-Cr)	10	*C*	15	*D*	50		nc	nc	8.9	56	-	µg/L	4.15	1.77	0.50	0.39	0.42	0.11	1.57
Cobalt (Co)	40		40		20		4	nc	nc	nc	-	µg/L	**4.52**	0.77	1.64	0.11	0.10	<0.10	3.05
Copper (Cu)																			
H 75 - < 100	40	*C*	20	*D*	1,500	*A, B*	3	2	nc	nc	-	µg/L	-	-	-	-	-	-	0.65
H 100 - < 125	50	*C*	20	*D*	1,500	*A, B*	4	2	nc	nc	-	µg/L	-	-	-	-	-	-	-
H 125 - < 150	60	*C*	20	*D*	1,500	*A, B*	5	2	nc	nc	-	µg/L	-	-	**2.25**	-	-	-	-
H 150 - < 175	70	*C*	20	*D*	1,500	*A, B*	6	2	nc	nc	-	µg/L	-	-	-	-	-	-	-
H 175 - < 200	80	*C*	20	*D*	1,500	*A, B*	7	2	nc	nc	-	µg/L	-	-	-	-	-	-	-
H ≥ 200	90	*C*	20	*D*	1,500	*A, B*	8	2	nc	nc	-	µg/L	1.43	<0.20	-	<0.20	<0.20	<0.20	-
Iron (Fe)	nc	*P, Q*	nc	*P, Q*	6,500	*A,B,P,Q*	350	nc	nc	nc	-	µg/L	31,900	15,000	642	34,400	34,600	21,900	9,520
Lead (Pb)																			
H 50 - < 100	50	*C*	20	*D*	10		3	2	nc	nc	-	µg/L	-	-	-	-	-	-	0.222
H 100 - < 200	60	*C*	20	*D*	10		3	2	nc	nc	-	µg/L	-	-	<0.05	-	-	-	-
H 200 - < 300	110	*C*	20	*D*	10		3	2	nc	nc	-	µg/L	1.21	0.153	-	<0.05	<0.05	<0.05	-
H ≥ 300	160	*C*	20	*D*	10		3	2	nc	nc	-	µg/L	-	-	-	-	-	-	-
Lithium (Li)	nc		nc		8		nc	nc	nc	nc	-	µg/L	2.8	2.2	1.1	3.3	3.4	3.7	2.4
Magnesium (Mg)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	23,500	13,900	9,480	26,600	26,800	31,100	7,770
Manganese (Mn)	nc	*R, S*	nc	*R, S*	1,500	*A,B,R,S*	700	nc	nc	100	-	µg/L	2,150	1,690	278	2,150	1,470	1,180	398
Mercury (Inorganic Hg)	0.25		0.25		1		1.25	1.25	nc	nc	-	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum (Mo)	10,000		10,000		250		1,000	nc	nc	nc	-	µg/L	2.19	0.338	0.478	0.388	0.387	0.408	1.21
Nickel (Ni)																			
H 60 - < 120	650	*C*	83	*D*	80		nc	nc	25	8.3	-	µg/L	-	-	-	-	-	-	**37.8**
H 120 - < 180	1,100	*C*	83	*D*	80		nc	nc	25	8.3	-	µg/L	-	-	**8.92**	-	-	-	-
H ≥ 180	1,500	*C*	83	*D*	80		nc	nc	150	8.3	-	µg/L	**25.2**	7.78	-	<0.50	<0.50	<0.50	-
Phosphorus (P)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	498	152	<50	260	264	232	<50
Potassium (K)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	4,000	5,930	5,380	4,430	4,540	2,550	3,230
Selenium (Se)	20		20		10		1	1	nc	nc	-	µg/L	0.840	0.280	0.141	0.221	0.236	0.294	0.401
Silicon (Si)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	14,200	13,000	10,600	16,700	16,500	16,700	11,000
Silver (Ag)																			
H < 100	0.5	*C*	15	*D*	20		0.05	1.5	nc	nc	-	µg/L	-	-	-	-	-	-	0.019
H ≥ 100	15	*C*	15	*D*	20		1.5	1.5	nc	nc	-	µg/L	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	-
Sodium (Na)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	13,600	13,300	12,900	19,200	19,700	5,140	6,670
Strontium (Sr)	nc		nc		2,500		nc	nc	nc	nc	-	µg/L	320	280	232	277	278	180	95.1
Sulfur (S)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	1,880	770	2,180	1,680	1,840	1,870	<500
Thallium (Tl)	3		3		nc		nc	nc	0.8	nc	-	µg/L	<0.01	<0.01	0.018	<0.01	<0.01	<0.01	<0.01
Tin (Sn)	nc		nc		2,500		nc	nc	nc	nc	-	µg/L	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)	1,000		1,000		nc		nc	nc	nc	nc	-	µg/L	26.0	2.07	<0.30	0.68	0.61	<0.30	1.78
Uranium (U)	85		85		20		nc	nc	8.5	nc	-	µg/L	0.457	0.171	0.140	0.090	0.093	0.032	0.570
Vanadium (V)	nc		nc		20		nc	nc	nc	50	-	µg/L	**22.8**	1.68	<0.50	0.54	0.56	<0.50	6.08
Zinc (Zn)																			
H < 90	75	*C*	100	*D*	3,000	*A*	7.5	10	nc	nc	-	µg/L	-	-	-	-	-	-	**31.1**
H 100 - < 200	900	*C*	100	*D*	3,000	*A*	15	10	nc	nc	-	µg/L	-	-	8.6	-	-	-	-
H 200 - < 300	1,650	*C*	100	*D*	3,000	*A*	90	10	nc	nc	-	µg/L	7.5	2.7	-	<1	<1	<1	-
H 400 - < 500	3,150	*C*	100	*D*	3,000	*A*	240	10	nc	nc	-	µg/L	-	-	-	-	-	-	-
H ≥ 500	SEE CALC	*C, Z*	100	*D*	3,000	*A*	SEE CALC	10	nc	nc	-	µg/L	-	-	-	-	-	-	-
Zirconium (Zr)	nc		nc		nc		nc	nc	nc	nc	-	µg/L	3.52	0.59	<0.30	<0.30	<0.30	<0.30	0.75

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River.
Result	Iron and Manganese standards and guidelines do not apply based on absence of specific CSR Schedule 2 activities.

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
C. Standard to protect freshwater aquatic life.
D. Standard to protect marine and estuarine aquatic life.
P. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item A6, A7, A8, A11, C1, C2, C3, C4, C6, D2, D3, D5, D6, E4 or H14
Q. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item H11 or H20 but only if the site was used for that purpose or activity in conjunction with or as a result of the site also being used for at least one of the purposes or activities set out in Note P.
R. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item B1, C1, C3, C4, D2, D3, D5, D6, E4, H3 or H14.
S. Standards apply to a site used for an industrial or commercial purpose or activity set out in Schedule 2 as Item H11 or H20 but only if the site was used for that purpose or activity in conjunction with or as a result of the site also being used for at least one of the purposes or activities set out in Note R.
Z. Standard for zinc when H > 500 can be calculated using the following formula: 10 x [7.5 + 0.75 * (Hardness - 90)].

TABLE W2b - ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER (FEDERAL GUIDELINES)

											Monitoring Well ID	BV-11BH-01M	BV-11BH-02M			BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-08M	BV-11BH-09M
											Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-02M	BV-11BH-03M	BV-11BH-04M	BV-11BH-07M	BV-11BH-08M	BV-11BH-09M
											Sampled By	Franz	Franz	Franz	Envirochem	Franz	Franz	Envirochem	Envirochem	Franz
											Laboratory ID	-	-	-	L2162381-6	-	-	L2162381-7	L2162381-8	-
											Analyzed By	AGAT	AGAT	AGAT	ALS	AGAT	AGAT	ALS	ALS	AGAT
											Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2018-SEP-11	2012-FEB-01	2012-FEB-01	2018-SEP-11	2018-SEP-11	2012-FEB-03
											Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	0.91 - 2.44	2.29 - 3.81	2.29 - 3.81
											AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	AEC-2	APEC-1	APEC-2
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units			Duplicate of BV-11BH-02M						
Physical Tests																				
pH (field)	6.5 to 9.0	7.0 to 8.7	7.0 to 10.5	6.5 to 9.0	6.5 to 9.0	6.5 to 9.0	6.5 to 9.0	7.0 to 8.7	7.0 to 8.7	-	pH	**6.36**	7.16	7.16	**6.60**	7.12	7.40	**6.40**	**6.84**	**6.62**
Hardness (as mg/L CaCO3)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	mg/L	193	152	154	103	145	180	147	79.4	533
Total Dissolved Solids	nc	nc	500	nc	nc	nc	nc	nc	nc	-	mg/L	-	-	-	150	-	-	203	107	-
Dissolved Metals																				
Aluminum (Al)	5	nc	100	5	5	5	5	nc	nc	-	µg/L	**23**	4	2	3.8	**9**	**10**	**21.2**	3.9	**7**
Antimony (Sb)	nc	nc	6	2,000	2,000	2,000	2,000	nc	nc	-	µg/L	0.14	0.06	<0.05	<0.10	<0.05	0.06	0.25	0.15	0.09
Arsenic (As)	5	12.5	10	5	5	5	5	12.5	12.5	-	µg/L	**33.3**	**26.0**	**25.9**	**29.8**	2.6	**13.5**	**24.0**	3.21	**28.3**
Barium (Ba)	nc	nc	1,000	500	500	2,900	2,900	500	500	-	µg/L	104	58.1	58.4	42.1	30.0	43.4	108	35.9	234
Beryllium (Be)	nc	nc	nc	5.3	5.3	5.3	5.3	100	100	-	µg/L	0.02	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.01
Boron (B)	1,500	nc	5,000	500	500	nc	nc	5,000	5,000	-	µg/L	64	128	129	60	16	57	62	19	243
Cadmium (Cd)																				
H 30 - < 90	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	-	-	-	-	-	<0.005	-
H 90 - < 150	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	-	<0.005	<0.01	-	<0.005	-	-
H 150 - < 210	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	<0.01	0.01	<0.01	-	-	<0.01	-	-	-
H ≥ 210	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	-	-	-	-	-	-	0.01
Calcium (Ca)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	58,300	45,600	46,000	29,900	31,500	22,700	47,700	19,700	145,000
Chromium (total-Cr)	nc	nc	50	nc	nc	8.9	8.9	56	56	-	µg/L	4.7	1.2	1.2	0.55	1.0	1.4	0.44	0.18	1.5
Cobalt (Co)	nc	nc	nc	50	50	nc	nc	nc	nc	-	µg/L	1.67	0.15	0.14	0.11	0.85	0.56	0.21	<0.10	3.96
Copper (Cu)																				
H 75 - < 100	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-	<0.20	-
H 100 - < 125	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	<0.20	-	-	-	-	-
H 125 - < 150	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	0.6	-	<0.20	-	-
H 150 - < 175	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	0.4	0.2	-	-	-	-	-	-
H 175 - < 200	4	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	0.9	-	-	-	-	0.8	-	-	-
H ≥ 200	4	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-	-	0.6
Iron (Fe)	300	nc	300	300	300	300	300	nc	nc	-	µg/L	95,300	37,200	37,800	22,800	9,820	18,000	20,800	16,000	48,900
Lead (Pb)																				
H 50 - < 100	1	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-	<0.05	-
H 100 - < 200	1	nc	10	nc	nc	nc	nc	2	2	-	µg/L	0.10	0.03	<0.01	<0.05	0.04	0.25	0.054	-	-
H 200 - < 300	7	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-	-	-
H ≥ 300	7	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-	-	0.15
Lithium (Li)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	3.8	2.1	2.0	2.1	0.7	2.0	1.5	1.2	3.6
Magnesium (Mg)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	11,400	9,370	9,470	6,780	16,200	30,000	6,730	7,330	41,500
Manganese (Mn)	nc	nc	50	200	200	nc	nc	nc	nc	-	µg/L	2,540	1,650	1,640	1,630	123	386	858	889	2,070
Mercury (Inorganic Hg)	0.026	0.016	1	nc	ns	0.026	0.026	0.016	0.016	-	µg/L	<0.003	<0.003	<0.003	<0.005	<0.003	0.004	<0.005	<0.005	<0.003
Molybdenum (Mo)	73	nc	nc	73	73	73	73	nc	nc	-	µg/L	0.63	0.57	0.32	0.415	0.62	0.47	4.34	0.458	1.07
Nickel (Ni)																				
H 60 - < 120	25	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	-	-	-	<0.50	-	-	-	<0.50	-
H 120 - < 180	25	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	-	0.7	0.2	-	2.4	-	1.86	-	-
H ≥ 180	150	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	1.7	-	-	-	-	1.4	-	-	3.9
Phosphorus (P)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	465	-	-	55	117	-
Potassium (K)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	1,580	-	-	4,190	2,170	-
Selenium (Se)	1	nc	50	1	1	1	1	54	54	-	µg/L	<0.1	0.1	<0.1	<0.05	<0.1	<0.1	0.196	<0.05	<0.1
Silicon (Si)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	17,600	-	-	12,200	10,200	-
Silver (Ag)																				
H < 100	0.25	7.5	nc	nc	nc	0.1	0.1	1.5	1.5	-	µg/L	-	-	-	-	-	-	-	<0.01	-
H ≥ 100	0.25	7.5	nc	nc	nc	0.1	0.1	1.5	1.5	-	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
Sodium (Na)	nc	nc	200,000	nc	nc	nc	nc	nc	nc	-	µg/L	8,860	9,310	9,420	6,550	4,980	5,770	9,250	5,590	71,800
Strontium (Sr)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	131	-	-	224	90.9	-
Sulfur (S)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	<500	-	-	1,590	<500	-
Thallium (Tl)	0.8	nc	nc	0.8	0.8	0.8	0.8	nc	nc	-	µg/L	0.011	<0.002	<0.002	<0.01	<0.002	<0.002	<0.01	<0.01	0.022
Tin (Sn)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	<0.10	-	-	<0.10	<0.10	-
Titanium (Ti)	nc	nc	nc	100	100	100	100	nc	nc	-	µg/L	91.7	58.3	58.3	1.06	39.8	30.9	1.24	0.43	**178**
Uranium (U)	15	nc	20	10	10	15	15	nc	nc	-	µg/L	0.03	0.01	<0.01	<0.01	0.01	0.06	0.606	0.020	0.30
Vanadium (V)	nc	nc	nc	100	100	nc	nc	nc	nc	-	µg/L	7.7	0.8	0.9	1.14	1.0	2.0	2.08	0.52	1.1
Zinc (Zn)																				
H < 90	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-	<1	-
H 100 - < 200	30	nc	5,000	10	10	30	30	10	10	-	µg/L	8	7	2	<1	3	**15**	2.7	-	-
H 200 - < 300	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-	-	-
H 400 - < 500	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-	-	-
H ≥ 500	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-	-	7
Zirconium (Zr)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	-	-	-	<0.30	-	-	<0.30	<0.30	-

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.
Result	Iron and Manganese guidelines do not apply based on absence of specific CSR Schedule 2 activities.

ENVIROCHEM SERVICES INC.

TABLE W2b - ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER (FEDERAL GUIDELINES)

Parameter	CCME-CEQG	CCME-CEQG	Health Canada	FCSAP-FIGQG	FCSAP-FIGQG	FCSAP-FIGQG	FCSAP-FIGQG	FCSAP-FIGQG	FCSAP-FIGQG	Reportable Detection Limit	Units	MW06-2	MW07-6	MW07-8	MW08-10		MW08-11	MW08-13
Monitoring Well ID												MW06-2	MW07-6	MW07-8	MW08-10		MW08-11	MW08-13
Sample ID												MW06-2	MW07-6	MW07-8	MW08-10	MW18-1	MW08-11	MW08-13
Sampled By												Envirochem	Envirochem	Envirochem	Envirochem	Envirochem	Envirochem	Envirochem
Laboratory ID												L2162381-1	L2162381-2	L2162381-9	L2162381-3	L2162381-10	L2162381-4	L2162381-5
Analyzed By												ALS	ALS	ALS	ALS	ALS	ALS	ALS
Date Sampled												2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11	2018-SEP-11
Screen Depth (m)												Unknown	0.60 - 3.00	0.50 - 3.50	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80	0.80 - 3.80
AECs / APECs Assessed												AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3	AEC-1, APEC-3
	Aquatic Life (AW) Freshwater	Aquatic Life (AW) Marine Water	Canadian Drinking Water Quality (CDWQ)	Tier 1	Tier 1	Tier 2 - Freshwater	Tier 2 - Freshwater	Tier 2 - Marine Water	Tier 2 - Marine Water							Duplicate of MW08-10		
	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines	Guidelines									
	-	-	-	Fine-Grained	Coarse-Grained	Fine-Grained	Coarse-Grained	Fine-Grained	Coarse-Grained									
Physical Tests																		
pH (field)	6.5 to 9.0	7.0 to 8.7	7.0 to 10.5	6.5 to 9.0	6.5 to 9.0	6.5 to 9.0	6.5 to 9.0	7.0 to 8.7	7.0 to 8.7	-	pH	**6.07**	**6.36**	**5.90**	**6.98**	**6.98**	7.07	**6.12**
Hardness (as mg/L CaCO3)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	mg/L	270	236	134	250	251	272	75.1
Total Dissolved Solids	nc	nc	500	nc	nc	nc	nc	nc	nc	-	mg/L	360	297	180	292	317	270	130
Dissolved Metals																		
Aluminum (Al)	5	nc	100	5	5	5	5	nc	nc	-	µg/L	**112**	**14.5**	**8.2**	3.3	2.7	1.4	**41.6**
Antimony (Sb)	nc	nc	6	2,000	2,000	2,000	2,000	nc	nc	-	µg/L	0.61	0.47	0.33	<0.10	<0.10	<0.10	0.70
Arsenic (As)	5	12.5	10	5	5	5	5	12.5	12.5	-	µg/L	**38.6**	**7.98**	1.36	**6.73**	**7.08**	3.99	**12.7**
Barium (Ba)	nc	nc	1,000	500	500	2,900	2,900	500	500	-	µg/L	131	74.0	92.3	**561**	**568**	82.9	51.9
Beryllium (Be)	nc	nc	nc	5.3	5.3	5.3	5.3	100	100	-	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron (B)	1,500	nc	5,000	500	500	nc	nc	5,000	5,000	-	µg/L	37	44	30	93	92	58	23
Cadmium (Cd)																		
H 30 - < 90	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	-	-	-	-	**0.0217**
H 90 - < 150	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	**0.115**	-	-	-	-
H 150 - < 210	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	-	-	-	-	-	-	-
H ≥ 210	0.09	0.12	5	0.017	0.017	0.017	0.017	0.12	0.12	-	µg/L	0.0128	<0.005	-	<0.005	<0.005	<0.005	-
Calcium (Ca)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	69,200	71,500	38,000	56,400	56,200	57,600	17,200
Chromium (total-Cr)	nc	nc	50	nc	nc	8.9	8.9	56	56	-	µg/L	4.15	1.77	0.50	0.39	0.42	0.11	1.57
Cobalt (Co)	nc	nc	nc	50	50	nc	nc	nc	nc	-	µg/L	4.52	0.77	1.64	0.11	0.10	<0.10	3.05
Copper (Cu)																		
H 75 - < 100	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	0.65
H 100 - < 125	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-
H 125 - < 150	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	**2.25**	-	-	-	-
H 150 - < 175	2	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-
H 175 - < 200	4	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-
H ≥ 200	4	4	1,000	nc	nc	nc	nc	2	2	-	µg/L	1.43	<0.20	-	<0.20	<0.20	<0.20	-
Iron (Fe)	300	nc	300	300	300	300	300	nc	nc	-	µg/L	31,900	15,800	842	34,400	24,600	27,900	8,520
Lead (Pb)																		
H 50 - < 100	1	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	0.222
H 100 - < 200	1	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	<0.05	-	-	-	-
H 200 - < 300	7	nc	10	nc	nc	nc	nc	2	2	-	µg/L	1.21	0.153	-	<0.05	<0.05	<0.05	-
H ≥ 300	7	nc	10	nc	nc	nc	nc	2	2	-	µg/L	-	-	-	-	-	-	-
Lithium (Li)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	2.8	2.2	1.1	3.3	3.4	3.7	2.4
Magnesium (Mg)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	23,500	13,900	9,480	26,600	26,800	31,100	7,770
Manganese (Mn)	nc	nc	50	200	200	nc	nc	nc	nc	-	µg/L	3,150	1,090	273	1,150	1,170	1,120	595
Mercury (Inorganic Hg)	0.026	0.016	1	nc	ns	0.026	0.026	0.016	0.016	-	µg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum (Mo)	73	nc	nc	73	73	73	73	nc	nc	-	µg/L	2.19	0.338	0.478	0.388	0.387	0.408	1.21
Nickel (Ni)																		
H 60 - < 120	25	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	-	-	-	-	-	-	**37.8**
H 120 - < 180	25	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	-	-	8.92	-	-	-	-
H ≥ 180	150	nc	nc	nc	nc	nc	nc	83	83	-	µg/L	25.2	7.78	-	<0.50	<0.50	<0.50	-
Phosphorus (P)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	498	152	<50	260	264	232	<50
Potassium (K)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	4,000	5,930	5,380	4,430	4,540	2,550	3,230
Selenium (Se)	1	nc	50	1	1	1	1	54	54	-	µg/L	0.840	0.280	0.141	0.221	0.236	0.294	0.401
Silicon (Si)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	14,200	13,000	10,600	16,700	16,500	16,700	11,000
Silver (Ag)																		
H < 100	0.25	7.5	nc	nc	nc	0.1	0.1	1.5	1.5	-	µg/L	-	-	-	-	-	-	0.019
H ≥ 100	0.25	7.5	nc	nc	nc	0.1	0.1	1.5	1.5	-	µg/L	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	-
Sodium (Na)	nc	nc	200,000	nc	nc	nc	nc	nc	nc	-	µg/L	13,600	13,300	12,900	19,200	19,700	5,140	6,670
Strontium (Sr)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	320	280	232	277	278	180	95.1
Sulfur (S)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	1,880	770	2,180	1,680	1,840	1,870	<500
Thallium (Tl)	0.8	nc	nc	0.8	0.8	0.8	0.8	nc	nc	-	µg/L	<0.01	<0.01	0.018	<0.01	<0.01	<0.01	<0.01
Tin (Sn)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Titanium (Ti)	nc	nc	nc	100	100	100	100	nc	nc	-	µg/L	26.0	2.07	<0.30	0.68	0.61	<0.30	1.78
Uranium (U)	15	nc	20	10	10	15	15	nc	nc	-	µg/L	0.457	0.171	0.140	0.090	0.093	0.032	0.570
Vanadium (V)	nc	nc	nc	100	100	nc	nc	nc	nc	-	µg/L	22.8	1.68	<0.50	0.54	0.56	<0.50	6.08
Zinc (Zn)																		
H < 90	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	**31.1**
H 100 - < 200	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	8.6	-	-	-	-
H 200 - < 300	30	nc	5,000	10	10	30	30	10	10	-	µg/L	7.5	2.7	-	<1	<1	<1	-
H 400 - < 500	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-
H ≥ 500	30	nc	5,000	10	10	30	30	10	10	-	µg/L	-	-	-	-	-	-	-
Zirconium (Zr)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	3.52	0.59	<0.30	<0.30	<0.30	<0.30	0.75

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.
Result	Iron and Manganese guidelines do not apply based on absence of specific CSR Schedule 2 activities.

ENVIROCHEM SERVICES INC.

TABLE W3a - ANALYTICAL RESULTS FOR PHENOLS IN GROUNDWATER (PROVINCIAL STANDARDS AND GUIDELINES)

												Monitoring Well ID	BV-11BH-01M	BV-11BH-02M		BV-11BH-03M	BV-11BH-04M	BV-11BH-09M
												Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-03M	BV-11BH-04M	BV-11BH-09M
												Sampled By	Franz	Franz	Franz	Franz	Franz	Franz
												Laboratory ID	-	-	-	-	-	-
												Analyzed By	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
												Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2012-FEB-01	2012-FEB-01	2012-FEB-03
												Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	2.29 - 3.81
												AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2
Parameter	BC CSR Aquatic Life (AW) Freshwater Standards	Notes	BC CSR Aquatic Life (AW) Marine Water Standards	Notes	BC CSR Drinking Water (DW) Standards	Notes	BCWQG Approved - Freshwater Guidelines	BCWQG Approved - Marine Water Guidelines	BCWQG Working - Freshwater Guidelines	BCWQG Working - Marine Water Guidelines	Reportable Detection Limit	Units			Duplicate of BV-11BH-02M			
Physical Tests																		
pH (field)	nc		nc		nc		nc	nc	nc	nc	-	pH	6.36	7.16	7.16	7.12	7.40	6.62
Hardness (as mg/L CaCO3)	nc		nc		nc		nc	nc	nc	nc	-	mg/L	193	152	154	145	180	533
Phenols																		
4-chloro-3-methylphenol	nc		nc		400		nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorophenol	19.5	*K*	19.5	*K*	45	*A, B*	0.1	0.1	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Cresol (2-methylphenol)	2,500		2,500		200		nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m+p-Cresol (3&4-methylphenol)	700		700		200		nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	3	*K*	3	*K*	900	*B*	0.2	0.2	nc	nc	-	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-dichlorophenol	10	*K*	10	*K*	nc		0.2	0.2	nc	nc	-	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-dimethylphenol	2.5	*K*	2.5	*K*	nc		0.2	0.2	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dinitrophenol	2,000		2,000		8		nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
Dinoseb	0.5		0.5		4		nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
2-methyl-4,6-dinitrophenol	nc		nc		nc		nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
2-nitrophenol	nc		nc		nc		nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
4-nitrophenol	nc		nc		nc		nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
Pentachlorophenol	1	*K*	1	*K*	60	*B*	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	2,000		2,000		1,000		4	nc	nc	nc	-	µg/L	<2	<2	<2	<2	<2	<2
2,3,4,5-tetrachlorophenol	2	*K*	2	*K*	nc		0.4	0.4	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4,6-tetrachlorophenol	5.5	*K*	5.5	*K*	100	*B*	1.1	1.1	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5,6-tetrachlorophenol	2.5	*K*	2.5	*K*	nc		0.5	0.5	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4-trichlorophenol	2.5	*K*	2.5	*K*	nc		0.5	0.5	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5-trichlorophenol	2.5	*K*	2.5	*K*	nc		0.5	0.5	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,6-trichlorophenol	8	*K*	8	*K*	nc		1.6	1.6	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	2.5	*K*	2.5	*K*	400		0.6	0.6	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	6	*K*	6	*K*	5	*B*	1.2	1.2	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3,4,5-trichlorophenol	1	*K*	1	*K*	nc		0.2	0.2	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes

BC CSR	British Columbia Contaminated Sites Regulation (B.C. Reg. 375/96, including amendments up to B.C. Reg. 116/2018, June 14, 2018)
BCWQG	British Columbia Water Quality Guidelines
Standards	CSR Schedule 3.2: Generic Numerical Water Standards for Aquatic Water Use (AW) and Drinking Water Use (DW).
Guidelines	BC Approved and Working Water Quality Guidelines for Freshwater and Marine Aquatic Water Use
nc	No criterion exists for this parameter
Result	Analytical result exceeds CSR standard for Aquatic Water Use (AW), Freshwater or Marine
Result	Analytical result exceeds CSR standard for Drinking Water Use (DW)
Result	Analytical result exceeds BCWQG for freshwater or marine water use
Result	Analytical result exceeds one or more of the applicable BC CSR standards and BCWQG guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to the age of the analysis.
Result	Analytical result only exceeds standards or guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

A. Standard is specific to protection of human health. Standard is derived with TRV protective of adults. Standard may not adequately protect other age groups.
B. Standard may not address aesthetic (organoleptic) concerns related to drinking water quality. Water treatment may be required.
K. Standard varies with pH, temperature, and substance isomer. Consult a director for further advice.

TABLE W3b - ANALYTICAL RESULTS FOR PHENOLS IN GROUNDWATER (FEDERAL GUIDELINES)

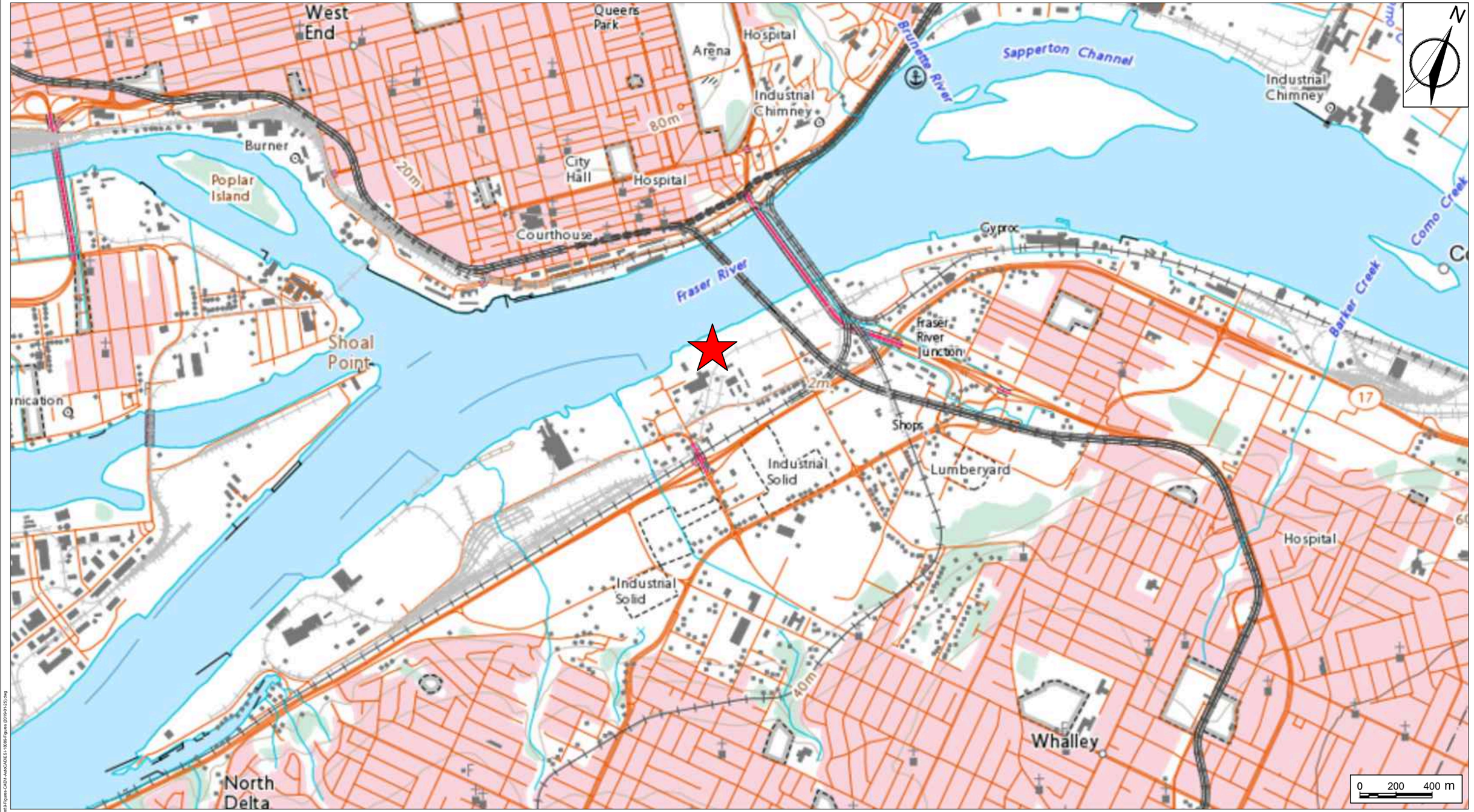
											Monitoring Well ID	BV-11BH-01M	BV-11BH-02M		BV-11BH-03M	BV-11BH-04M	BV-11BH-09M
											Sample ID	BV-11BH-01M	BV-11BH-02M	BV-GWDUP1	BV-11BH-03M	BV-11BH-04M	BV-11BH-09M
											Sampled By	Franz	Franz	Franz	Franz	Franz	Franz
											Laboratory ID	-	-	-	-	-	-
											Analyzed By	AGAT	AGAT	AGAT	AGAT	AGAT	AGAT
											Date Sampled	2012-FEB-03	2012-FEB-02	2012-FEB-02	2012-FEB-01	2012-FEB-01	2012-FEB-03
											Screen Depth (m)	3.05 - 4.57	3.05 - 4.57	3.05 - 4.57	2.44 - 3.96	1.52 - 3.05	2.29 - 3.81
											AECs / APECs Assessed	APEC-3	APEC-3	APEC-3	APEC-3	APEC-3	APEC-2
Parameter	CCME-CEQG Aquatic Life (AW) Freshwater Guidelines -	CCME-CEQG Aquatic Life (AW) Marine Water Guidelines -	Health Canada Canadian Drinking Water Quality (CDWQ) Guidelines -	FCSAP-FIGQG Tier 1 Guidelines Fine-Grained	FCSAP-FIGQG Tier 1 Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Freshwater Guidelines Coarse-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Fine-Grained	FCSAP-FIGQG Tier 2 - Marine Water Guidelines Coarse-Grained	Reportable Detection Limit	Units			Duplicate of BV-11BH-02M			
Phenols																	
4-chloro-3-methylphenol	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorophenol	7	nc	nc	330	330	330	330	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Cresol (2-methylphenol)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m+p-Cresol (3&4-methylphenol)	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	0.2	nc	0.3	0.2	0.2	0.2	0.2	nc	nc	-	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-dichlorophenol	0.2	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-dimethylphenol	0.2	nc	nc	3,900	3,900	3,900	3,900	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dinitrophenol	nc	nc	nc	1,100	1,100	1,100	1,100	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
Dinoseb	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
2-methyl-4,6-dinitrophenol	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
2-nitrophenol	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
4-nitrophenol	nc	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<5	<5	<5	<5	<5	<5
Pentachlorophenol	0.5	nc	30	0.5	0.5	0.5	0.5	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol	4	nc	nc	4	4	4	4	nc	nc	-	µg/L	<2	<2	<2	<2	<2	<2
2,3,4,5-tetrachlorophenol	1	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4,6-tetrachlorophenol	1	nc	1	1	1	1	1	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5,6-tetrachlorophenol	1	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,4-trichlorophenol	18	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,5-trichlorophenol	18	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,3,6-trichlorophenol	18	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	18	nc	nc	160	160	160	160	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	18	nc	2	18	18	18	18	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3,4,5-trichlorophenol	18	nc	nc	nc	nc	nc	nc	nc	nc	-	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Notes

CCME-CEQG	Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines
FCSAP-FIGQG	Federal Contaminated Sites Action Plan - Federal Interim Groundwater Quality Guidelines for Industrial (IL) and Commercial (CL) Land Use
Guidelines	Water Quality Guidelines for Freshwater and Marine Aquatic Water Use and Health Canada Drinking Water Quality Guidelines
nc	No criterion exists for this parameter
Result	Analytical result exceeds CCME-CEQG freshwater or marine water aquatic life
Result	Analytical result exceeds Health Canada CDWQ for Drinking Water Use (DW)
Result	Analytical result exceeds FCSAP-FIGQG for freshwater or marine water AW for correct application of Tier 1 vs. Tier 2 and Coarse vs. Fine Soils
Result	Analytical result exceeds more than one of the above guidelines
Result	Laboratory detection limit exceeds one or more of the applied standards or guidelines due to age of the analysis.
Result	Analytical result only exceeds guidelines that do not apply due to proximity of the monitoring well to the Fraser River.

APPENDIX B

Figures



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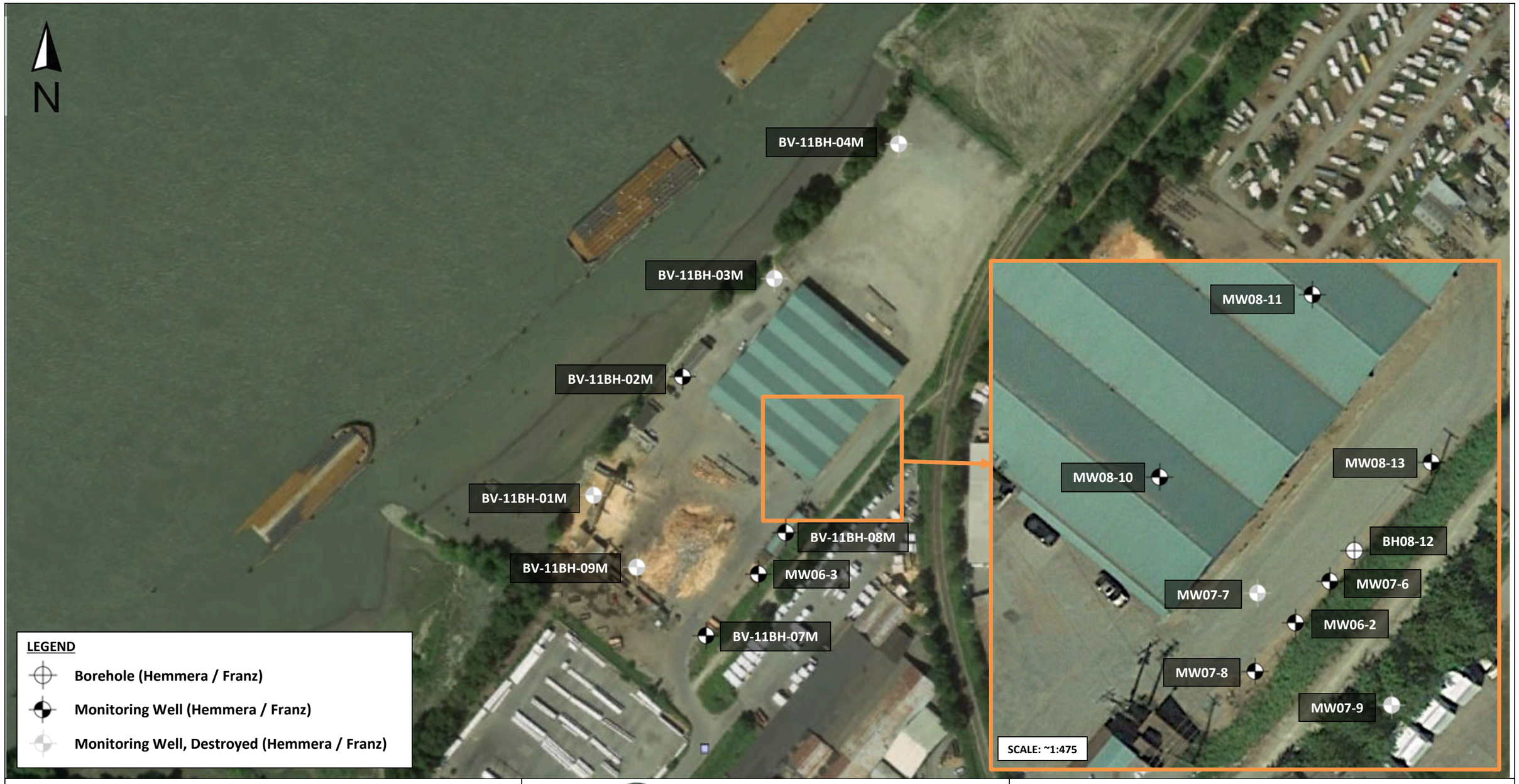
NOTE:
- Topographic image, The Atlas of Canada - Toporama (http://www.atlas.gc.ca/toporama), download date 18th September 2018.
- Original drawing is ANSI expand B (11.00 x 17.00 Inches) and in colour.

LEGEND:
★ Approximate site location

Title: Site Location Plan	Figure No: 1	Rev No: 00
	Date: January 2019	
Client: Mill and Timber Products Ltd.	Project No: 18089	
Project: Phase I Environmental Site Assessment (ESA)	Drawn: FT/GS	Checked: SH
Location: 10880 Dyke Road, Surrey, BC	Scale: 1:20000	



Envirochem Services Inc.
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CLIENT: **Mill & Timber Products Ltd.**

PROJECT: **Mill & Timber – Smallwood Exit Assessment**

TITLE: **Borehole and Monitoring Well Plan**

NOTES:
1) Original drawing is ANSI expand B (11.00 x 17.00 inches) and in colour.
2) Aerial image obtained from Google Earth, dated July 22, 2018.
3) All borehole locations are considered approximate and are based on a combination of site reconnaissance and locations presented in previous environmental reports by Hemmera and Franz.

DWN BY:	PROJECT NO.:		
SH	18089		
CH'KD BY:	REV. NO.:	DATE:	
EC	0	January 2019	
	SCALE:	FIGURE NO.:	
	~1:2,000	2	

Borehole ID	Sample ID	Sample Date	Sample Depth (m)	BTEXS	VPH / F1	LEPH	HEPH	PAHs	IACR	METALS	PHENOLS
MW06-3	MW06-3-1	2006-JUN-29	0.30 - 0.91	-	-	<RDL	<RDL	-	-	-	-
	MW06-3-3	2006-JUN-29	1.53 - 1.98	-	-	<RDL	<RDL	-	-	-	-
BV-11BH-01M	BV-11BH-01M-2	2011-DEC-14	0.50 - 1.00	<RDL	<RDL	<RDL	<RDL	<RDL	0.569	<STD	<RDL
	BV-11BH-01M-5	2011-DEC-14	3.00 - 4.00	<RDL	<RDL	<RDL	79	Naphthalene (0.03)	0.569	As (17.2)	<RDL
	BV-Dup5 (DUP)	2011-DEC-14	3.00 - 4.00	-	-	-	-	-	-	As (17.5)	<RDL
BV-11BH-02M	BV-11BH-02M-2	2011-DEC-16	0.50 - 1.00	<RDL	<RDL	<RDL	64	Naphthalene (0.02)	0.569	<STD	<RDL
	BV-11BH-02M-3	2011-DEC-16	1.50 - 2.00	<STD	<RDL	<RDL	27	Naphthalene (0.10) Phenanthrene (0.17)	3.271	<STD	<RDL
BV-11BH-03M	BV-11BH-03M-1	2011-DEC-15	0.50 - 1.00	<RDL	<RDL	<RDL	<RDL	<STD	0.569	<STD	<RDL
	BV-11BH-03M-3	2011-DEC-15	2.00 - 3.00	<RDL	<RDL	<RDL	71	<STD	0.569	<STD	<RDL
BV-11BH-04M	BV-11BH-04M-1	2011-DEC-17	0.00 - 0.50	<RDL	<RDL	<RDL	170	Naphthalene (0.02)	0.579	<STD	<RDL
	BV-11BH-04M-3	2011-DEC-17	1.50 - 2.00	<RDL	<RDL	<RDL	<RDL	<RDL	0.569	<STD	<RDL
	BV-Dup9 (DUP)	2011-DEC-17	1.50 - 2.00	-	-	-	-	-	-	<STD	<RDL
BV-11BH-07M	BV-11BH-07M-2	2011-DEC-17	0.50 - 1.00	<RDL	<RDL	30	110	Naphthalene (0.02) Phenanthrene (0.07)	0.569	-	-
	BV-Dup8 (DUP)	2011-DEC-17	0.50 - 1.00	<RDL	<RDL	<RDL	33	Naphthalene (0.02) Phenanthrene (0.07)	0.569	-	-
	BV-11BH-07M-3	2011-DEC-17	1.50 - 2.00	<RDL	<RDL	43	220	Naphthalene (0.07) Phenanthrene (0.05)	0.569	-	-
BV-11BH-08M	BV-11BH-08M-1	2011-DEC-16	0.35 - 0.50	-	-	<RDL	<RDL	<RDL	0.569	-	-
	BV-11BH-08M-4	2011-DEC-16	2.00 - 3.00	-	-	<RDL	<RDL	<RDL	0.569	-	-
BV-11BH-09M	BV-11BH-09M-1	2011-DEC-14	0.00 - 0.50	-	-	41	600	Naphthalene (0.09)	0.569	<STD	<RDL
	BV-11BH-09M-5	2011-DEC-14	3.00 - 4.00	-	-	<RDL	60	<STD	0.569	<STD	<RDL

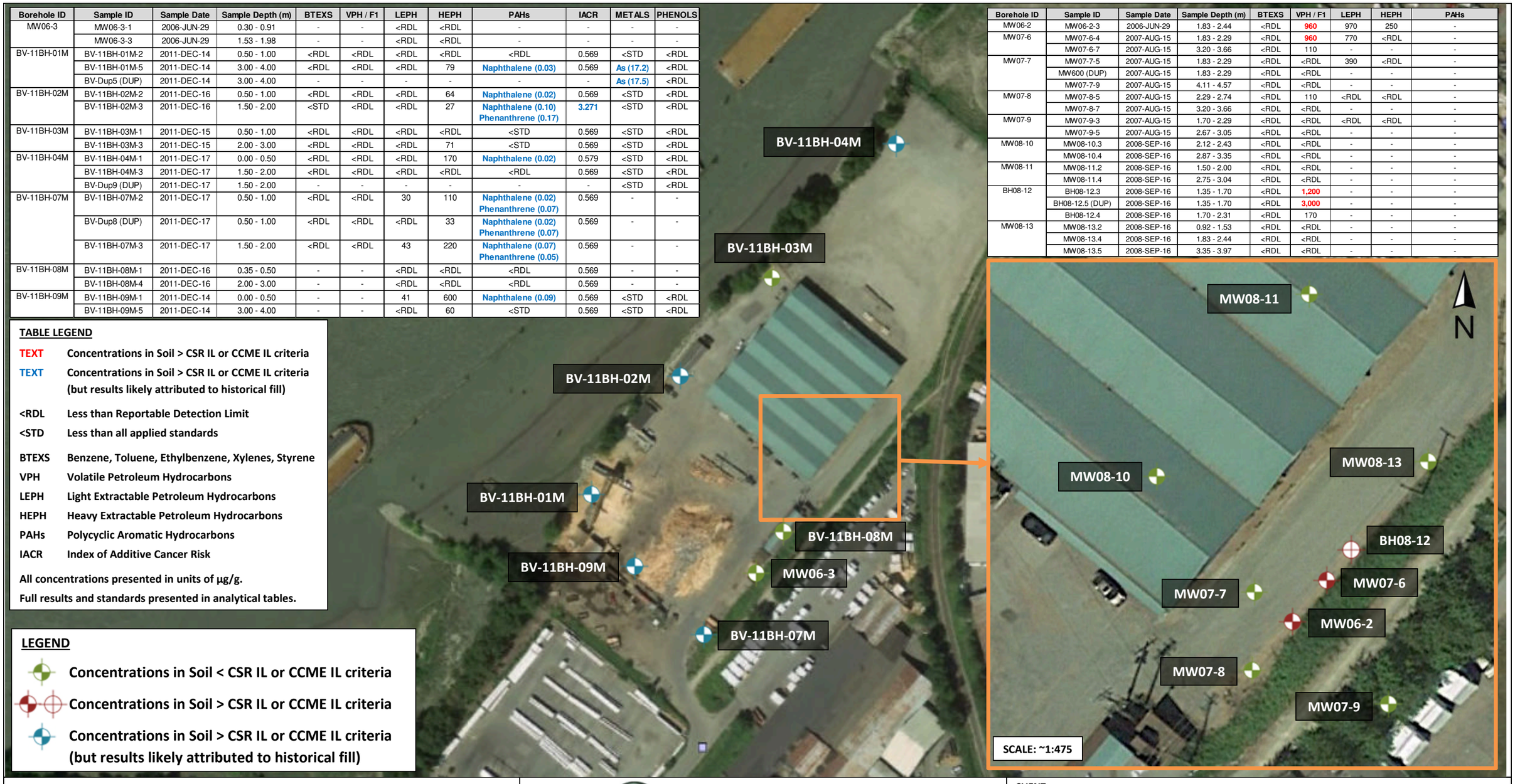
Borehole ID	Sample ID	Sample Date	Sample Depth (m)	BTEXS	VPH / F1	LEPH	HEPH	PAHs
MW06-2	MW06-2-3	2006-JUN-29	1.83 - 2.44	<RDL	960	970	250	-
MW07-6	MW07-6-4	2007-AUG-15	1.83 - 2.29	<RDL	960	770	<RDL	-
	MW07-6-7	2007-AUG-15	3.20 - 3.66	<RDL	110	-	-	-
MW07-7	MW07-7-5	2007-AUG-15	1.83 - 2.29	<RDL	<RDL	390	<RDL	-
	MW600 (DUP)	2007-AUG-15	1.83 - 2.29	<RDL	<RDL	-	-	-
	MW07-7-9	2007-AUG-15	4.11 - 4.57	<RDL	<RDL	-	-	-
MW07-8	MW07-8-5	2007-AUG-15	2.29 - 2.74	<RDL	110	<RDL	<RDL	-
	MW07-8-7	2007-AUG-15	3.20 - 3.66	<RDL	<RDL	-	-	-
MW07-9	MW07-9-3	2007-AUG-15	1.70 - 2.29	<RDL	<RDL	<RDL	<RDL	-
	MW07-9-5	2007-AUG-15	2.67 - 3.05	<RDL	<RDL	-	-	-
MW08-10	MW08-10.3	2008-SEP-16	2.12 - 2.43	<RDL	<RDL	-	-	-
	MW08-10.4	2008-SEP-16	2.87 - 3.35	<RDL	<RDL	-	-	-
MW08-11	MW08-11.2	2008-SEP-16	1.50 - 2.00	<RDL	<RDL	-	-	-
	MW08-11.4	2008-SEP-16	2.75 - 3.04	<RDL	<RDL	-	-	-
BH08-12	BH08-12.3	2008-SEP-16	1.35 - 1.70	<RDL	1,200	-	-	-
	BH08-12.5 (DUP)	2008-SEP-16	1.35 - 1.70	<RDL	3,000	-	-	-
	BH08-12.4	2008-SEP-16	1.70 - 2.31	<RDL	170	-	-	-
MW08-13	MW08-13.2	2008-SEP-16	0.92 - 1.53	<RDL	<RDL	-	-	-
	MW08-13.4	2008-SEP-16	1.83 - 2.44	<RDL	<RDL	-	-	-
	MW08-13.5	2008-SEP-16	3.35 - 3.97	<RDL	<RDL	-	-	-

TABLE LEGEND

TEXT	Concentrations in Soil > CSR IL or CCME IL criteria
TEXT	Concentrations in Soil > CSR IL or CCME IL criteria (but results likely attributed to historical fill)
<RDL	Less than Reportable Detection Limit
<STD	Less than all applied standards
BTEXS	Benzene, Toluene, Ethylbenzene, Xylenes, Styrene
VPH	Volatile Petroleum Hydrocarbons
LEPH	Light Extractable Petroleum Hydrocarbons
HEPH	Heavy Extractable Petroleum Hydrocarbons
PAHs	Polycyclic Aromatic Hydrocarbons
IACR	Index of Additive Cancer Risk

All concentrations presented in units of µg/g.

Full results and standards presented in analytical tables.



LEGEND

- Concentrations in Soil < CSR IL or CCME IL criteria
- Concentrations in Soil > CSR IL or CCME IL criteria
- Concentrations in Soil > CSR IL or CCME IL criteria (but results likely attributed to historical fill)

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ENVIROCHEM SERVICES INC.

CLIENT: **Mill & Timber Products Ltd.**

PROJECT: **Mill & Timber – Smallwood Exit Assessment**

TITLE: **Soil Quality Plan**

NOTES:
1) Original drawing is ANSI expand B (11.00 x 17.00 inches) and in colour.
2) Aerial image obtained from Google Earth, dated July 22, 2018.
3) All borehole locations are considered approximate and are based on a combination of site reconnaissance and locations presented in previous environmental reports by Hemmera and Franz.

DWN BY:	PROJECT NO.:		
SH	18089		
CH'KD BY:	REV. NO.:	DATE:	
EC	0	January 2019	
	SCALE:	FIGURE NO.:	
	~1:2,000	3	

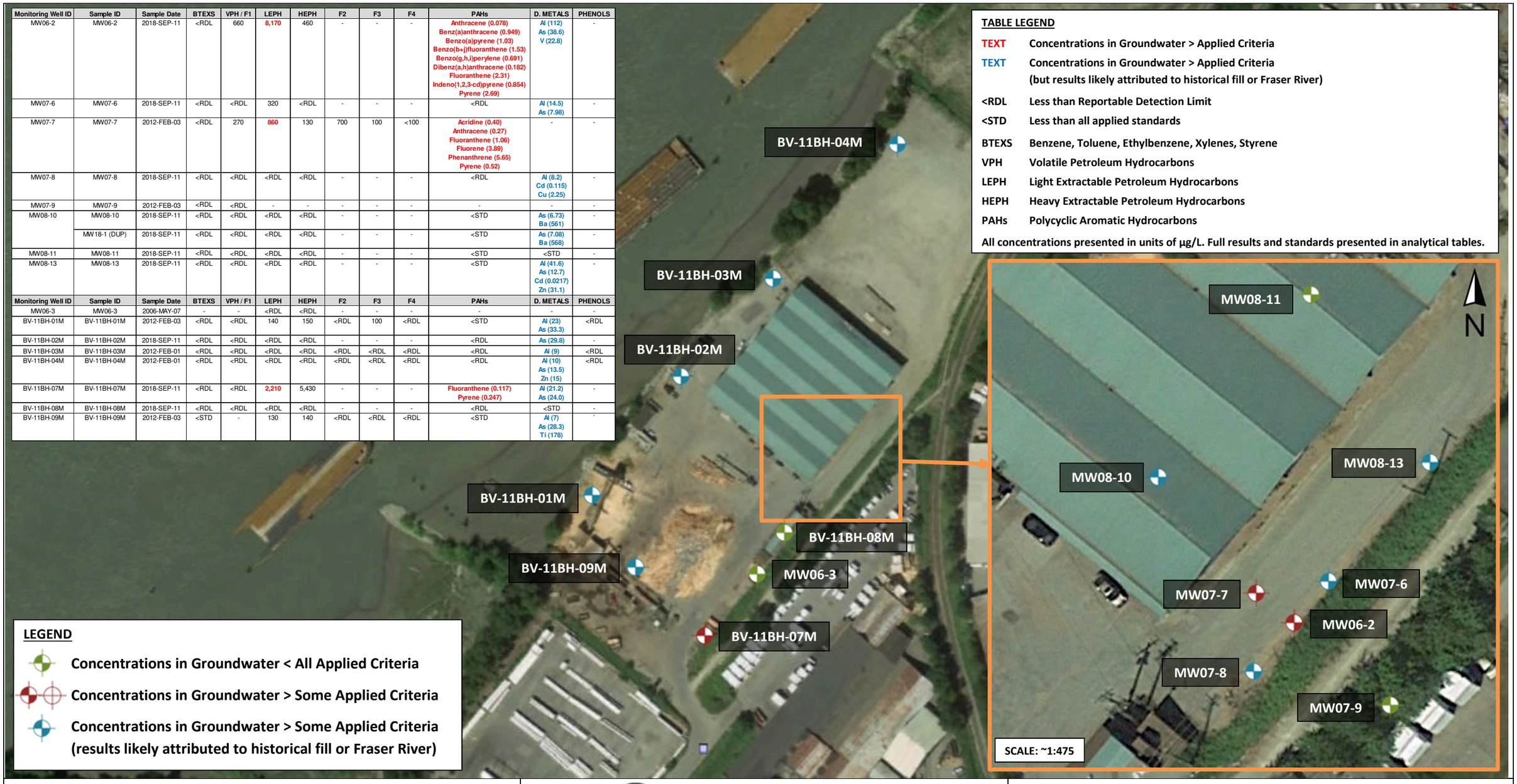
Monitoring Well ID	Sample ID	Sample Date	BTEXS	VPH / F1	LEPH	HEPH	F2	F3	F4	PAHs	D. METALS	PHENOLS
MW06-2	MW06-2	2018-SEP-11	<RDL	660	8,170	460	-	-	-	Anthracene (0.078) Benz(a)anthracene (0.949) Benzo(a)pyrene (1.03) Benzo(b+j)fluoranthene (1.53) Benzo(g,h,i)perylene (0.691) Dibenz(a,h)anthracene (0.182) Fluoranthene (2.31) Indeno(1,2,3-cd)pyrene (0.854) Pyrene (2.69)	Al (112) As (38.6) V (22.8)	-
MW07-6	MW07-6	2018-SEP-11	<RDL	<RDL	320	<RDL	-	-	-	<RDL	Al (14.5) As (7.98)	-
MW07-7	MW07-7	2012-FEB-03	<RDL	270	860	130	700	100	<100	Acridine (0.40) Anthracene (0.27) Fluoranthene (1.06) Fluorene (3.89) Phenanthrene (5.65) Pyrene (0.52)	-	-
MW07-8	MW07-8	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<RDL	Al (8.2) Cd (0.115) Cu (2.25)	-
MW07-9	MW07-9	2012-FEB-03	<RDL	<RDL	-	-	-	-	-	-	-	-
MW08-10	MW08-10	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<STD	As (6.73) Ba (561)	-
	MW18-1 (DUP)	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<STD	As (7.08) Ba (568)	-
MW08-11	MW08-11	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<STD	<STD	-
MW08-13	MW08-13	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<STD	Al (41.6) As (12.7) Cd (0.0217) Zn (31.1)	-

Monitoring Well ID	Sample ID	Sample Date	BTEXS	VPH / F1	LEPH	HEPH	F2	F3	F4	PAHs	D. METALS	PHENOLS
MW06-3	MW06-3	2006-MAY-07	-	-	<RDL	<RDL	-	-	-	-	-	-
BV-11BH-01M	BV-11BH-01M	2012-FEB-03	<RDL	<RDL	140	150	<RDL	100	<RDL	<STD	Al (23) As (33.3)	<RDL
BV-11BH-02M	BV-11BH-02M	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<RDL	As (29.8)	-
BV-11BH-03M	BV-11BH-03M	2012-FEB-01	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	Al (9)	<RDL
BV-11BH-04M	BV-11BH-04M	2012-FEB-01	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	<RDL	Al (10) As (13.5) Zn (15)	<RDL
BV-11BH-07M	BV-11BH-07M	2018-SEP-11	<RDL	<RDL	2,210	5,430	-	-	-	Fluoranthene (0.117) Pyrene (0.247)	Al (21.2) As (24.0)	-
BV-11BH-08M	BV-11BH-08M	2018-SEP-11	<RDL	<RDL	<RDL	<RDL	-	-	-	<RDL	<STD	-
BV-11BH-09M	BV-11BH-09M	2012-FEB-03	<STD	-	130	140	<RDL	<RDL	<RDL	<STD	Al (7) As (28.3) Ti (178)	`

TABLE LEGEND

TEXT	Concentrations in Groundwater > Applied Criteria
TEXT	Concentrations in Groundwater > Applied Criteria (but results likely attributed to historical fill or Fraser River)
<RDL	Less than Reportable Detection Limit
<STD	Less than all applied standards
BTEXS	Benzene, Toluene, Ethylbenzene, Xylenes, Styrene
VPH	Volatile Petroleum Hydrocarbons
LEPH	Light Extractable Petroleum Hydrocarbons
HEPH	Heavy Extractable Petroleum Hydrocarbons
PAHs	Polycyclic Aromatic Hydrocarbons

All concentrations presented in units of µg/L. Full results and standards presented in analytical tables.



LEGEND

- Concentrations in Groundwater < All Applied Criteria
- Concentrations in Groundwater > Some Applied Criteria
- Concentrations in Groundwater > Some Applied Criteria (results likely attributed to historical fill or Fraser River)

Envirochem Services Inc.
#206 – 267 West Esplanade, North Vancouver, BC V7M 1A5
T: 604-986-0233 E: response@envirochem.com

ENVIROCHEM SERVICES INC.

CLIENT: **Mill & Timber Products Ltd.**

PROJECT: **Mill & Timber – Smallwood Exit Assessment**

TITLE: **Groundwater Quality Plan**

NOTES:
1) Original drawing is ANSI expand B (11.00 x 17.00 inches) and in colour.
2) Aerial image obtained from Google Earth, dated July 22, 2018.
3) All borehole locations are considered approximate and are based on a combination of site reconnaissance and locations presented in previous environmental reports by Hemmera and Franz.

DWN BY:	PROJECT NO.:		
SH	18089		
CH'KD BY:	REV. NO.:	DATE:	
EC	0	January 2019	
	SCALE:	FIGURE NO.:	
	~1:2,000	4	

APPENDIX C

Site Photographs

Photo 1: Entrance to the Smallwood Sawmill site and weather conditions at time of sampling

Date: September 11, 2018	**Facing:** North

Photo 2: General locations of the monitoring wells south of the distribution warehouse, as seen during a preliminary site visit.

Date: August 1, 2018	**Facing:** Southwest

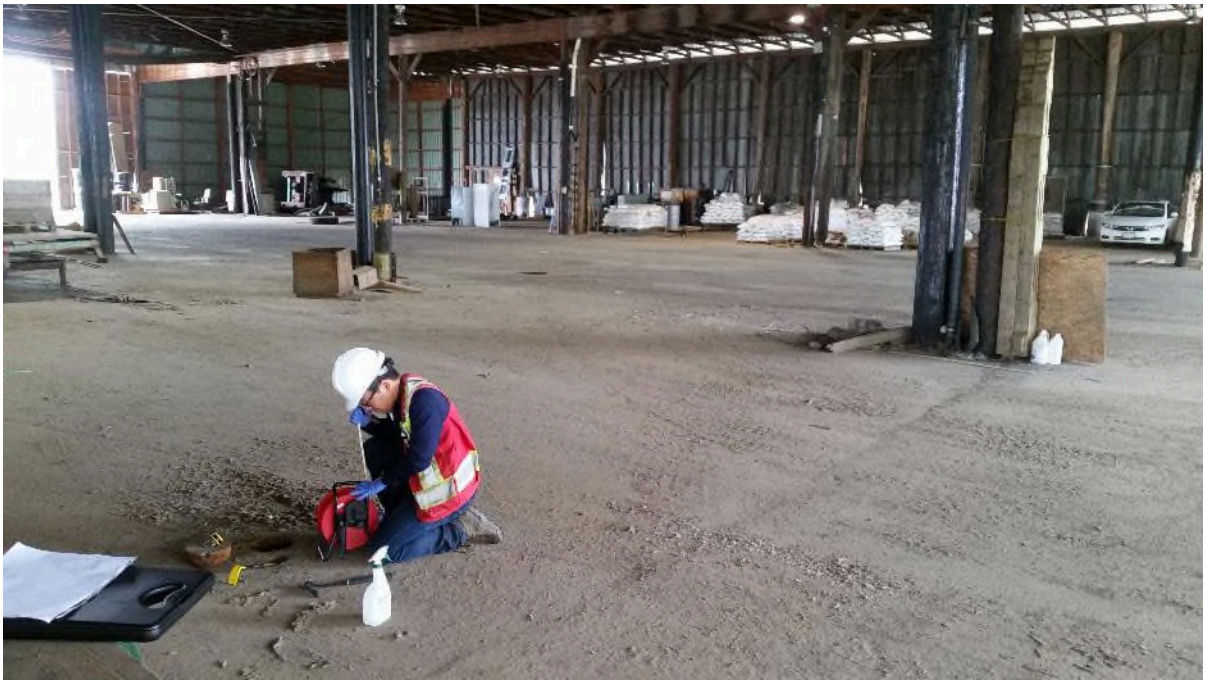


Photo 3: Checking the depth to groundwater on MW08-11 during the preliminary site visit.

Date: August 1, 2018	**Facing:** North

Photo 4: Location of MW08-10 within the distribution warehouse.

Date: August 1, 2018	**Facing:** Southwest

Photo 5: Examples of monitoring wells which have been destroyed since they were last sampled, due to the wells being too close to ground surface, J-plugs getting broken, and wells filling with soil.

Date: August 1, 2018	**Facing:** n/a

APPENDIX D

Laboratory Certificate of Analysis

ENVIROCHEM SERVICES INC.
ATTN: Bryan Tsai
206-267 West Esplanade
North Vancouver BC V7M 1A5

Date Received: 11-SEP-18
Report Date: 19-SEP-18 15:44 (MT)
Version: FINAL

Client Phone: 604-986-0233

Certificate of Analysis

Lab Work Order #: L2162381

Project P.O. #: NOT SUBMITTED
Job Reference: 18089
C of C Numbers: 17-717614, 17-717615
Legal Site Desc:

Dean Watt, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2162381-1	L2162381-2	L2162381-3	L2162381-4	L2162381-5
Description	Water	Water	Water	Water	Water
Sampled Date	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18
Sampled Time					
Client ID	MW06-2	MW07-6	MW08-10	MW08-11	MW08-13
Grouping / **Analyte**					
WATER					
Physical Tests Hardness (as CaCO3) (mg/L)	270	236	250	272	75.1
Total Dissolved Solids (mg/L)	360	297	292	270	130
Dissolved Metals Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.112	0.0145	0.0033	0.0014	0.0416
Antimony (Sb)-Dissolved (mg/L)	0.00061	0.00047	<0.00010	<0.00010	0.00070
Arsenic (As)-Dissolved (mg/L)	0.0386	0.00798	0.00673	0.00399	0.0127
Barium (Ba)-Dissolved (mg/L)	0.131	0.0740	0.561	0.0829	0.0519
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	0.037	0.044	0.093	0.058	0.023
Cadmium (Cd)-Dissolved (mg/L)	0.0000128	<0.0000050	<0.0000050	<0.0000050	0.0000217
Calcium (Ca)-Dissolved (mg/L)	69.2	71.5	56.4	57.6	17.2
Chromium (Cr)-Dissolved (mg/L)	0.00415	0.00177	0.00039	0.00011	0.00157
Cobalt (Co)-Dissolved (mg/L)	0.00452	0.00077	0.00011	<0.00010	0.00305
Copper (Cu)-Dissolved (mg/L)	0.00143	<0.00020	<0.00020	<0.00020	0.00065
Iron (Fe)-Dissolved (mg/L)	31.9	15.8	34.4	27.9	8.52
Lead (Pb)-Dissolved (mg/L)	0.00121	0.000153	<0.000050	<0.000050	0.000222
Lithium (Li)-Dissolved (mg/L)	0.0028	0.0022	0.0033	0.0037	0.0024
Magnesium (Mg)-Dissolved (mg/L)	23.5	13.9	26.6	31.1	7.77
Manganese (Mn)-Dissolved (mg/L)	3.15	1.09	1.15	1.13	0.595
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.00219	0.000338	0.000388	0.000408	0.00121
Nickel (Ni)-Dissolved (mg/L)	0.0252	0.00778	<0.00050	<0.00050	0.0378
Phosphorus (P)-Dissolved (mg/L)	0.498	0.152	0.260	0.232	<0.050
Potassium (K)-Dissolved (mg/L)	4.00	5.93	4.43	2.55	3.23
Selenium (Se)-Dissolved (mg/L)	0.000840	0.000280	0.000221	0.000294	0.000401
Silicon (Si)-Dissolved (mg/L)	14.2	13.0	16.7	16.7	11.0
Silver (Ag)-Dissolved (mg/L)	0.000026	<0.000010	<0.000010	<0.000010	0.000019
Sodium (Na)-Dissolved (mg/L)	13.6	13.3	19.2	5.14	6.67
Strontium (Sr)-Dissolved (mg/L)	0.320	0.280	0.277	0.180	0.0951
Sulfur (S)-Dissolved (mg/L)	1.88	0.77	1.68	1.87	<0.50
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved (mg/L)	0.00015	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	0.0260	0.00207	0.00068	<0.00030	0.00178
Uranium (U)-Dissolved (mg/L)	0.000457	0.000171	0.000090	0.000032	0.000570
Vanadium (V)-Dissolved (mg/L)	0.0228	0.00168	0.00054	<0.00050	0.00608
Zinc (Zn)-Dissolved (mg/L)	0.0075	0.0027	<0.0010	<0.0010	0.0311

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2162381-6	L2162381-7	L2162381-8	L2162381-9	L2162381-10
Description	Water	Water	Water	Water	Water
Sampled Date	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18
Sampled Time					
Client ID	BV-11BH-02M	BV-11BH-07M	BV-11BH-08M	MW07-8	MW18-1
Grouping / **Analyte**					
WATER					
Physical Tests					
Hardness (as CaCO3) (mg/L)	103	147	79.4	134	251
Total Dissolved Solids (mg/L)	150	203	107	180	317
Dissolved Metals					
Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved (mg/L)	0.0038	0.0212	0.0039	0.0082	0.0027
Antimony (Sb)-Dissolved (mg/L)	<0.00010	0.00025	0.00015	0.00033	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.0298	0.0240	0.00321	0.00136	0.00708
Barium (Ba)-Dissolved (mg/L)	0.0421	0.108	0.0359	0.0923	0.568
Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron (B)-Dissolved (mg/L)	0.060	0.062	0.019	0.030	0.092
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	0.000115	<0.0000050
Calcium (Ca)-Dissolved (mg/L)	29.9	47.7	19.7	38.0	56.2
Chromium (Cr)-Dissolved (mg/L)	0.00055	0.00044	0.00018	0.00050	0.00042
Cobalt (Co)-Dissolved (mg/L)	0.00011	0.00021	<0.00010	0.00164	0.00010
Copper (Cu)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	0.00225	<0.00020
Iron (Fe)-Dissolved (mg/L)	22.8	20.0	16.0	0.842	34.6
Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000054	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.0021	0.0015	0.0012	0.0011	0.0034
Magnesium (Mg)-Dissolved (mg/L)	6.78	6.73	7.33	9.48	26.8
Manganese (Mn)-Dissolved (mg/L)	1.03	0.855	0.889	0.273	1.17
Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000415	0.00434	0.000458	0.000478	0.000387
Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00186	<0.00050	0.00892	<0.00050
Phosphorus (P)-Dissolved (mg/L)	0.465	0.055	0.117	<0.050	0.264
Potassium (K)-Dissolved (mg/L)	1.58	4.19	2.17	5.38	4.54
Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000196	<0.000050	0.000141	0.000236
Silicon (Si)-Dissolved (mg/L)	17.6	12.2	10.2	10.6	16.5
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	6.55	9.25	5.59	12.9	19.7
Strontium (Sr)-Dissolved (mg/L)	0.131	0.224	0.0909	0.232	0.278
Sulfur (S)-Dissolved (mg/L)	<0.50	1.59	<0.50	2.18	1.84
Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	0.00106	0.00124	0.00043	<0.00030	0.00061
Uranium (U)-Dissolved (mg/L)	<0.000010	0.000606	0.000020	0.000140	0.000093
Vanadium (V)-Dissolved (mg/L)	0.00114	0.00208	0.00052	<0.00050	0.00056
Zinc (Zn)-Dissolved (mg/L)	<0.0010	0.0027	<0.0010	0.0086	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2162381-1	L2162381-2	L2162381-3	L2162381-4	L2162381-5
Description	Water	Water	Water	Water	Water
Sampled Date	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18
Sampled Time					
Client ID	MW06-2	MW07-6	MW08-10	MW08-11	MW08-13
Grouping / **Analyte**					
WATER					
Dissolved Metals / Zirconium (Zr)-Dissolved (mg/L)	0.00352	0.00059	<0.00030	<0.00030	0.00075
Volatile Organic Compounds / Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene (mg/L)	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Surrogate: 4-Bromofluorobenzene (SS) (%)	109.8	111.9	98.1	98.6	103.5
Surrogate: 1,4-Difluorobenzene (SS) (%)	103.1	103.0	104.9	104.4	104.7
Hydrocarbons / EPH10-19 (mg/L)	8.17	0.32	<0.25	<0.25	<0.25
EPH10-19 (sg) (mg/L)					
EPH19-32 (mg/L)	0.47	<0.25	<0.25	<0.25	<0.25
EPH19-32 (sg) (mg/L)					
LEPH (mg/L)	8.17	0.32	<0.25	<0.25	<0.25
LEPHw-sg (mg/L)					
HEPH (mg/L)	0.46	<0.25	<0.25	<0.25	<0.25
HEPHw-sg (mg/L)					
Volatile Hydrocarbons (VH6-10) (mg/L)	0.66	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10) (mg/L)	0.66	<0.10	<0.10	<0.10	<0.10
Surrogate: 2-Bromobenzotrifluoride (%)	129.6	113.3	103.4	109.4	106.5
Surrogate: 2-Bromobenzotrifluoride, EPH-sg (%)					
Surrogate: 3,4-Dichlorotoluene (SS) (%)	87.5	85.7	84.2	85.8	95.8
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)	0.000154	<0.000010	0.000021	0.000716	0.000014
Acenaphthylene (mg/L)	0.000111	<0.000010	<0.000010	<0.000010	<0.000010
Acridine (mg/L)	<0.000030 DLCI	<0.000010	<0.000010	<0.000010	<0.000010
Anthracene (mg/L)	0.000078	<0.000010	<0.000010	<0.000010	<0.000010
Benz(a)anthracene (mg/L)	0.000949	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(a)pyrene (mg/L)	0.00103	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Benzo(b&j)fluoranthene (mg/L)	0.00153	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(b+j+k)fluoranthene (mg/L)	0.00200	<0.000015	<0.000015	<0.000015	<0.000015
Benzo(g,h,i)perylene (mg/L)	0.000691	<0.000010	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene (mg/L)	0.000474	<0.000010	<0.000010	<0.000010	<0.000010
Chrysene (mg/L)	<0.00070 DLCI	<0.000010	<0.000010	<0.000010	<0.000010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2162381-6	L2162381-7	L2162381-8	L2162381-9	L2162381-10
Description	Water	Water	Water	Water	Water
Sampled Date	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18
Sampled Time					
Client ID	BV-11BH-02M	BV-11BH-07M	BV-11BH-08M	MW07-8	MW18-1
Grouping / **Analyte**					
WATER					
Dissolved Metals / Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Volatile Organic Compounds / Benzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Ethylbenzene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Methyl t-butyl ether (MTBE) (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Styrene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene (mg/L)	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045
ortho-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
meta- & para-Xylene (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylenes (mg/L)	<0.00075	<0.00075	<0.00075	<0.00075	<0.00075
Surrogate: 4-Bromofluorobenzene (SS) (%)	97.5	100.9	100.2	99.7	99.6
Surrogate: 1,4-Difluorobenzene (SS) (%)	104.3	102.3	103.7	104.1	103.7
Hydrocarbons / EPH10-19 (mg/L)	<0.25	2.21	<0.25	<0.25	<0.25
EPH10-19 (sg) (mg/L)		1.36			
EPH19-32 (mg/L)	<0.25	5.43	<0.25	<0.25	<0.25
EPH19-32 (sg) (mg/L)		4.11			
LEPH (mg/L)	<0.25	2.21	<0.25	<0.25	<0.25
LEPHw-sg (mg/L)		1.36			
HEPH (mg/L)	<0.25	5.43	<0.25	<0.25	<0.25
HEPHw-sg (mg/L)		4.11			
Volatile Hydrocarbons (VH6-10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
VPH (C6-C10) (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
Surrogate: 2-Bromobenzotrifluoride (%)	110.3	111.4	107.0	103.2	90.1
Surrogate: 2-Bromobenzotrifluoride, EPH-sg (%)		66.8			
Surrogate: 3,4-Dichlorotoluene (SS) (%)	83.6	92.7	102.0	92.6	88.5
Polycyclic Aromatic Hydrocarbons / Acenaphthene (mg/L)	<0.000010	0.000970	<0.000010	<0.000010	0.000025
Acenaphthylene (mg/L)	<0.000010	<0.00030 DLCI	<0.000010	<0.000010	<0.000010
Acridine (mg/L)	<0.000010	<0.00070 DLCI	<0.000010	<0.000010	<0.000010
Anthracene (mg/L)	<0.000010	<0.00020 DLCI	<0.000010	<0.000010	<0.000010
Benz(a)anthracene (mg/L)	<0.000010	<0.000020 DLCI	<0.000010	<0.000010	<0.000010
Benzo(a)pyrene (mg/L)	<0.0000050	<0.000010 DLCI	<0.0000050	<0.0000050	<0.0000050
Benzo(b&j)fluoranthene (mg/L)	<0.000010	<0.000020 DLCI	<0.000010	<0.000010	<0.000010
Benzo(b+j+k)fluoranthene (mg/L)	<0.000015	<0.000022	<0.000015	<0.000015	<0.000015
Benzo(g,h,i)perylene (mg/L)	<0.000010	<0.000040 DLQ	<0.000010	<0.000010	<0.000010
Benzo(k)fluoranthene (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chrysene (mg/L)	<0.000010	<0.000030 DLCI	<0.000010	<0.000010	<0.000010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2162381-1	L2162381-2	L2162381-3	L2162381-4	L2162381-5
	Description	Water	Water	Water	Water	Water
	Sampled Date	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18	11-SEP-18
	Sampled Time					
	Client ID	MW06-2	MW07-6	MW08-10	MW08-11	MW08-13
Grouping	**Analyte**					
WATER						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/L)	0.000182	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Fluoranthene (mg/L)	0.00231	<0.000010	<0.000010	<0.000010	<0.000010
	Fluorene (mg/L)	0.000084	<0.000010	<0.000010	<0.000010	<0.000010
	Indeno(1,2,3-c,d)pyrene (mg/L)	0.000854	<0.000010	<0.000010	<0.000010	<0.000010
	1-Methylnaphthalene (mg/L)	0.000757	<0.00020 DLQ	<0.000050	<0.000050	<0.000050
	2-Methylnaphthalene (mg/L)	0.000383	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.0020 DLCI	<0.00020 DLCI	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	0.000134	<0.000020	<0.000020	<0.000020	<0.000020
	Pyrene (mg/L)	0.00269	<0.000010	<0.000010	<0.000010	<0.000010
	Quinoline (mg/L)	<0.00080 DLCI	<0.00020 DLCI	<0.000050	<0.000050	<0.000080 DLCI
	Surrogate: Acridine d9 (%)	98.3	88.6	81.4	75.6	86.7
	Surrogate: Chrysene d12 (%)	109.4	96.2	89.0	84.2	95.1
	Surrogate: Naphthalene d8 (%)	106.4	92.1	83.2	78.9	91.9
	Surrogate: Phenanthrene d10 (%)	109.0	101.0	94.2	88.9	99.9

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2162381-6 Water 11-SEP-18 BV-11BH-02M	L2162381-7 Water 11-SEP-18 BV-11BH-07M	L2162381-8 Water 11-SEP-18 BV-11BH-08M	L2162381-9 Water 11-SEP-18 MW07-8	L2162381-10 Water 11-SEP-18 MW18-1
WATER						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/L)	<0.0000050	<0.000010 DLCI	<0.0000050	<0.0000050	<0.0000050
	Fluoranthene (mg/L)	<0.000010	0.000117	<0.000010	<0.000010	<0.000010
	Fluorene (mg/L)	<0.000010	0.00106	<0.000010	<0.000010	<0.000010
	Indeno(1,2,3-c,d)pyrene (mg/L)	<0.000010	<0.000020 DLCI	<0.000010	<0.000010	<0.000010
	1-Methylnaphthalene (mg/L)	<0.000050	0.000421	<0.000050	<0.000050	<0.000050
	2-Methylnaphthalene (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Naphthalene (mg/L)	<0.000050	<0.00030 DLCI	<0.000050	<0.000050	<0.000050
	Phenanthrene (mg/L)	<0.000020	<0.00020 DLCI	<0.000020	<0.000020	<0.000020
	Pyrene (mg/L)	<0.000010	0.000247	<0.000010	<0.000010	<0.000010
	Quinoline (mg/L)	<0.000050	<0.00070 DLCI	<0.000050	<0.00020 DLCI	<0.000050
	Surrogate: Acridine d9 (%)	76.7	83.3	80.0	76.8	97.1
	Surrogate: Chrysene d12 (%)	80.4	96.6	86.6	80.3	113.0
	Surrogate: Naphthalene d8 (%)	77.4	95.1	75.3	72.8	104.8
	Surrogate: Phenanthrene d10 (%)	86.2	97.2	90.3	86.9	111.1

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L2162381-1, -2
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L2162381-1, -2
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Potassium (K)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2162381-1, -10, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L2162381-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLCI	Detection Limit Raised: Chromatographic Interference due to co-elution.
DLQ	Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EPH-ME-FID-VA	Water	EPH in Water	BC Lab Manual

EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. EPH results include PAHs and are therefore not equivalent to LEPH or HEPH.

EPH-SG-ME-FID-VA	Water	EPHsg in Water	BC Lab Manual

EPH is extracted from water using a hexane micro-extraction technique, with analysis by GC-FID, as per the BC Lab Manual. The BC Lab Manual method "Silica Gel Cleanup of Extractable Petroleum Hydrocarbons" (May 6, 2004) is applied to selectively remove naturally occurring organics. This analysis is sometimes also referred to as Total Petroleum Hydrocarbons.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

LEPH/HEPH-CALC-VA	Water	LEPHs and HEPHs	BC MOE LEPH/HEPH

LEPHw and HEPHw are measures of Light and Heavy Extractable Petroleum Hydrocarbons in water. Results are calculated by subtraction of applicable PAH concentrations from EPH10-19 and EPH19-32, as per the BC Lab Manual LEPH/HEPH calculation procedure.
LEPHw = EPH10-19 minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene.
HEPH = EPH19-32 minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

LEPH/HEPH-SG-CALC-VA	Water	LEPHw-sg & HEPHw-sg (Silica Gel Treated)	BC MOE LEPH/HEPH

LEPHw-sg and HEPHw-sg are measures of LEPHw and HEPHw (Light and Heavy Extractable Petroleum Hydrocarbons in Waters) after Silica Gel treatment, which may be used to remove suspected natural-source polar organic interferences. Results are calculated by subtraction of applicable PAH concentrations from EPH10-19-sg and EPH19-32-sg, as per the BC Lab Manual LEPH/HEPH calculation procedure.

LEPHw-sg = EPH10-19-sg minus Acenaphthene, Acridine, Anthracene, Fluorene, Naphthalene and Phenanthrene.

HEPHw-sg = EPH19-32-sg minus Benz(a)anthracene, Benzo(a)pyrene, Fluoranthene, and Pyrene.

MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

PAH-ME-MS-VA	Water	PAHs in Water	EPA 3511/8270D (mod)

Reference Information

PAHs are extracted from water using a hexane micro-extraction technique, with analysis by GC/MS. Because the two isomers cannot be readily separated chromatographically, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

VH-HSFID-VA	Water	VH in Water by Headspace GCFID	BC Env. Lab Manual (VH in Water)

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Compounds eluting between n-hexane and n-decane are measured and summed together using flame-ionization detection.

VH-SURR-FID-VA	Water	VH Surrogates for Waters	BC Env. Lab Manual (VH in Solids)
VOC7-HSMS-VA	Water	BTEX/MTBE/Styrene by Headspace GCMS	EPA 5021A/8260C

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA	Water	VOC7 and/or VOC Surrogates for Waters	EPA 5035A/5021A/8260C
VPH-CALC-VA	Water	VPH is VH minus select aromatics	BC MOE VPH

VPHw measures Volatile Petroleum Hydrocarbons in water. Results are calculated by subtraction of specific Monocyclic Aromatic Hydrocarbons from VH6-10, as per the BC Lab Manual VPH calculation procedure.
VPHw = VH6-10 minus Benzene, Toluene, Ethylbenzene, Xylenes, and Styrene

XYLENES-CALC-VA	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Calculation of Total Xylenes

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

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

17-717614 17-717615

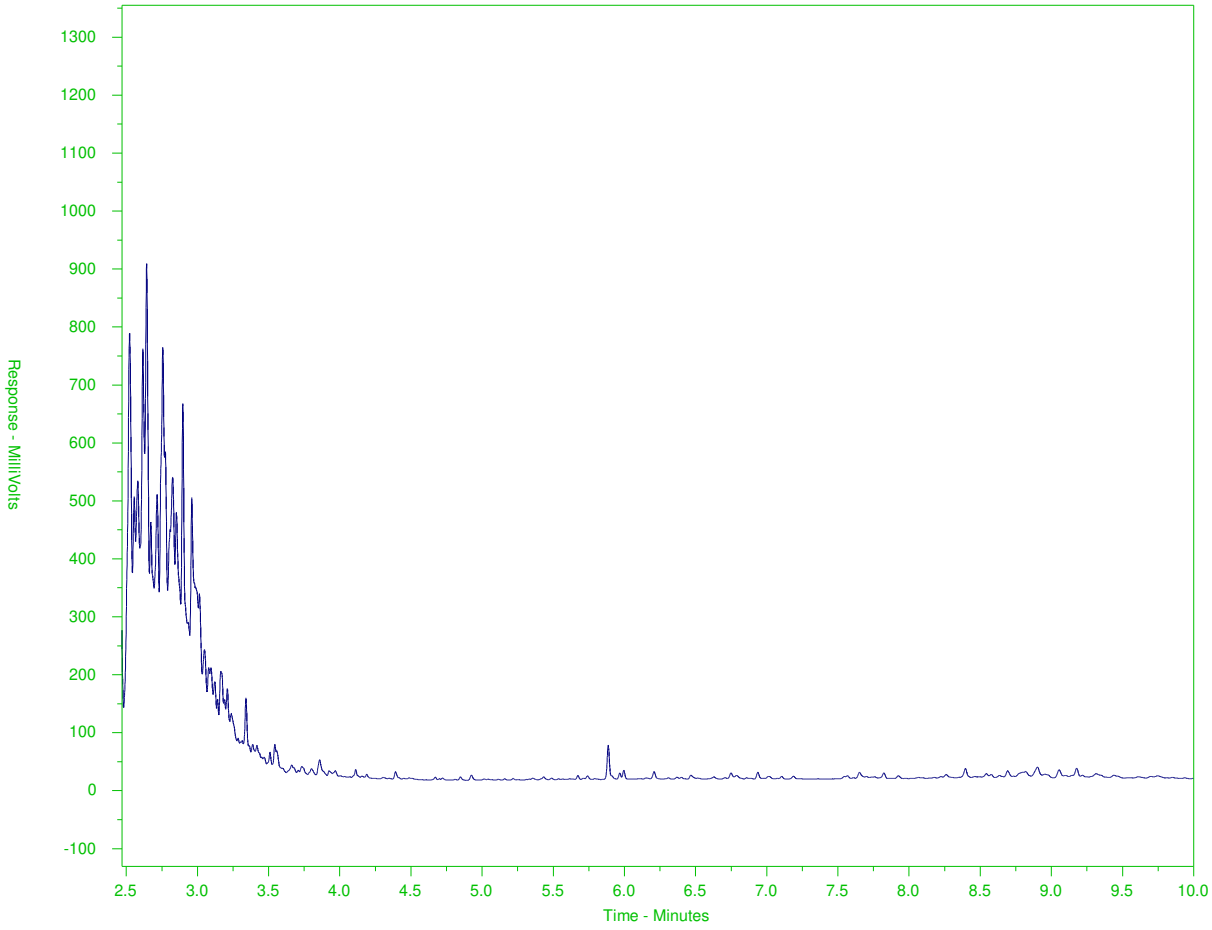
GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-1
Client Sample ID: MW06-2



← EPH10-19 →	← EPH19-32 →	
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

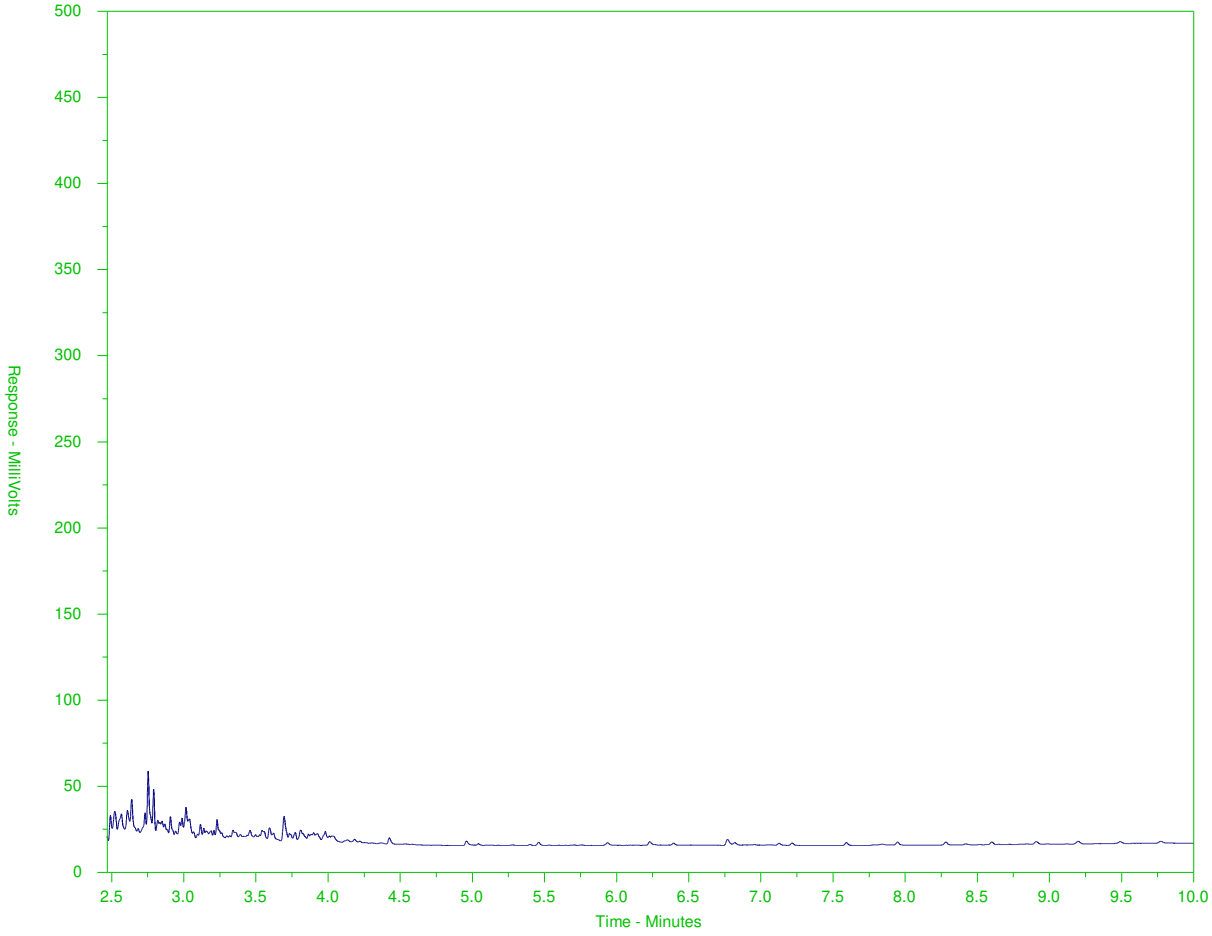
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-2
Client Sample ID: MW07-6



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

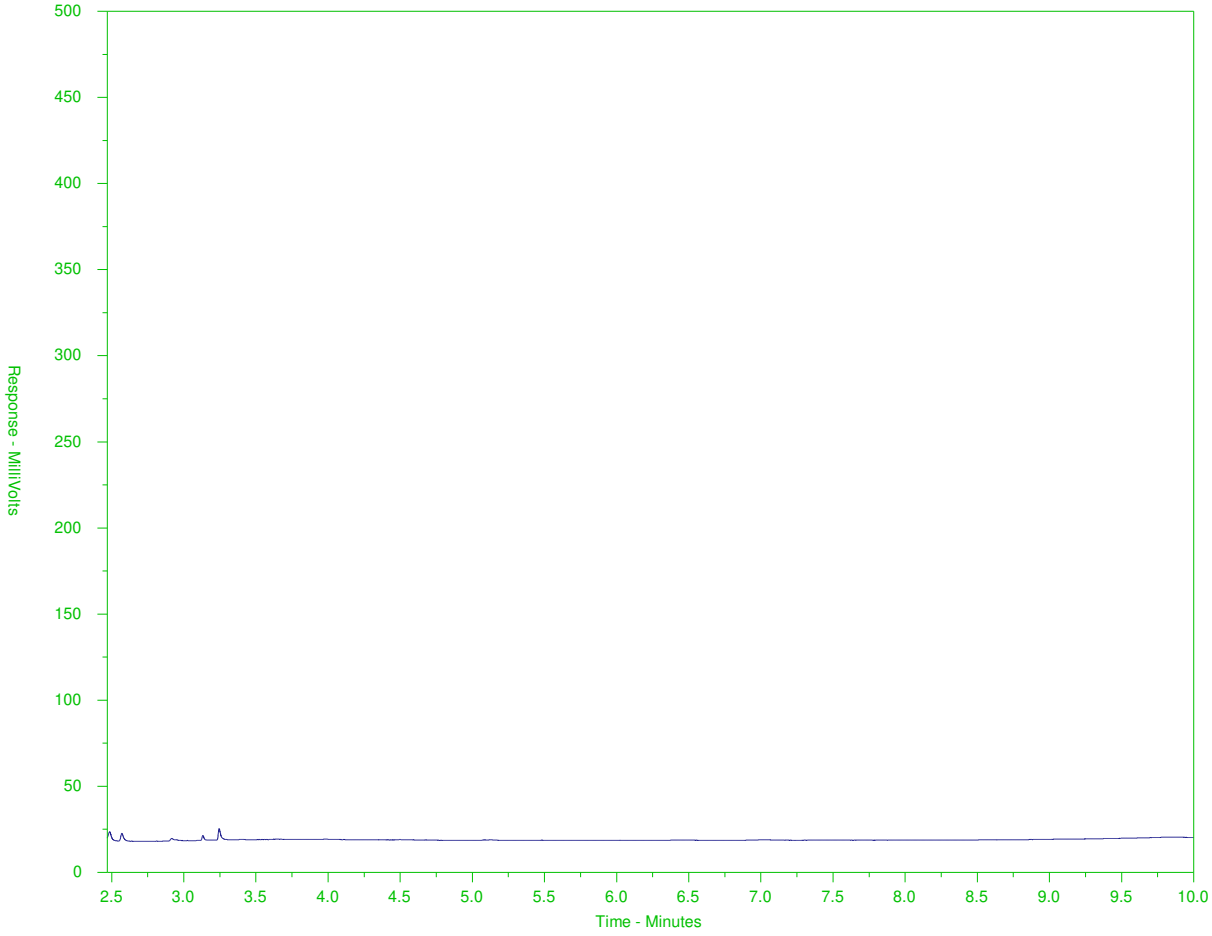
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-3
Client Sample ID: MW08-10



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

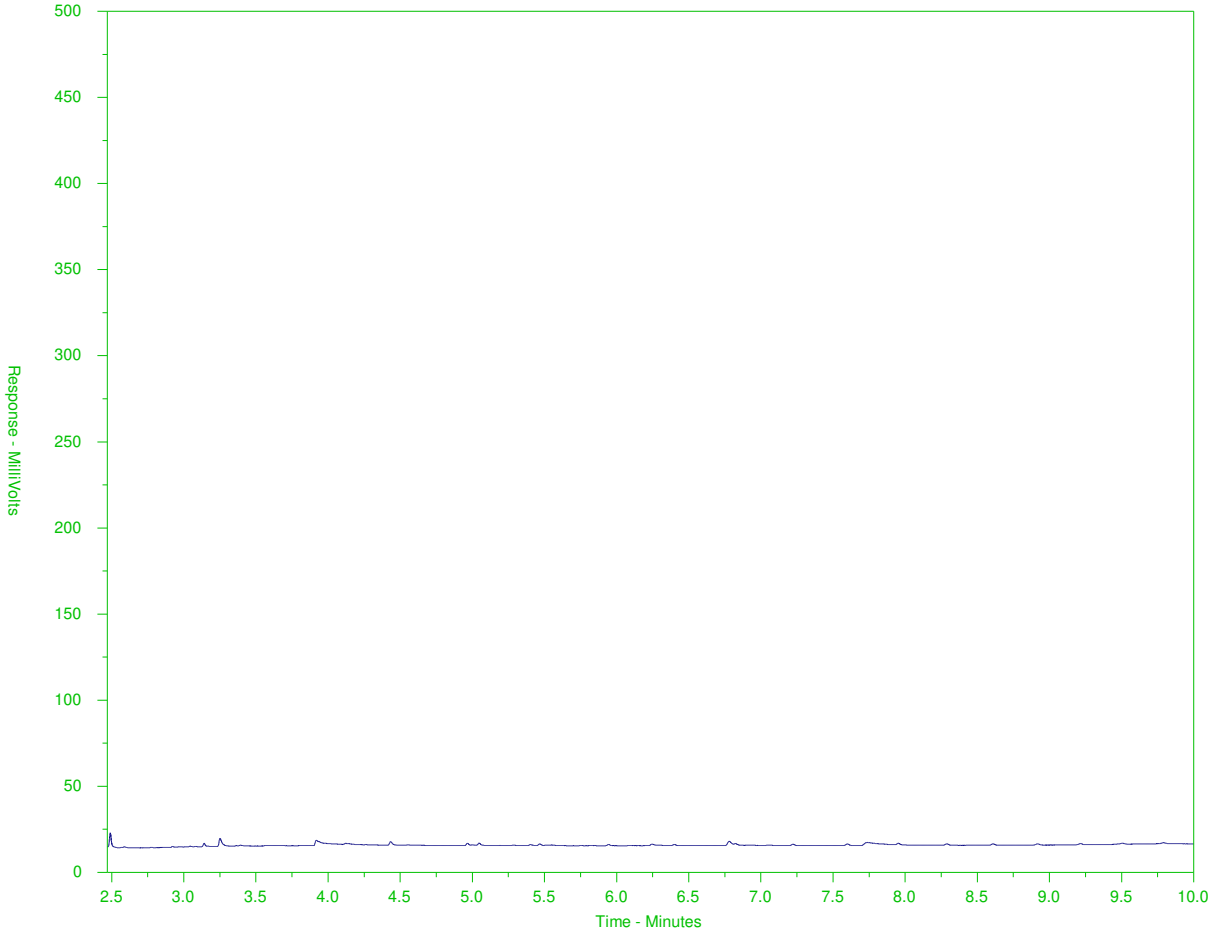
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-4
Client Sample ID: MW08-11



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

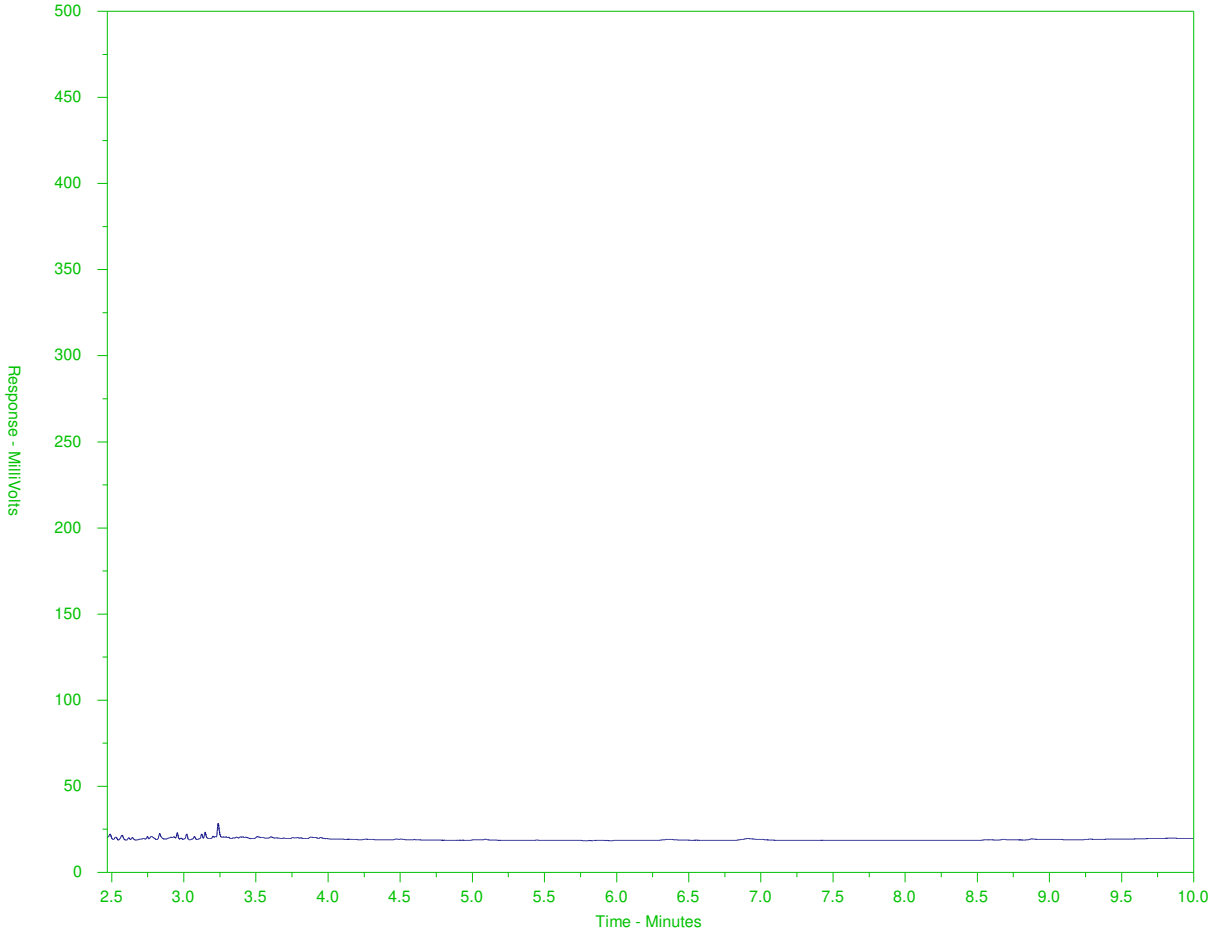
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-5
Client Sample ID: MW08-13



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

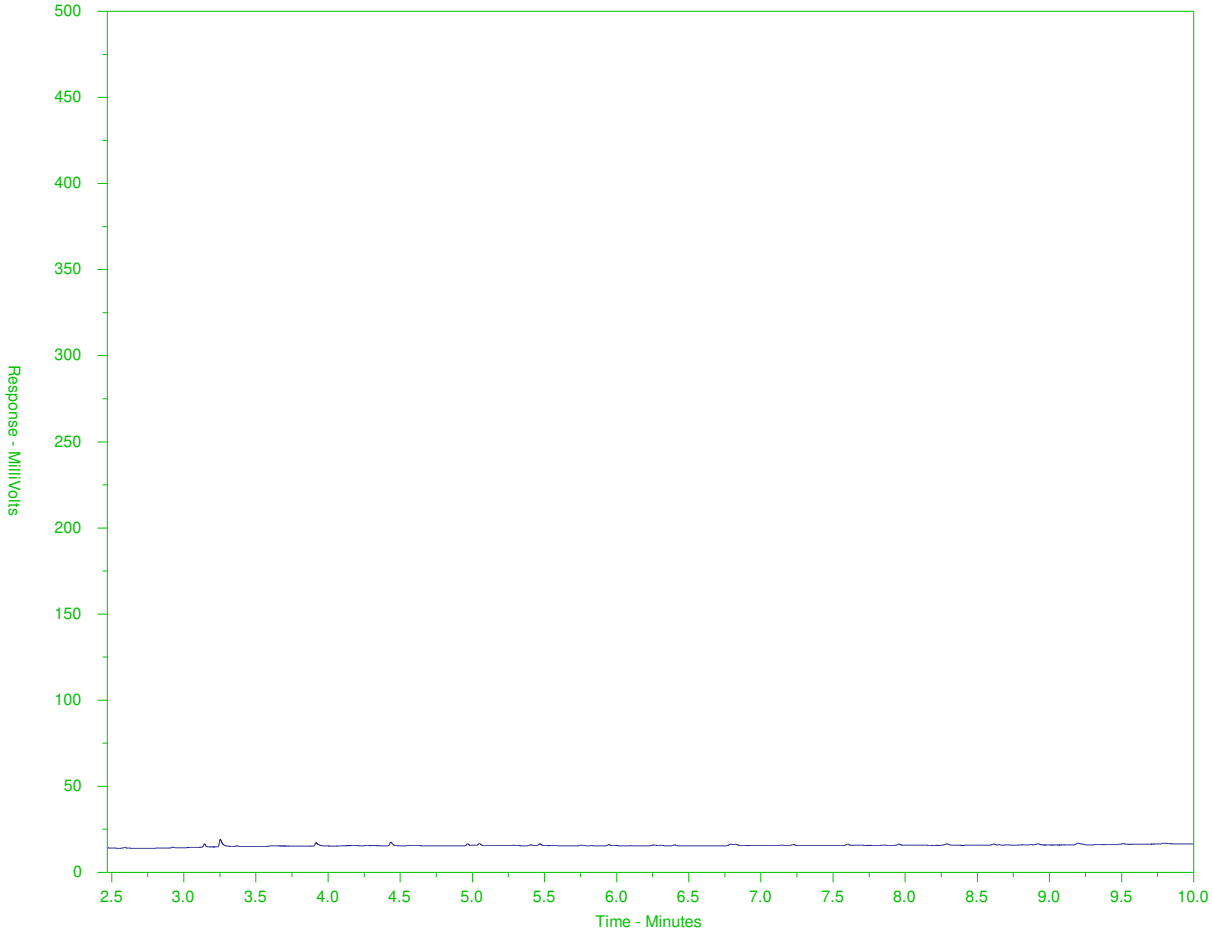
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-6
Client Sample ID: BV-11BH-02M



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

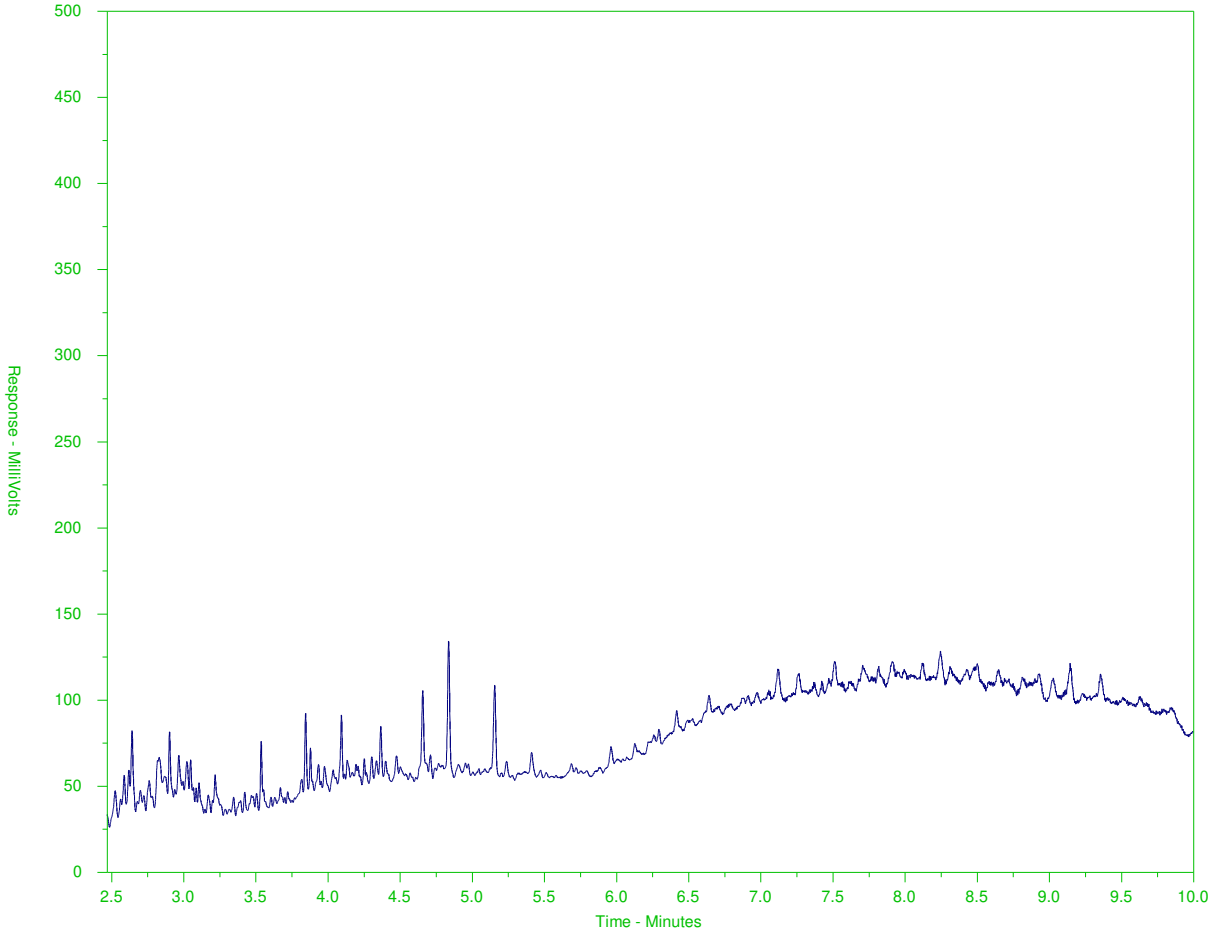
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-7
Client Sample ID: BV-11BH-07M



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

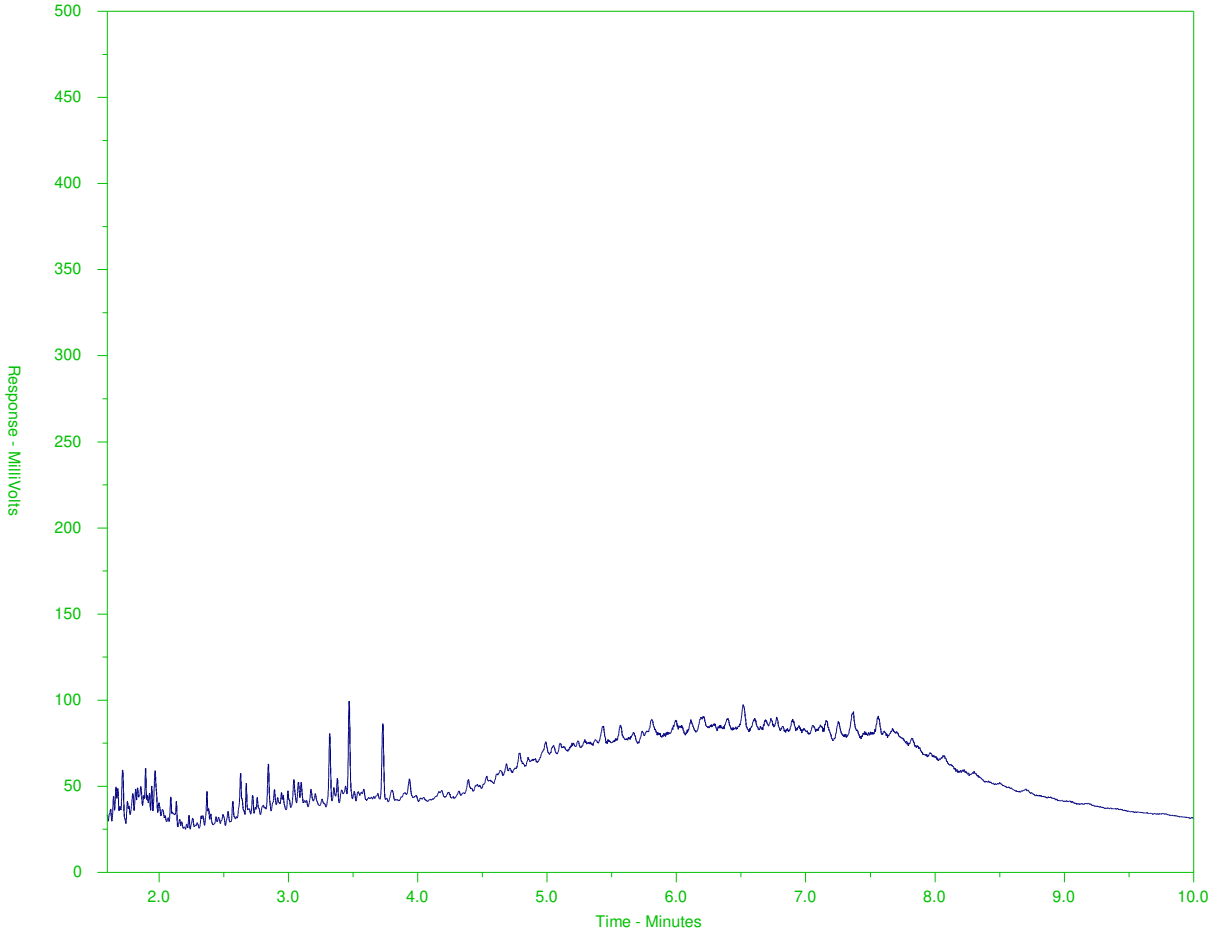
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-S-7
Client Sample ID: BV-11BH-07M



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

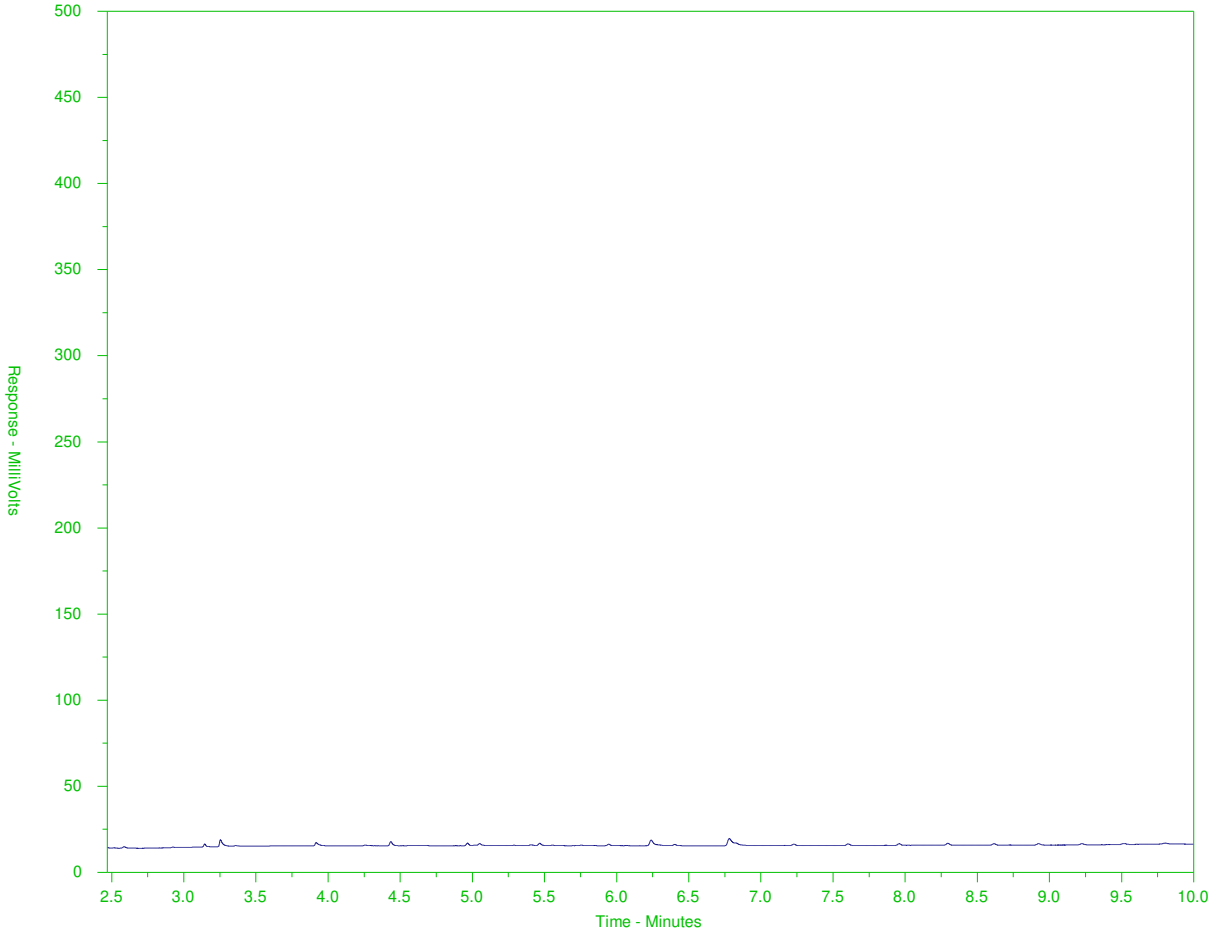
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-8
Client Sample ID: BV-11BH-08M



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

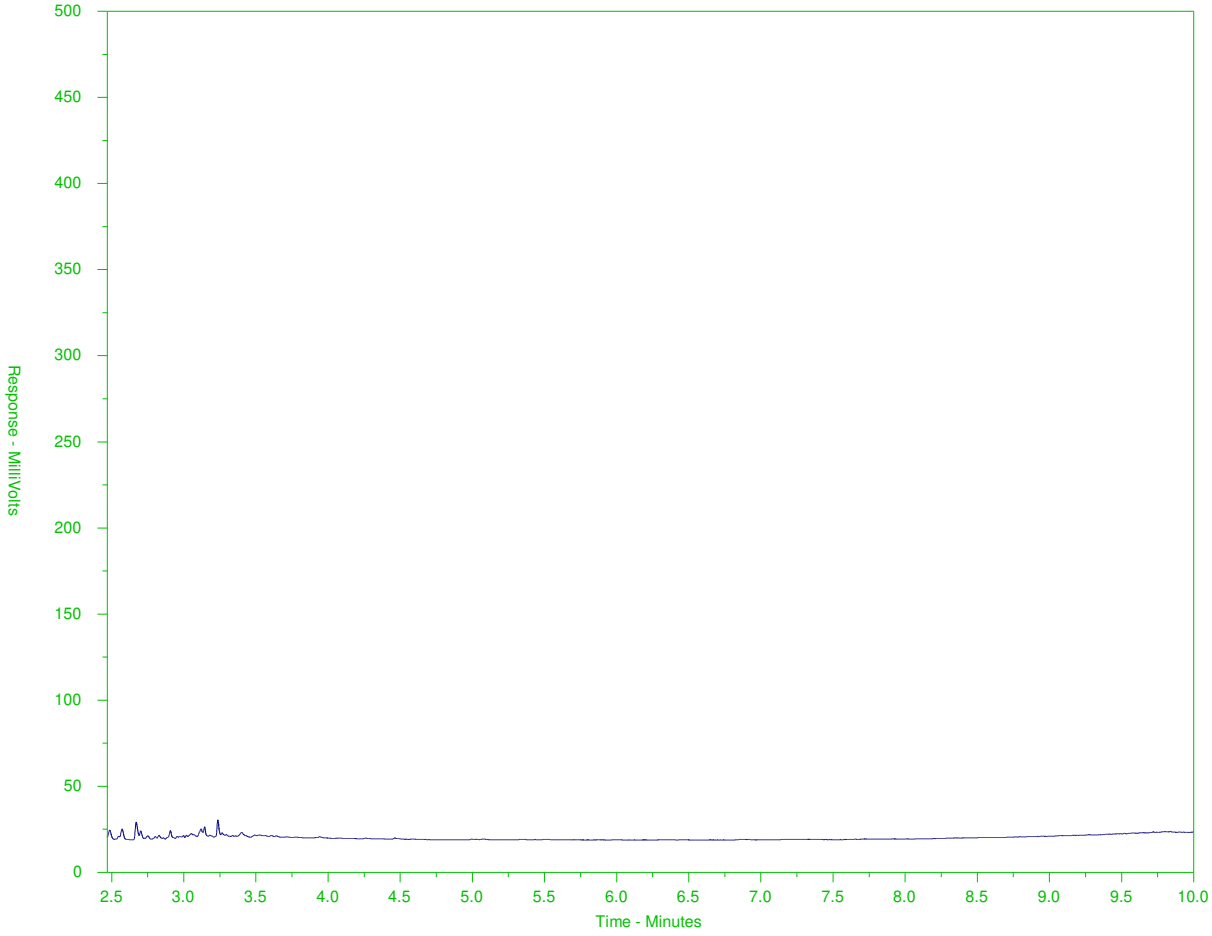
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-9
Client Sample ID: MW07-8



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

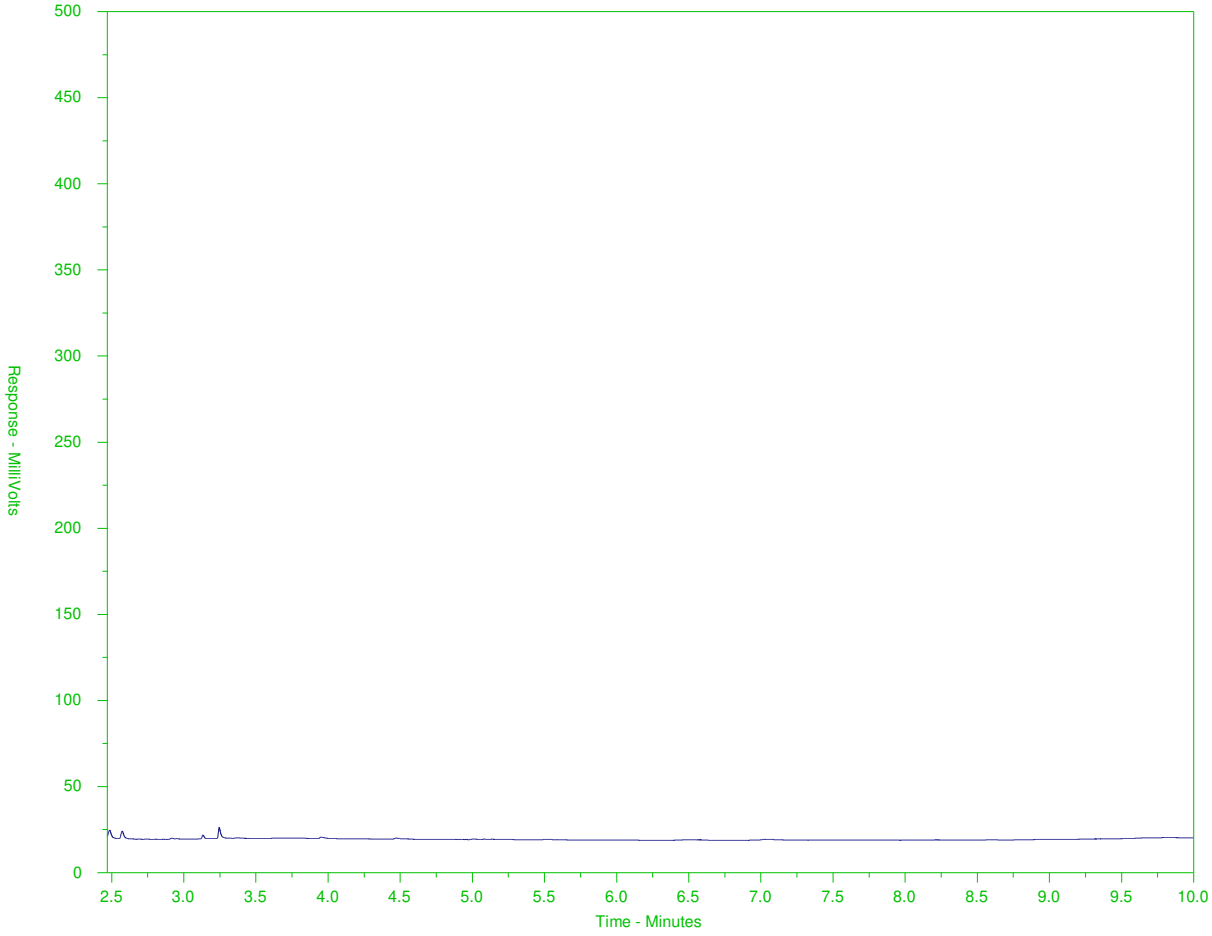
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

BC EPH HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L2162381-10
Client Sample ID: MW18-1



← EPH10-19 →		← EPH19-32 →
nC10	nC19	nC32
174°C	330°C	467°C
346°F	626°F	873°F
← Gasoline →	← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →		

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

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

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

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

Note: This chromatogram was produced using GC conditions that are specific to the ALS Canada EPH method. Refer to the ALS Canada EPH Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2162381-COFC

COC Number: 17 - 717614

Page 1 of 2

Report To	Contact and company name below will appear on the final report
Company:	Envirochem Services Inc
Contact:	Bryan Tsai
Phone:	778-952-9152
	Company address below will appear on the final report
Street:	#206 - 267 Esplanade W.
City/Province:	North Vancouver
Postal Code:	V7M 1A5
Invoice To	Same as Report To YES NO
	Copy of Invoice with Report YES NO
Company:	Envirochem Services Inc
Contact:	accounts.payable@envirochem.com

Report Format / Distribution

Select Report Format: PDF EXCEL EDD (DIGITAL)
Quality Control (QC) Report with Report YES NO
Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: EMAIL MAIL FAX
Email 1 or Fax: bryan.tsai@envirochem.com
Email 2:
Email 3:

Invoice Distribution

Select Invoice Distribution: EMAIL MAIL FAX
Email 1 or Fax: Celia Henslowe
Email 2: celia@envirochem.com

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] 3 day [P3-25%] 2 day [P2-50%]

EMERGENCY: 1 Business day [E-100%] Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)]

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

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:
Job #: 18089
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only):
ALS Contact: Dean Watt
Sampler: BT

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX / VPH	LEPH / HEPH / PAHs	LEPH / HEPH silica Gel	Dissolved Metals (F)	Dissolved Chromium 6 (F)	Total / Dissolved Solids	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW06-2	11-09-18		Water	X	X		X	X	X			8
	MW07-6				X	X		X	X	X			8
	MW08-10				X	X		X	X	X			8
	MW08-11				X	X		X	X	X			8
	MW08-13				X	X		X	X	X			8
	BV-11BH-02M				X	X		X	X	X			8
	BV-11BH-07M				X	X	X	X	X	X			8
	BV-11BH-08M				X	X		X	X	X			8
	MW-07-8				X	X		X	X	X			8
	~~BV-11BH-01M~~				X	X		X	X	X			8
	~~BV-11BH-03M~~				X	X		X	X	X			8
	~~BV-11BH-04M~~				X	X		X	X	X			8

Drinking Water (DW) Samples' (client use)

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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Please place ALL Cr6 Samples on hold

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen SIF Observations Yes No
Ice Packs Ice Cubes Custody seal intact Yes No
Cooling Initiated

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4.6	7.9	7.9	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
							Sept 11 2018	9:00 PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2162381-COFC

COC Number: 17 - 717615

Page 2 of 2

Report To	Contact and company name below will appear on the final report
Company:	Envirochem Services Inc
Contact:	Bryan Tsai
Phone:	778-952-9152
	Company address below will appear on the final report
Street:	#206-269 Esplanade W.
City/Province:	North Vancouver, BC
Postal Code:	V7M 1A5
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	Envirochem Services Inc
Contact:	Celia Meusloup

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL | | EDD (DIGITAL)
Quality Control (QC) Report with Report ☐ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL | | MAIL ☐ FAX
Email 1 or Fax: bryan.tsai@envirochem.com
Email 2:
Email 3:

Invoice Distribution

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: celia@envirochem.com
Email 2: accounts-payable@envirochem.com

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#:
Major/Minor Code: | Routing Code:
Requisitioner:
Location:

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E-100%] ☐ | Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] ☐

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

For tests that can not be performed according to the service level selected, you will be contacted.

Project Information

ALS Account # / Quote #:
Job #:
PO / AFE:
LSD:

ALS Lab Work Order # (lab use only):
ALS Contact:
Sampler:

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX / VPH	LEPH / HEPH / PAHs	LEPH / HEPH Silica Gel	Dissolved Metals	Dissolved Cr6+	Total Dissolved Solids	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	MW18-1	11-09-18		Water	X	X		X	X	X			8

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

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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Please place ALL Cr6 samples on hold.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations: Yes ☐ No ☐
Ice Packs ☑ Ice Cubes ☐ | Custody seal intact: Yes ☐ No ☐
Cooling Initiated ☑

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				4.6	7.9		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
							Sept 11 2018	9:01 AM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

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

APPENDIX E

Quality Assurance / Quality Control Results

TABLE Q1. ANALYTICAL QUALITY CONTROL RESULTS FOR GROUNDWATER SAMPLES

			Envirochem Sample ID	MW08-10	MW18-1	Relative Percent Difference
			Laboratory Sample ID	L2162381-3	L2162381-10	
			Laboratory	ALS	ALS	
			Date Sampled (dd-mmm-yy)	11-Sept-18	11-Sept-18	
Parameter	**Reportable Detection Limit**	**Units**			Duplicate of MW08-10	
Benzene	0.5	µg/L		<0.5	<0.5	-
Ethylbenzene	0.5	µg/L		<0.5	<0.5	-
Methyl tert-butyl ether (MTBE)	0.5	µg/L		<0.5	<0.5	-
Styrene	0.5	µg/L		<0.5	<0.5	-
Toluene	0.45	µg/L		<0.45	<0.45	-
Xylenes	0.75	µg/L		<0.75	<0.75	-
VHw6-10	100	µg/L		<100	<100	-
VPHw	100	µg/L		<100	<100	-
EPHw10-19	250	µg/L		<250	<250	-
EPHw19-32	250	µg/L		<250	<250	-
LEPHw	250	µg/L		<250	<250	-
HEPHw	250	µg/L		<250	<250	-
Acenaphthene	0.01	µg/L		0.021	0.025	17%
Acenaphthylene	0.01	µg/L		<0.01	<0.01	-
Acridine	0.01	µg/L		<0.01	<0.01	-
Anthracene	0.01	µg/L		<0.01	<0.01	-
Benz(a)anthracene	0.01	µg/L		<0.01	<0.01	-
Benzo(a)pyrene	0.005	µg/L		<0.005	<0.005	-
Benzo(b+j)fluoranthene	0.01	µg/L		<0.01	<0.01	-
Benzo(g,h,i)perylene	0.01	µg/L		<0.01	<0.01	-
Benzo(k)fluoranthene	0.01	µg/L		<0.01	<0.01	-
Chrysene	0.01	µg/L		<0.01	<0.01	-
Dibenz(a,h)anthracene	0.005	µg/L		<0.005	<0.005	-
Fluoranthene	0.01	µg/L		<0.01	<0.01	-
Fluorene	0.01	µg/L		<0.01	<0.01	-
Indeno(1,2,3-cd)pyrene	0.01	µg/L		<0.01	<0.01	-
1-Methylnaphthalene	0.05	µg/L		<0.05	<0.05	-
2-Methylnaphthalene	0.05	µg/L		<0.05	<0.05	-
Naphthalene	0.05	µg/L		<0.05	<0.05	-
Phenanthrene	0.02	µg/L		<0.02	<0.02	-
Pyrene	0.01	µg/L		<0.01	<0.01	-
Quinoline	0.05	µg/L		<0.05	<0.05	-
Hardness	0.5	mg/L		250	251	0%
Total Dissolved Solids	20	mg/L		292	317	8%
Alumnium (Al)	1	µg/L		3.3	2.7	20%
Antimony (Sb)	0.1	µg/L		<0.1	<0.1	-
Arsenic (As)	0.1	µg/L		6.73	7.08	5%
Barium (Ba)	0.1	µg/L		561	568	1%
Beryllium (Be)	0.05	µg/L		<0.05	<0.05	-
Boron (B)	10	µg/L		93	92	1%
Cadmium (Cd)	0.005	µg/L		<0.005	<0.005	-
Calcium (Ca)	50	µg/L		56,400	56,200	0%
Chromium (Cr)	0.1	µg/L		0.39	0.42	7%
Cobalt (Co)	0.1	µg/L		0.11	0.10	10%
Copper (Cu)	0.2	µg/L		<0.20	<0.20	-
Iron (Fe)	10	µg/L		34,400	34,600	1%
Lead (Pb)	0.05	µg/L		<0.05	<0.05	-
Lithium (Li)	1	µg/L		3.3	3.4	3%
Magnesium (Mg)	100	µg/L		26,600	26,800	1%
Manganese (Mn)	0.1	µg/L		1,150	1,170	2%
Mercury (Inorganic Hg)	0.005	µg/L		<0.005	<0.005	-
Molybdenum (Mo)	0.05	µg/L		0.388	0.387	0%
Nickel (Ni)	0.5	µg/L		<0.50	<0.50	-
Phosphorus (P)	50	µg/L		260	264	2%
Potassium (K)	100	µg/L		4,430	4,540	2%
Selenium (Se)	0.05	µg/L		0.221	0.236	7%
Silicon (Si)	50	µg/L		16,700	16,500	1%
Silver (Ag)	0.01	µg/L		<0.01	<0.01	-
Sodium (Na)	50	µg/L		19,200	19,700	3%
Strontium (Sr)	0.2	µg/L		277	278	0%
Sulfur (S)	500	µg/L		1,680	1,840	9%
Thallium (Tl)	0.01	µg/L		<0.01	<0.01	-
Tin (Sn)	0.1	µg/L		<0.1	<0.1	-
Titanium (Ti)	0.3	µg/L		0.68	0.61	11%
Uranium (U)	0.01	µg/L		0.090	0.093	3%
Vanadium (V)	0.5	µg/L		0.54	0.56	4%
Zinc (Zn)	1	µg/L		<1	<1	-
Zirconium (Zr)	0.3	µg/L		<0.3	<0.3	-

Notes

Result	Exceeds Criteria RPD > 20%
Result	Exceeds Criteria RPD > 50%
	Exceeds Criteria but both values < 5 times RDL

APPENDIX F

Historical Borehole Logs

Log of Monitoring Well: MW07-6

Project Name/No: Brownsville Phase 2 / 405-003.04
Client: PMV
Date Drilled: August 15, 2007
Site Location: Surrey, BC

Drilling Company: Rocky Mountain Soil Sampling
Drilling Method: Solid Stem Augering
Logged by: CMI

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

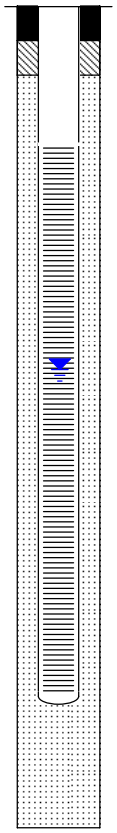
Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
			Ground Surface	99.50
			ASPHALT and GRAVEL FILL	0.00 / 99.35
0–3	0–1		**SAND** sand (medium to fine grained), trace silt, brown, loose, poorly graded, moist, no odour, no staining	0.15 / 98.59
3–12	1–3.66		**SILT** silt, trace sand (fine grained), trace clay, dark grey, medium stiff, poorly graded, moist to wet, PHC odour, no staining, peat observed at 0.96 m	0.91 / 95.84
			End of Log	3.66

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm	LEL %
MW07-6-1	N		55	
MW07-6-2	N		250	
MW07-6-3	N		395	
MW07-6-4	Y		405	
MW07-6-5	N		325	
MW07-6-6	N		460	
MW07-6-7	Y		500	

Vapour ppm: 0 250 500
LEL %: 0 50 100

Backfill details



Well location: MW07-6
Depth to water level (TOC): 1.623 m
Date of water level: August 15, 2007
Borehole diameter: 15 cm

Well casing diameter: 5 cm
Well casing material: PVC
Well screen slot size: 0.025 cm
Well screen interval (bgs): 0.61 to 3.05 m

Depth of well (TOC): 2.973 m
Well Elevation (TOC): 99.430 m
Ground Elevation: 99.500 m

Log of Monitoring Well: MW07-7

Project Name/No: Brownsville Phase 2 / 405-003.04

Client: PMV

Date Drilled: August 15, 2007

Site Location: Surrey, BC

Drilling Company: Rocky Mountain Soil Sampling

Drilling Method: Solid Stem Augering

Logged by: CMI

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
0	0		Ground Surface	99.41
0	0		**ASPHALT and GRAVEL FILL**	0.00 / 99.26
0–3	0–1		**SAND** sand (medium to fine grained), trace silt, brown, loose, poorly graded, moist, no odour, no staining	0.15
3–15	1–4		**SILT** silt, trace sand (fine grained), dark grey, firm, poorly graded, moist to wet, PHC odour, no staining, wood fragments observed from 0.91 and 1.52 m	98.50 / 0.91
15	4		End of Log	94.84 / 4.57

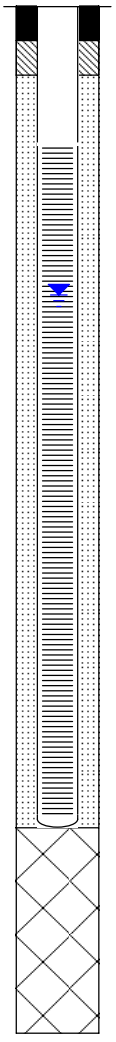
SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm	LEL %
MW07-7-1	N		250	
MW07-7-2	N		250	
MW07-7-3	N		400	
MW07-7-4	N		475	
MW07-7-5	Y		500	
MW07-7-6	N		425	
MW07-7-7	N		295	
MW07-7-8	N		150	
MW07-7-9	Y		150	

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: MW07-7

Depth to water level (TOC): 1.284 m

Date of water level: August 15, 2007

Borehole diameter: 15 cm

Well casing diameter: 5 cm

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 0.61 to 3.66 m

Depth of well (TOC): 3.519 m

Well Elevation (TOC): 99.350 m

Ground Elevation: 99.410 m

Log of Monitoring Well: MW07-8

Project Name/No: Brownsville Phase 2 / 405-003.04

Client: PMV

Date Drilled: August 15, 2007

Site Location: Surrey, BC

Drilling Company: Rocky Mountain Soil Sampling

Drilling Method: Solid Stem Augering

Logged by: CMI

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

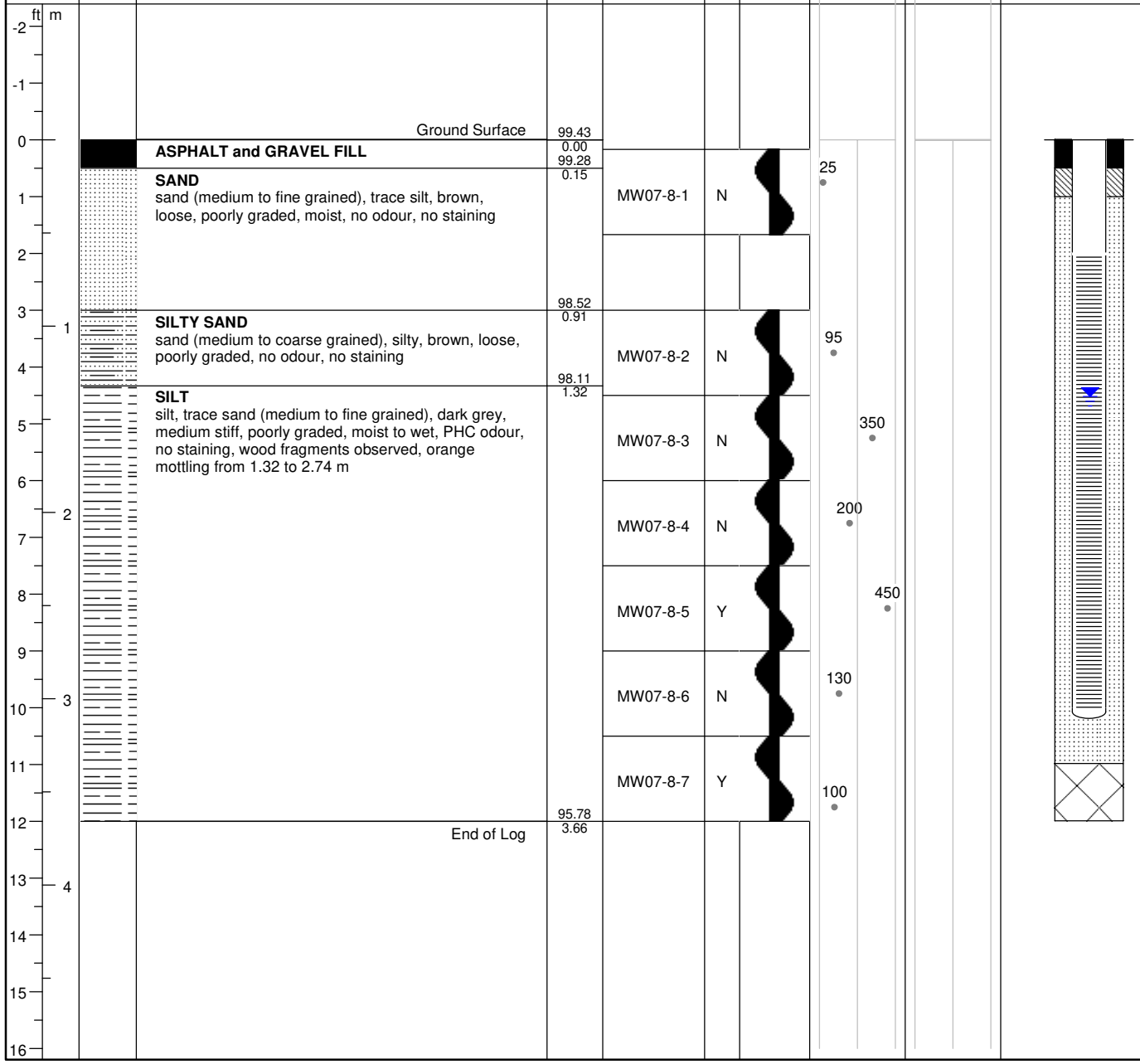
Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
0	0		Ground Surface	99.43
			ASPHALT and GRAVEL FILL	0.00 / 99.28
1			**SAND** sand (medium to fine grained), trace silt, brown, loose, poorly graded, moist, no odour, no staining	0.15
3	1		**SILTY SAND** sand (medium to coarse grained), silty, brown, loose, poorly graded, no odour, no staining	0.91 / 98.52
4			**SILT** silt, trace sand (medium to fine grained), dark grey, medium stiff, poorly graded, moist to wet, PHC odour, no staining, wood fragments observed, orange mottling from 1.32 to 2.74 m	1.32 / 98.11
12	3.66		End of Log	95.78

SAMPLE

Sample ID	Analysed Y,N	Sample Type
MW07-8-1	N	
MW07-8-2	N	
MW07-8-3	N	
MW07-8-4	N	
MW07-8-5	Y	
MW07-8-6	N	
MW07-8-7	Y	

Vapour ppm (0 250 500)

LEL % (0 50 100)



Backfill details

Well location: MW07-8

Depth to water level (TOC): 1.379 m

Date of water level: August 15, 2007

Borehole diameter: 15 cm

Well casing diameter: 5 cm

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 0.61 to 3.05 m

Depth of well (TOC): 3.014 m

Well Elevation (TOC): 99.433 m

Ground Elevation: 99.500 m

Log of Monitoring Well: MW07-9

Project Name/No: Brownsville Phase 2 / 405-003.04

Client: PMV

Date Drilled: August 15, 2007

Site Location: Surrey, BC

Drilling Company: Rocky Mountain Soil Sampling

Drilling Method: Pionjar

Logged by: CMI

HEMMERA

Sheet: 1 of 1

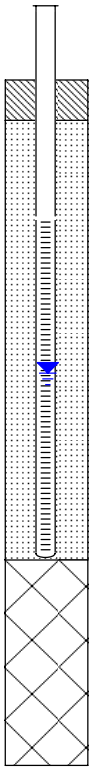
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
			Ground Surface	98.52
0	0		**SAND** sand (medium to coarse grained), brown, loose, poorly graded, moist, no odour, no staining, cobbles and roots at surface	0.00
4	1			
				96.81
6	2		**SILT** silt, trace sand (medium to fine grained), dark grey, firm, poorly graded, moist to wet, no odour, no staining, wood fragments observed from 1.83 to 2.23 m	1.70
				96.23
8	3		**SANDY SILT** sand (fine to coarse grained), dark grey, firm, wet, no odour, no staining, wood fragments observed from 2.8 to 3.0 m	2.29
				94.86
12	4		End of Log	3.66
16				

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW07-9-1	N		65	
MW07-9-2	N		100	
MW07-9-3	Y		150	
MW07-9-4	N		80	
MW07-9-5	Y		200	

Backfill details



Well location: MW07-9

Depth to water level (TOC): 1.300 m

Date of water level: August 15, 2007

Borehole diameter: 5 cm

Well casing diameter: 2.5 cm

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 0.61 to 2.13 m

Depth of well (TOC): 2.232 m

Well Elevation (TOC): 98.515

Ground Elevation: 98.515

Log of Monitoring Well: MW08-10

Project Name/No: Brownsville Phase 2 / 405-003.04
Client: PMV
Date Drilled: September 16, 2008
Site Location: Surrey, BC

Drilling Company: Beck Drilling
Drilling Method: Solid Stem Augering
Logged by: AN

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE			SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
		Ground Surface	99.43						
0		**ASPHALT and GRAVEL FILL**	0.00 99.28						
1		**SAND** sand (medium to fine grained), trace silt, yellowish brown, medium dense, homogeneous, dry to moist, no odour, no staining, black mottling at 0.45 m	0.15	MW08-10-1	N		25		
2									
3									
4				MW08-10-2	N		30		
5									
6			97.60						
7		**SAND** sand (medium to fine grained), trace silt, dark grey, medium dense, homogeneous, moist to wet, no odour, no staining, wood fragments observed at 2.6 m	1.83						
8				MW08-10-3	Y		60		
9			96.54						
10		**SILT** silt, some sand (medium to fine grained), dark grey, soft, homogeneous, wet, no odour, no staining	2.90	MW08-10-4	Y		50		
11									
12									
13									
14									
15			94.86						
16		End of Log	4.57						

Well location: MW08-10
Depth to water level (TOC): 2.063 m
Date of water level: September 22, 2008
Borehole diameter: 15 cm

Well casing diameter: 5 cm
Well casing material: PVC
Well screen slot size: 0.025 cm
Well screen interval (bgs): 0.91 to 3.96 m

Depth of well (TOC): 4.57 m
Well Elevation (TOC): 99.330 m
Ground Elevation: 99.467 m

Log of Monitoring Well: MW08-11

Project Name/No: Brownsville Phase 2 / 405-003.04

Client: PMV

Date Drilled: September 16, 2008

Site Location: Surrey, BC

Drilling Company: Beck Drilling

Drilling Method: Hollow/Solid Stem Augering

Logged by: AN

HEMMERA

Sheet: 1 of 1

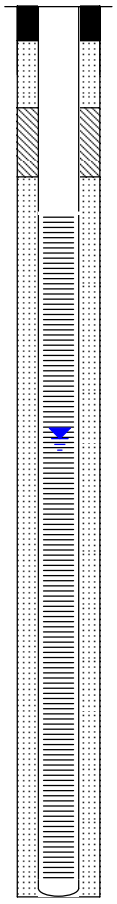
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
0			Ground Surface	99.45
0			**ASPHALT and GRAVEL FILL**	0.00 99.30
1			**SAND** sand (medium to fine grained), trace silt, yellowish brown, medium dense, homogeneous, dry to moist, no odour, no staining	0.15
3	1		**SAND** sand (medium to fine grained), trace silt, dark grey, medium dense, homogeneous, moist to wet, no odour, no staining, wood fragments and peat observed from 2.6 to 3.05 m	98.53 0.91
9	2		**SILT** silt, some sand (medium to fine grained), dark grey, soft, homogeneous, wet, no odour, no staining	96.71 2.74
13	4		End of Log	95.49 3.96

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW08-11-1	N		10	
MW08-11-2	Y		50	
MW08-11-3	N		50	
MW08-11-4	Y		30	

Backfill details



Well location: MW08-11

Depth to water level (TOC): 1.926 m

Date of water level: September 22, 2008

Borehole diameter: 15 cm

Well casing diameter: 5 cm

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 0.91 to 3.96 m

Depth of well (TOC): 3.96 m

Well Elevation (TOC): 99.394 m

Ground Elevation: 99.449 m

Log of Borehole: BH08-12

Project Name/No: Brownsville Phase 2 / 405-003.04

Client: PMV

Date Drilled: September 16, 2008

Site Location: Surrey, BC

Logged by: AN

Drilling Method: Solid Stem Augering

Drilling Company: Beck Drilling

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
		Ground Surface	99.51						
		ASPHALT and GRAVEL FILL	0.00 99.36						
		SAND sand (medium to fine grained), trace silt, yellowish brown, medium dense, homogeneous, dry to moist, no odour, no staining	0.15	BH08-12-1	N		25		
			98.60						
1		**SAND** sand (medium to fine grained), trace silt, dark grey, medium dense, homogeneous, moist, PHC odour, black staining at 0.9 m	0.91	BH08-12-2	N			5.0	
				BH08-12-3	Y			10.0	
			97.83						
2		**SILT** silt, some sand (medium to fine grained), dark grey, soft, homogeneous, moist to wet, PHC odour, no staining, wood fragments at 1.8 to 2.4 m	1.68	BH08-12-4	Y			5.0	
3			96.46						
		End of Log	3.05						
4									

Borehole location: BH08-12

Borehole ground elevation: 99.510 m

Borehole diameter: 15 cm

Borehole depth: 3.05 m

Log of Monitoring Well: MW08-13

Project Name/No: Brownsville Phase 2 / 405-003.04
Client: PMV
Date Drilled: September 16, 2008
Site Location: Surrey, BC

Drilling Company: Beck Drilling
Drilling Method: Solid Stem Augering
Logged by: AN

HEMMERA

Sheet: 1 of 1

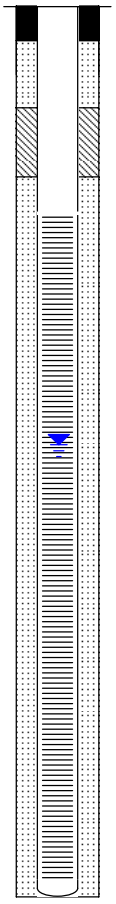
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	99.57
0		**ASPHALT and GRAVEL FILL**	0.00 / 99.42
1		**SAND** sand (medium to fine grained), trace silt, trace gravel, yellowish brown, medium dense, homogeneous, dry to moist, no odour, no staining	0.15 / 98.66
3 / 1		**SAND** sand (medium to fine grained), trace silt, trace gravel, dark grey, medium dense, poorly graded, moist to wet, no odour, no staining	0.91 / 97.74
6 / 2		**SILT** silt, some sand (medium to fine grained), dark grey, soft, homogeneous, wet, no odour, no staining, peat observed at 1.85 m	1.83 / 95.61
13 / 4		End of Log	3.96

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
MW08-13-1	N		20	
MW08-13-2	Y		140	
MW08-13-3	N		80	
MW08-13-4	Y		35	
MW08-13-5	Y		30	

Backfill details



Well location: MW08-13
Depth to water level (TOC): 1.952 m
Date of water level: September 22, 2008
Borehole diameter: 15 cm

Well casing diameter: 5 cm
Well casing material: PVC
Well screen slot size: 0.025 cm
Well screen interval (bgs): 0.91 to 3.96 m

Depth of well (TOC): 3.96 m
Well Elevation (TOC): 99.520 m
Ground Elevation: 99.572 m

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Borehole Log: BV-11BH-07M

Project No: 2090-1103

Project: Mountainview Reload and Brownsville Site

Client: Port Metro Vancouver

Apec: 21 ***Logged By: AS***

SUBSURFACE PROFILE

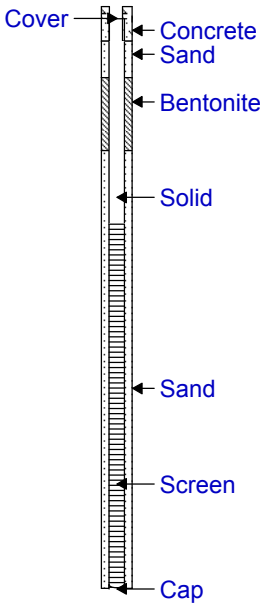
Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev.
0	0		Ground Surface	0.0
0–5	0–1.5		***Medium Sand*** trace gravel, grey, loose, dry to moist, slight hydrocarbon odour	1.5
5–6.5	1.5–2.0		***Silty Sand*** trace wood debris, dark grey, medium dense, wet	2.0
6.5–10	2.0–3.0		***Wood Fragments***	3.0
10–13	3.0–4.0		***Silt*** grey, medium dense, moist to wet	4.0
13	4		End of Borehole	

SAMPLE

Sample No.	Duplicate	Type	Vapour ppm
1		G	40
2	BV-DUP8	G	55
3		G	35
4		G	
5		G	15

Vapour ppm: 200 600 1000 1400 1800

Well Completion Details



Drilled By: Rocky Mountain Soil Sampling

Drill Method: Solid Stem Auger

Drill Date: December 17, 2011

Hole Diameter: 6"

Well Diameter: 2"

Sheet: 1 of 1

Supplemental Site Investigation
Surrey Brownsville Site (Lots 2, 3, 4, 5, 6)
Surrey, BC

June 2013
Project #: 2090-1103

Prepared for:
Vancouver Fraser Port Authority
100 The Pointe, 999 Canada Place
Vancouver, BC V6C 3T4

FRANZ ENVIRONMENTAL INC.
• CONSULTING • ENGINEERING • TECHNOLOGIES •

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SUPPLEMENTAL SITE INVESTIGATION

SURREY BROWNSVILLE SITE (LOTS 2, 3, 4, 5, 6)
SURREY, BC

Prepared for:
Vancouver Fraser Port Authority
100 The Pointe, 999 Canada Place
Vancouver, BC V6C 3T4

Prepared by:
Franz Environmental Inc.
308 -1080 Mainland Street
Vancouver, BC V6B 2T4

Project No. 2090-1103
June 2013

EXECUTIVE SUMMARY

The following represent key localized or site wide areas of environmental concern (AECs) identified at the Surrey Brownsville Site (Lots 2,3,4,5 and 6) through FRANZ's 2011 Supplemental Site Investigation (SSI). These issues will be carried forward and evaluated with respect to risks to receptors in a subsequent human health and ecological risk assessment. Long term management or remedial options will be prepared for the Site based on the outcomes of the risk assessment.

Site or Area Wide Issues

- **Groundwater Metals** - Concentrations of multiple metals (aluminum, arsenic, antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, titanium, zinc) in groundwater exceed federal Guidelines in monitoring wells across the Site. Groundwater also exceeds provincial Standards/ Guidelines for various metals (aluminum, arsenic, antimony, barium, cadmium, chromium, iron, lead, manganese, nickel, zinc) including at upgradient Site boundaries. Metals exceedances have been identified offsite and the impact area remains undelineated and is expected area wide including on neighboring properties. With metal impacts identified in near shore wells, further characterization of groundwater and surface water interaction at the Fraser River is recommended.
- **Soil PAHs** – PAH parameters (index of additive cancer risk (IACR), naphthalene and phenanthrene) exceed federal soil Guidelines in numerous localized areas across the Site. These low level PAH impacts are expected to be present site-wide and are generally limited to the sandy fill/upper silt intervals (0-4m bgs). Soil from one tested offsite location north of B-Mill (Lot 5) also exceeds federal guidelines for PAHs (naphthalene, phenanthrene, acenapthene, fluorene and IACR) however this offsite PAH impact may not be originating from onsite sources. Tested onsite and offsite soil does not exceed provincial soil Standards for PAHs.

Localized Issues by Lot

Lots 2 and 4

- **Soil Metals** - Soil exceeding federal Guidelines for various metals (chromium, copper, cadmium, nickel, zinc, antimony, arsenic) is present in the area north and west of the tannery on Lot 4 (impact area of 1.6 ha) and at depths of 0.6-4.6 m bgs, for a potential volume estimate of 64,000 m^3. Onsite soil also exceeds provincial metal Standards (antimony, arsenic, cadmium, chromium, copper, lead, zinc). Soil metals (chromium) exceeding federal and provincial Guidelines/Standards were confirmed southwest of Lots 2 and 4 (offsite) and remain to be horizontally or vertically delineated. Chromium concentrations in soil southwest of Lots 2/4 are expected to be reflective of the previous industrial use of the southwest properties, and not necessarily indicative of offsite migration.

- **Groundwater MAHs and VOCs -** Groundwater exceeds current federal Guidelines for toluene and benzene in one near shore well (100m^2) in Lot 2. Chlorobenzene and toluene concentrations in this well also exceed provincial water quality guidelines. Based on current groundwater data in the area, it is likely that these exceedances are from historical point sources and are no longer present onsite.

- **Groundwater PAHs** - Pyrene concentrations in one nearshore well in Lot 2 exceeds federal and provincial Guidelines. Low level PAH concentrations in soil are anticipated to be widespread across the Site and there remains a potential for low level PAH concentrations to be present in groundwater site-wide. Given that this well is within 10m of the surface water environment, there remains a potential for migration to the Fraser River. Re-sampling MW2-30 is recommended to verify this result in near shore groundwater.

- **Groundwater Chlorophenols** – Groundwater pentachlorophenol and 2,3,4,6-tetrachlorophenol concentrations exceed federal guidelines in one well at Lot 4, for an 1000m^2 impact area. Groundwater at this location also exceeds provincial Standards for Pentachlorophenol and 2,4,5-trichlorophenol. Chlorophenol impacts are not expected to be migrating off the Lot 2/4 area.

Lot 3

- **Soil Metals –** Soil exceeds federal Guidelines for metals (arsenic, copper, zinc) in one location in the Lot 3 road ditch adjacent to Dyke Road (estimated 10m^2 impact area). Road ditch soil also exceeds provincial Standards for metals (arsenic, copper, and/or zinc) for estimated impact areas of approximately 10m^2 around two road ditch hotspots. Localized hotspots (estimated 10m^2 for each) for metals (chromium, lead and/or zinc) exceeding provincial Standards were identified around the septic AST (APEC 8), former lumber storage area (APEC 9) and former kiln (APEC 19) in Lot 3. Soil southwest of Lot 3 exceeds provincial Standards for lead (Pb). This lead impact has not been fully delineated, and may be reflective of the previous industrial use of the southwestern properties.

- **Soil EPH (C19-32) and HEPH in Soil –** Soil exceeds provincial Standards for EPH(C19-32) and HEPH to depths of 1.5 m bgs in one 100m^2 road ditch area downgradient of the mineral oil and grease spill (APEC 16), and one 500m^2 area onsite and upgradient of APEC 16. These areas potentially represent a volume of 900 m^3 of EPH (C19-32) /HEPH impacted soil in Lot 3. Given the proximity of the impacts to the Site boundary, further investigation is recommended in the area of MV-11BH-07M to delineate HEPH impacts around the Site boundary.

- **Soil Chlorophenols –** Soil exceeds provincial Standards for pentachlorophenol in one location in the A-Mill (APEC 7) footprint of Lot 3. For estimation purposes this impact is assumed to have a 10m^2 area.

- **Groundwater Phenols/Chlorophenols –** Groundwater concentrations of phenols and chlorophenols (Pentachlorophenol, 2,3,4,6-tetrachlorophenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6- trichlorophenol, and phenol) exceed federal guidelines in wells at and south of the A- Mill footprint (APECs 7 and 9) for a plume of approximate 3000-5000 m^2 area. Groundwater in this impact area also exceeds provincial phenol and chlorophenol Standards (pentachlorophenol, 2,3,4,6-tetrachlorophenol, and total tetrachlorophenols, 2,4,6- trichlorophenol, 2,4,5-trichlorophenol, phenol, 2-methyl 4,6-dinitrophenol, 2,3,4,5-tetrachlorophenol, 3,4,5-trichlorophenol, and total trichlorophenols).

Lot 5

- **Soil Xylenes/ EPH (C10-19)/ VPH/ Toluene -** Soil on the north side of the B-Mill footprint (APEC 14) and downgradient of the waste oil AST and gasoline UST (APECs 10 and 11) exceeds federal Guidelines for xylenes, and provincial Standards for xylenes, EPH(C10-19) and VPH. The onsite impact area is estimated to be 400m^2, for an approximate impacted soil volume of 600 m^3. Soil from two offsite locations adjacent to Lot 5, exceed federal Guidelines for toluene but are compliant with applicable provincial Standards. Offsite toluene concentrations are not expected be originating from Site operations.
- **Soil Chlorophenols –** Soil on the north side of the B-Mill footprint (APEC 14) exceeds federal guidelines for pentachlorophenol and 2, 3, 4, 6-tetrachlorophenol. Concentrations of 2, 3, 4, 6-tetrachlorophenol also exceed provincial soil Standards. The identified impact area is approximately 400 m^2 and likely does not extend off Site.
- **Soil Metals** – Zinc concentrations exceeding federal and provincial Guidelines/Standards were identified in offsite soil (0.5-1 m bgs) adjacent to the Lot 5 boundary. The zinc impact has not been fully delineated on the offsite property and is unlikely to be originating from onsite operations.
- **Groundwater MAHs –** Groundwater concentrations of ethylbenzene exceeds federal and provincial Guidelines in a 250 m^2 impact area adjacent to the AST and UST (APECs 10 and 11) in Lot 5. Impacted groundwater is not anticipated to extend offsite.
- **Groundwater LEPH** - LEPH concentrations in groundwater exceed provincial groundwater Standards in the area at and downgradient of the AST and UST (APECs 10 and 11) in Lot 5. The plume remains to be delineated offsite, but extends across the Site boundary and is expected to cover an area of approximately 900m^2. Further work is recommended to delineate the LEPH plume offsite.
- **Groundwater PAHs -** Groundwater in Lot 5 exceeds federal and provincial Guidelines/Standards for naphthalene at and downgradient of the Lot 5 AST/UST (APECs 10 and 11) for an onsite impact area of approximately 1,000 m^2. Benzo(a)pyrene, fluoranthene and pyrene concentrations in groundwater from one offsite well adjacent to the Lot 5 boundary exceeded

federal Guidelines, with concentrations of benzo[a]pyrene also exceeding provincial Standards. Offsite impacts are not fully delineated but are unlikely to be originating from Site operations.

- **Groundwater Chlorophenols -** Cholorophenol concentrations in groundwater exceed federal Guidelines at three areas in Lot 5: **(1)** the B-Mill footprint (for pentachlorophenol, 2,3,4,6-tetrachlorophenol, and 2,4,6-trichlorophenol) for an approximate 1500m^2 impact area that does not appear to extend offsite. Concentrations of chlorophenols (pentachlorophenol, tetrachlorophenols (2,3,4,5; 2,3,4,6; and 2,3,5,6, isomers) and trichloropenols (2,3,4-; 2,3,5-; 2,4,5-; 2,4,6-; 3,4,5- isomers)) in this area also exceed provincial Standards. **(2)** at one location in the west of Lot 5 (for pentachlorophenol) for an estimated impact area of 700m^2. **(3)** at the southeastern Lot 5 boundary (for pentachlorophenol, 2,3,4,6-tetrachlorophenol) for an estimated impact area of 1250 m^2. Chlorophenol concentrations at the southeast boundary (Pentachlorophenol, 2,3,4,6-tetrachlorophenol, 2,3,4,5-tetrachlorophenol, 2,3,4-trichlorophenol, and 2,3,6,-trichlorophenol) exceed provincial Standards and may extend offsite in this area. Further investigation is recommended in the 5-BH29 area to delineate chlorophenol impacts around the southeastern Site boundary.

Lot 6

- **Soil Metals -** Soil exceeds federal arsenic Guidelines at depths of 3-4 m bgs in two Lot 6 foreshore locations. Arsenic impacts are expected to be localized (assumed for estimation purposes to be 10 m^2 around each identified hotspot). Arsenic concentrations at one of the foreshore locations also exceed provincial Soil Standards.

- **Soil VPH -** Soil concentrations of VPH at the east side of the Lindal Warehouse Building (APEC 34) in Lot 6 exceed provincial Standards and represent a localized impact area of approximately 400m^2, with a vertical thickness of about 1.5 meters. The estimated volume of impacted material is approximately 600 m^3.

- **Groundwater VPH -** VPH concentrations in groundwater at one well southwest of the former kiln (APEC 22) exceed provincial Standards and represents a localized VPH plume (estimated 100 m^2) at this location.

- **Groundwater LEPH –** LEPH groundwater concentrations exceed provincial Standards in two areas of Lot 6: **(1)** at the location of the Lot 6 oil shed (APEC 21) for an estimated 100m^2 plume. **(2)** at the east side of the Lindal Warehouse building (APEC 34, source not identified) for an impact area of approximately 200m^2.

- **Groundwater PAHs -** PAHs (acridine, anthracene, benzo[a]anthracene, benzo[a]pyrene, fluoranthene, fluorene, phenanthrene and pyrene) exceed federal groundwater guidelines at the east side of the Lindal Warehouse Building (APEC 34, source not identified) for an approximate 200m^2 impact area. Benzo[a]pyrene, phenanthrene and pyrene concentrations in groundwater at these wells also exceed provincial groundwater Standards.

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1.0 INTRODUCTION

Franz Environmental Inc. (FRANZ) was retained by Vancouver Fraser Port Authority (VFPA) to conduct a Supplemental Site Investigation (SSI) at the Surrey Brownsville Site (Lots 2,3,4,5, and 6) in Surrey, BC (the Site). The work was commissioned under contract 80415 as per our work plan submitted on September 28, 2011, and the onsite work was conducted between December 2011 and February 2012.

Report Background

Subsequent to the VFPA taking ownership of the Site, it underwent environmental monitoring triggered by the VFPA's own due diligence process. Between the years of 1990-2010, environmental site investigations were conducted in the various Site Lots to identify and characterize the contaminated site liabilities. During these investigations soil and groundwater contamination was identified, potentially related to the following sources:

- historical operations of sawmills and a tannery onsite;
- historical or current equipment fuelling and maintenance activities;
- historical uncontrolled releases from lumber treatment (chromium and chlorophenols);
- unknown fill quality;
- poor housekeeping at current or former operations;
- and other adjacent offsite activities (i.e. autowrecking yards, former lumber and tannery operations, rail line right of way).

The aim of the current SSI work conducted by FRANZ is to comprehensively summarize historical and current site information to support the development of remedial options and/or long-term risk management strategies for ongoing use of the Site.

Scope of Work

The objective of this report is to document the findings of all investigations to provide a comprehensive assessment of the soil and groundwater quality on the Site.

A work plan was provided to VFPA by FRANZ, dated September 28, 2011 which identified current data gaps and provided a plan to further investigate soil and groundwater at the Site. The scope of work for the SSI included the following tasks:

- Conduct a review of historical environmental investigation reports and compile all historical data available for the Site;
- Georeference historical station locations and input this information into FRANZ'S Geographic Information System (GIS);
- Digitize analytical results for historical soil and groundwater sampling locations, and include this information in our database and GIS and compare results to current regulatory guidelines;

- Produce a complete list of APECs and PCOCs for the Site;
- Identify site investigation data gaps and prepare detailed sampling and analysis plans to address these gaps at the Site;
- Drill boreholes for soil sample collection, and install monitoring wells at APEC locations as per our proposed work plan dated September 28, 2011;
- Monitor groundwater and collect samples at all newly installed monitoring wells and at selected existing monitoring wells;
- Prepare a SSI report that summarizes the analytical results of the 2011 field investigation in conjunction with analytical results from previous investigations, and provides recommendations for risk management of contaminated soil and/or groundwater at the Site.

2.0 SITE DESCRIPTION

The Site is located in Surrey, BC, approximately 0.5km southwest of the Pattullo Bridge. The Site is situated on the east banks of the Fraser River and covers an area of approximately 16.2 ha (Figure 1).

The Site is divided into five lots (Lots 2,3,4,5,6) with Lot 6 comprised of Parcels A,B,C, Rem-C,7, and 8) as described in the Phase 2 ESA Report for the area (Hemmera, 2008). APECs identified across the Site are further discussed in Section 2.7.

Surrounding Site Description

Land use surrounding the Site is as follows:

- **North**: The Fraser River is north and northwest of the Site (adjacent to the Lot 6 boundary). Historical sawmilling activities took place on the adjacent northeast property, as historically B-Mill (on Lot 5) extended over the northeast Site boundary, and the offsite portion was not included in the 1999 land purchase.
- **East**: Commercial autobody and autowrecking operations, and a metals depot border the Site (Lots 3 and 5) in this direction.
- **South:** A City of Surrey Park (Tannery Park) is currently located southwest of the Site, (adjacent to Lot 2 and 4 boundaries). Tannery and wood processing operations historically occurred adjacent to the Site in the south/southwest directions.
- **West:** The Fraser River is directly adjacent to the Site (Lots 2 and 6) boundary in this direction.

Site History

The VFPA (formerly the Fraser River Port Authority) has owned Lots 2, 3, 4, and 5 of the Site since 1999 when the land was purchased in a foreclosure sale of Imperial Lumber Ltd. The two sawmills onsite (in Lots 3 and 5) were operated by Imperial Lumber Ltd from the 1950s until the 1980s. At both sawmills, complete processing of raw logs to finished lumber occurred, including sorting, milling, planning, stamping, and treating with antisapstains. A tannery operated by Leckie JW Co., was also historically present in the Lot 4 area until approximately1970 (Next Environmental Inc, 1998e-h).

In 2008, the VFPA acquired the former CN Rail right-of-way, in the north western portion (Lot 6) of the Site, and adjacent to the current rail corridor. Historical activities at Lot 6 include the following (per Hemmera, Phase 1 ESA report, 2006):

- Wood chipping activities carried out by two sawmilling operations in the southwest portion of the Lot. Brown Lee Mills operated in the southwest of Lot 6 from 1962 to the 1970s, and Smallwood Sawmills has operated in the southwest of Lot 6 from the 1980's to present.

- Wood storage and distribution activities in the central portion of Lot 6. Lindal Cedar homes has operated in the centre of Lot 6 from the 1980's to present.
- Manufacture, storage and log salvaging operations have occured in the northeastern portion of Lot 6 from the 1930s to the 1960s. Brownsville Mills has operated in the northeast of the Lot from 1963 to the 1980s, Lyndowana Lumber Ltd has operated in the northeast of the Lot from 2003-2006.

Current Site Use

The Surrey Brownsviile Site is currently zoned and used for various industrial activities, including those listed in the below Lots (and identified in Figure 2a):

- **Lots 2/4**: Apex Terminals Inc. currently operates a lumber storage and distribution centre in Lots 2 and 4.
- **Lot 3:** Apex Terminals Inc, and Kwest Lumber currently operate in Lot 3, where lumber storage, and distribution by truck and rail, vehicle maintenance, lumber cutting and packaging activities occur onsite.
- **Lot 5:** Apex Terminals Inc. and RDM Enterprises operate in Lot 5, where lumber storage and distribution by truck and rail, large vehicle and equipment storage, and equipment maintenance activities occur.
- **Lot 6:** Smallwood Sawmill and the Lindal Cedar Homes Warehouse and Distribution Centre currently operate in Lot 6, where lumber storage and distribution, and wood chipping activities occur.

Topography and Geology

Topographic information for the Site was obtained from COSMOS. The Site is relatively flat, ranging in elevation between 2 and 4m above sea level (asl), with the highest elevation areas in the southwest corner (Lot 2) and along a raised pedestrian path running between Lot 6 and Lots 3 and 5. From the southwest corner of the Site, there is a slight slope down to the east/northeast, and west, towards the Fraser River.

Regional surficial geologic information was obtained from Armstrong and Hicock (map 1484A). Surficial geology in the vicinity of the Site is comprised of bog, swamp and shallow lake deposits; specifically, lowland peat up to 14m thick, in part overlying either overbank sandy to silt loam or overbank silty to silt clay loam.

Local surficial geology was observed during previous environmental investigations and by FRANZ during the 2011 SSI.

Generally soil stratigraphy can be divided along Dyke Road, into eastern and western Site portions. In the western portion of the Site (Lots 2 and 4, and 6), a surficial sand layer was observed to depths ranging between 0.5 and 3.8m below ground surface (bgs). In the vicinity of the former tannery, a layer of dark sandy fill (inclusive of wood debris and animal waste (hair) between 0.6 and 1.3m thick was observed.

In the eastern portion of the Site (Lots 3 and 5) a surficial sand to sandy silt layer was observed to depths ranging between 0.5 and 2.25m bgs.

In all areas of the Site, the surficial layer is underlain by sandy silt to silt, containing discontinuous peat lenses and occasional woody debris, to the final borehole depth of 6 m bgs. This stratigraphy is consistent with the bog, swamp and shallow lake deposits described in map 1484A above.

In select boreholes across the Site, discontinuous wood waste fill (approximately 0.5m thick) was encountered between the sand and silt intervals.

Hydrogeology

According to the BC Water Resources Atlas (BC WRA), the 9 km^2 Fraser River Junction Aquifer underlies the Site. This is a Type IIIB Aquifer, with low demand, and moderate productivity and vulnerability. The water use of the aquifer is classified as non-drinking water. Potable drinking water is currently supplied to the Site via the Greater Vancouver Water District (GVWD) municipal piped distribution system, which primarily draws from reservoirs in North Vancouver. Details regarding the underlying aquifer are presented in Appendix G.

Depth to groundwater was measured in onsite wells during the 2011 SSI and ranged between 0.31m and 3.655m below top of casing (TOC). Groundwater flow direction onsite is inferred to be

to the west/northwest (towards the Fraser River) as identified during previous site investigations (NEXT Environmental 1998, Hemmera 2006, 2008).

Previous Investigations

The Site has undergone environmental monitoring as a component of risk management. Historical investigation and monitoring program reports for the Site were reviewed by FRANZ prior to completing the current SSI. As part of the current work, sampling locations and analytical results were extracted from the historical reports, digitized, input into our database and GIS mapping systems, and re-assessed against current Federal and Provincial Standards and Guidelines (see Section 3.0). The reviewed reports are as follows:

- Phase 3 Environmental Property Investigation, Imperial Lumber Property Surrey, BC. SRK-Robinson Inc., April 1994.
- Pre-Cleanup Environmental Investigation, Imperial Lumber Ltd. Site, Surrey, BC. SRK-Robinson Inc., October 1994.
- Environmental Stage 1 Preliminary Site Investigation at 11715 Tannery Road, Lot 17, District Lots 7 and 8 (Imperial Lumber Lot 2), Surrey, BC. Next Environmental Inc., June 1998.
- Environmental Stage 1 Preliminary Site Investigation at 11715 Tannery Road, Parcel 1, Reference Plan 6432, Block A, District Lot 7 (Imperial Lumber Lot 4) Surrey, BC. Next Environmental Inc., June 1998.
- Environmental Stage 1 Preliminary Site Investigation at 11715 Tannery Road, Lot 52, District Lots 6 and 7 (Imperial Lumber Lot 3) Surrey, BC. Next Environmental Inc., July 1998.
- Environmental Stage 1 Preliminary Site Investigation at 10897 Timberland Road, Parcel D, Reference Plan 15209 of Parcel B, District Lots 5 and 6 (Imperial Lumber Lot 5), Surrey, BC. Next Environmental Inc., July 1998.
- Environmental Stage 2 Preliminary Site Investigation at 11715 Tannery Road, Lot 52, District Lots 6 & 7 (Imperial Lumber Lot 3), Surrey, BC. Next Environmental Inc., September 1998.
- Environmental Stage 2 Preliminary Site Investigation at 10897 Timberland Road, Parcel D, Reference Plan 15209 of Parcel B, District Lots 5 & 6 (Imperial Lumber - Lot 5), Surrey, BC. Next Environmental Inc., September 1998.
- Environmental Stage 2 Preliminary Site investigation at 11715 Tannery Road, Parcel 1, Reference Plan 6432, Block A, District Lot 7 (Imperial Lumber - Lot 4), Surrey, BC. Next Environmental Inc., September 1998.
- Environmental Stage 2 Preliminary Site Investigation at 11715 Tannery Road, Lot 17, District Lots 7 and 8 (Imperial Lumber Lot 2) Surrey, BC. Next Environmental Inc., September 1998.
- Review and Assessment of Contaminated Sites and Buildings Issues at Imperial Lumber Lots 2, 3, 4 and 5. BC Research Inc., final April 1999.

- GW Monitoring Wells, Lots 3 & 5, Imperial Lumber Site 3. BC Research Inc., September 1999.
- Site Monitoring, March 30, 2000, Lots 3 & 5, Imperial Lumber Site. BC Research Inc., May 2000.
- Chromium Level Monitoring, June 15, 2000, Lots 2 and 4, Imperial Lumber Site. BC Research Inc., July 2000.
- Site Monitoring, March 26, 2001, Lots 3 & 5, Imperial Lumber Site. BC Research Inc., April 2000.
- Risk Management Plan for Imperial Lumber Lots 2, 3, 4, and 5. BC Research Inc., October 2001.
- Site Monitoring, Oct 15, 2001, Lots 3 & 5, Imperial Lumber. BC Research Inc., November 2001.
- Site Monitoring, December 17, 2003, Lots 3 & 5, Imperial Lumber. Vizon SciTec Inc., May 2004.
- Site Monitoring, November 3, 2004, Lots 3 and 5, Imperial Lumber. Vizon SciTec Inc., December 2004.
- Phase I Environmental Site Assessment, Fraser River Port Authority, Brownsville Site, Surrey, BC. Hemerra, September 2006.
- Remedial Options Evaluation, Brownsville Site, Surrey, BC. Hemmera, December 2008.
- Supplemental Phase 2 Environmental Site Assessment, Brownsville Site, Surrey, BC. Hemerra, December 2008.
- Results of April 2009 (Q4) GW Monitoring/Sampling at Port Metro Vancouver Surrey Lots 2 & 4, Surrey Lots 3 & 5, 11715 Tannery Road, Surrey, BC. Hemmera, July 2009.
- Results of November 2009 GW Sampling Program at the Vancouver Fraser Port Authority's Surrey Lots 2&4, Surrey Lots 3&5, 11715 Tannery Road, Surrey, BC. Hemmera, September 2010.
- Mountainview Reload: Project Review and Data Gap Identification – Final Report. Hemmera, March 2011.

APECs and PCOCs

Following the review of historical reports and data, FRANZ prepared a complete list of APECs and PCOCs for the Site.

The APECs identified are presented in Table 1. and Figure 2b. In some cases, the APECs were determined based on activities occurring in discrete locations (i.e.: APEC 3, Paint AST located in the east portion of A Mill ((Lot 3)). In other cases, the APECs were determined based on larger operations where targeting a specific, discrete location as a potential source of contamination was not possible due to the nature of the activities (i.e.: APEC 9, Former Lumber Storage Area (Lot 3)).

Associated potentially contaminating substances were identified according to the activities conducted at each APEC. PCOCs were then identified according to the applicable regulations at the Site and offsite.

Table 1 APECS and PCOCs

					PCOCs										
APEC	On/ Off Site	APEC Description	Potentially Contaminating Substance	Media	Metals	PAH	Sulfides	VOC s	F2/F3 (L/HEPH)	F4	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
1	ON	Former Leckie JW Co. Tannery	Tannery process chemicals: Cr, Sulfides, Salts and solvents	SOIL	x		x	x						x	
				GW	x		x	x						x	
2	ON	Lumber Storage Area	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
3	ON	Paint AST in the east central portion of the main building	Paint, solvents	SOIL	x			x							
				GW	x			x							
4	ON	Former Mill Service Shop	Oils, waste oil, hydraulic fluids, solvents, hydraulic hoists, metal machining (metals)	SOIL	x	x		x	x	x	x	x	x		
				GW	x	x		x	x		x	x	x		
5	ON	Waste Oil AST outside the Mill Service Shop	Waste oil, solvents	SOIL	x	x		x	x		x	x	x		
				GW	x	x		x	x		x	x	x		
6	ON	Former fueling facility	Diesel, gasoline	SOIL		x			x		x	x			
				GW		x			x		x	x			
7	ON	Main Building (Lumber Storage, Packaging, Application of PCP)	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
8	ON	Septic UST	Waste disposal (paints, chemicals etc.)	SOIL		x		x	x		x	x	x		X
				GW		x		x	x		x	x	x		X
9	ON	Former Lumber Storage Area	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						X
				GW	x	x			x						x
10	ON	Gasoline UST	Gasoline	SOIL					x		x	x			
				GW					x		x	x			
11	ON	Waste Oil AST	Waste oil,	SOIL	x	x			x	x	x	x	x		

					PCOCs										
APEC	On/ Off Site	APEC Description	Potentially Contaminating Substance	Media	Metals	PAH	Sulfides	VOC s	F2/F3 (L/HEPH)	F4	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
			solvents	GW	x	x			x		x	x	x		
12	ON	Disposal area for hydraulic in-ground hoists	Hydraulic fluid, PCBs	SOIL				x	x	x					
				GW				x	x						
13	ON	Former Green Chain and Planer Mill	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
14	ON	Former Chlorophenol Dip Tank (location of former hydraulic hoists)	Wood treatment chemicals (CCA, chlorophenols), PCBs, hydraulic fluid	SOIL	x	x			x	x					x
				GW	x	x			x						x
15	ON	Wood Chip and Wood Debris Area	Organic leachate: Phenolics, metals, wood treatment chemicals (CCA, chlorophenols)	SOIL	x										x
				GW	x										x
16	ON	Area of Mineral Oil and Grease above Level C in soil identified by SRKR	Petroleum hydrocarbons (mineral oil and grease)	SOIL		x			x	x	x	x			
				GW		x			x		x	x			
17	OFF	Auto Wrecking Yard along Timberland Road (Air Photos)	Automotive fuels and fluids, antifreeze, solvents, metals,	SOIL	x	x		x	x		x	x	x		
				GW	x	x		x	x		x	x	x		
18	OFF	Rypac Aluminum Recycling Ltd. At 10746 Parton Road (BC Online)	Metals, petroleum hydrocarbons	SOIL	x	x			x						
				GW	x	x			x						
19	ON	Former Kiln A- Lot 3 (South)	Konus Oil	SOIL		x			x						
				GW		x			x						
20	ON	Former Kiln - Lot 5	Konus Oil	SOIL		x			x						
				GW		x			x						
21	ON	Oil Storage Shed - Brownsville	Konus Oil/Heating Oil	SOIL		x			x		x	x			
				GW		x			x		x	x			
22	ON	Former Kiln –	Konus Oil	SOIL		x			x		x	x			

					PCOCs										
APEC	On/ Off Site	APEC Description	Potentially Contaminating Substance	Media	Metals	PAH	Sulfides	VOC s	F2/F3 (L/HEPH)	F4	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
		Brownsville		GW		x			x		x	x			
23	ON	Former Green Chain - Brownsville	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
24	OFF	Former PCP Spray Tank, Spray Area and Lumber Storage - Brownsville	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
25	ON	Lumber Storage Area - Brownsville	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
26	ON	Fill Lot 2/4	Metals, PAHs, petroleum hydrocarbons	SOIL	x	x			x		x	x			
				GW	x	x			x		x	x			
27	ON	Historical Chromium-impacted soil stockpile on Lot 2/4	Metals, (potentially from treated lumber or tannery wastes)	SOIL	x										
				GW	x										
28	ON	Fill Lot 3	Metals, PAHs, petroleum hydrocarbons	SOIL	x	x			x		x	x			
				GW	x	x			x		x	x			
29	ON	Fill Lot 5	Metals, PAHs, petroleum hydrocarbons	SOIL	x	x			x		x	x			
				GW	x	x			x		x	x			
30	ON	Fill Lot 6	metals, PAHs, petroleum hydrocarbons	SOIL	x	x			x		x	x			
				GW	x	x			x		x	x			
31	ON	Lumber Storage Area - Lot 5	Wood treatment chemicals (CCA, chlorophenols)	SOIL	x	x			x						x
				GW	x	x			x						x
32	ON	Former Kiln B - Lot 3 (North)	Konus Oil	SOIL		x			x						
				GW		x			x						
33	OFF	Diesel Spill – railway	Diesel	SOIL		x			x						
				GW		x			x						
34	ON	VPH and LEPH Plume by Warehouse- Lot 6	Petroleum hydrocarbons	Soil		x			x		x	x			
				GW		x			x		x	x			

3.0 REGULATORY FRAMEWORK

The Site is under the jurisdiction of the Port. The applicable guidelines governing concentrations of various parameters in soil, groundwater and surface water at the Site are therefore Federal.

In general, onsite soil analytical results were compared against Canadian Council of Minister's of the Environment (CCME) Soil Quality Guidelines. Groundwater analytical results were compared against Environment Canada's Federal Interim Groundwater Quality Guidelines (FIGQG) that were developed for sites with funding from the Federal Contaminated Sites Action Plan (FCSAP) (applicable to groundwater >10m from a surface water body) and against Health Canada's Guidelines for Canadian Drinking Water Quality (applicable to groundwater with the potential to be used as a potable water resource, discussed in Section 3.1.1). Soil and groundwater collected from offsite locations near Site boundaries were also compared to federal Guidelines, this was done to consider situations where impacted offsite media may have the potential to move onsite.

Per Environment Canada guidance (FIGQG, May 2010), groundwater within 10m of a surface water body was assessed against surface water guidelines; therefore, onsite groundwater analytical results located within 10 m of the banks of the Fraser River were compared against CCME Water Quality Guidelines.

The land surrounding the Site is under provincial jurisdiction. As a result, soil and groundwater analytical results from tested locations onsite and offsite were also compared against BC Contaminated Sites Regulations (CSR) Standards. This was done to consider stations located outside the Site boundary and drilled for delineation purposes, or for selected stations located at or near the Site boundary, where impacted onsite media may have the potential to move offsite. According to the CSR Technical Guidance 15 (Draft), concentration limits are not specified for groundwater within 10m of a surface water body high water mark. As a measure of conservatism, groundwater concentrations from wells within this dilution zone were compared against BC Working or Approved Water Quality Guidelines. Onsite and offsite soil results were also compared and characterized against provincial soil Relocation Standards (Schedule 7) in case impacted material onsite or at/near the Site boundaries has the potential to be excavated and transported offsite during future remediation efforts.

Details regarding the site specific standards applicable to soil and groundwater are discussed in Appendix H.

4.0 SUPPLEMENTAL SITE INVESTIGATION METHODOLOGY

The field portion of the SSI was conducted by FRANZ personnel between December 9 and 17, 2011 and between February 1 and 14, 2012.

Detailed descriptions of the methodologies used during field activities are described in the following sections. Photographs taken during field activities are presented in Appendix A.

Utility Locates

Western Utility Locate Services was contracted to locate any potential underground utilities at the Site on December 9, 2011. A ground-penetrating radar (GPR) and electromagnetic (EM) induction device were used to locate conductive (i.e. metal) utilities in the vicinity of all proposed borehole locations.

Borehole Drilling and Soil Sampling

Rocky Mountain Soil Sampling Inc. (RMSS) was contracted to provide drilling services between December 12 and 17, 2011. A total of 25 boreholes were drilled. Twenty-one of these boreholes were completed as monitoring wells. All boreholes were drilled using solid stem augers. Borehole logs are presented in Appendix B.

Soil samples were collected as grab samples during auger drilling. To prevent cross contamination, a new pair of nitrile gloves was used to collect each sample. Samples were collected from each stratigraphic unit and placed into laboratory supplied, sterile jars. A portion of each sample was placed in a Ziplog bag and screened for vapours using a portable gas monitor (RKI Eagle).

All samples, upon collection, were placed in a cooler with ice in order to keep the samples cold during the remainder of sampling and transportation to the project laboratory for analysis. The project laboratory for this project was Agat Laboratories (AGAT) in Burnaby, BC. Soil samples were selected for analysis based on soil headspace vapour screening results, the presence of soil staining or odours, and stratigraphic location. Analytical parameters tested varied according to PCOCs identified for each APEC.

Monitoring Well Construction

Monitoring wells were installed in 21 of the boreholes. Each of the wells are 50 mm in diameter, constructed of Schedule 40 polyvinyl chloride (PVC) pipe. One well (MV-11BH-04M) consists of a 10 foot screened section and a riser pipe; all other wells consist of a 5 foot screened section and a riser pipe. Silica sand was used to backfill the boreholes to one foot above the screen; bentonite chips were then used to backfill the hole to one foot below ground surface. More silica sand was used as backfill above the bentonite. Each of the wells was finished with a flush-mounted protective casing set in concrete.

Well completion details are presented in Appendix B (borehole logs).

Groundwater Sampling

Between February 1 and 15, 2012, groundwater sampling was completed for 20 of the 21 newly installed monitoring wells and select existing wells. One well installed by FRANZ in 2011 MV-11BH-04M, was destroyed by truck traffic and could not be sampled. Some of the existing wells were not sampled, for one of the following reasons:

- The well could not be located;
- The well had been destroyed or compromised; or
- The well was located beneath stacks of lumber or equipment which could not be moved

The locations of the new and previously installed wells are presented in Figures 3-2 through 11-5.

For all wells, FRANZ developed the wells using dedicated inertial sample pumps (low density polyethylene tubing with inertial foot valve) to remove any sediment that had accumulated and to ensure formation water was present for sampling. The wells were developed until either a minimum of three well volumes (including sand pack) was removed or the well was pumped dry. To minimize the potential for cross-contamination, all purging was completed with dedicated inertial pumps.

Prior to groundwater sampling, each monitoring well was purged using a peristaltic pump and dedicated tubing. The wells were purged until a minimum of three well volumes of groundwater was removed and stable groundwater chemistry was reached. Following purging samples were collected, also using a peristaltic pump, into laboratory supplied, sterile bottles. To prevent cross contamination, a new pair of nitrile gloves was used to collect each sample. Water samples collected for dissolved metals analysis were field filtered using Waterra High Density In-Line filters designed to remove sediment greater than 45 microns. The filtered water was acidified in the field with laboratory-supplied preservative (nitric acid). Water samples collected for sulfide were preserved in the field with laboratory-supplied sodium hydroxide and zinc acetate.

The collected samples were stored in insulated coolers and chilled with ice during the remainder of sampling and transportation to AGAT. Analytical parameters tested varied with PCOCs identified at each APEC.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

FRANZ has a Quality Assurance/Quality Control (QA/QC) protocol that includes appropriate techniques for soil sampling, sample storage, shipping and handling as well as the collection of duplicates. This section pertains to the sampling conducted by FRANZ in December 2011 and February 2012.

To minimize possible cross contamination, disposable nitrile rubber gloves, were worn while collecting samples and were replaced after handling each sample. The soil and groundwater samples were placed into laboratory supplied, appropriately labeled, jars and bottles. The samples were placed into insulated coolers and kept cool with frozen ice packs during transport to the laboratory. FRANZ personnel maintained chain of custody control for the samples submitted to AGAT through the use of chain of custody documentation.

Laboratory Quality Assurance and Quality Control Procedures

AGAT is a Canadian Association for Laboratory Accreditation (CALA) certified laboratory with stringent internal QA/QC protocols. Analytical precision was evaluated by the laboratory using internal duplicate analyses. AGAT's QA/QC documentation is provided with the analytical report and it was reviewed by FRANZ as part of the QA/QC protocol.

Field QA/QC Samples

Field sample QA/QC consisted of collecting duplicate samples to monitor both sampling and laboratory analytical precision and accuracy, with respect to soil and groundwater samples collected at the Site. Duplicate samples were also collected and analyzed to identify sample variability. One duplicate sample was collected for every ten samples collected during the sampling program.

Precision/Accuracy

Analytical precision was evaluated by performing duplicate analyses on a single sample, whereby, the sampling precision is evaluated by collecting and analyzing field duplicate samples. Precision is evaluated by calculating the relative percent difference (RPD) for a sample and duplicate pair according to the following equation:

$$RPD = \{2(X_1-X_2)/(X_1+X_2)\} * 100$$

where: X_1 = concentration for sample 1 of duplicate pair, and

X_2 = concentration for sample 2 of duplicate pair.

Blind duplicates were submitted at a nominal rate of approximately 10%, rounded up for both water and soil.

The following bulleted list presents the data quality objectives (DQOs) for this project.

- PAH: 75% in soil, 45% in water

- VOC (including BTEX/VPH): 60% in soil, 45% in water
- EPH: 60% in soil, 45% in water
- Metals (Ag, Al, Ba, Hg, K, Mo, Na, Pb, Sn, Sr, Ti): 60% in soil, 30% in water
- Other Metals: 45% in soil, 30% in water
- General Inorganics in Soil: 45%
- General Inorganics in Water: 30%

These levels are specified on the BC MOE's (Q&A) website (i.e., Standards - Question/Answer # 36) which indicates the recommended relative percent difference (RPD) for duplicate field samples not exceed 1.5 times the acceptable lab RPD for the same compound. Acceptable DQOs for laboratory duplicates which are derived from the BC Environmental Laboratory Manual (Section A) for the prescribed elements and compounds.

RPD was not calculated if either the sample or its duplicate were less than reported detection limit (RDL), or if either the sample or its duplicate were less than five times the RDL. Soil RPD, because true soil duplicates are essentially impractical, usually measures more than analytical variability and so must be interpreted less rigidly than water RPD results.

Soil RPDs

Ten sample/duplicate pairs were collected in soil. They are listed below:

- MV-11BH-08-2 / MV-DUP1
- MV-11BH-16M-1 / MV-DUP2
- MV-11BH-15M-3 / MV-DUP3
- MV-11BH-11M-1 / MV-DUP4
- BV-11BH-01M-5 / BV-DUP5
- MV-11BH-01M-4 / MV-DUP6
- MV-11BH-17M-3 / MV-DUP7
- BV-11BH-07M-2 / BV-DUP8
- BV-11BH-04M-3 / BV-DUP9
- BV-11BH-05M-5 / BV-DUP10

Duplicate analysis results for soil are presented in Appendix C. Duplicates were collected for VPH/BTEX, PHC fractions 1-4, LEPH/HEPH, PAH, metals, VOCs and chlorinated and non-chlorinated phenols.

RPDs were not calculated for BTEX, styrene, LEPH, PHC fractions F1 and F2, and select PAH, VOCs, metals and phenols samples. For these parameters, sample and/or duplicate concentrations were less than 5x reportable detection limits (RDL).

All calculated RPDs for VPH, PHC fractions F3 and F4 and PAH are less than the target levels of precision.

The calculated RPD for HEPH in sample/duplicate pair MV-11BH-11M-1 / MV-DUP4 is 81%, which exceeds the target level of precision. Both the sample and duplicate concentration are significantly below the CSR IL Standard for HEPH; and there are no CCME Guidelines for HEPH. Therefore, the variability in the RPD is not materially significant with respect to classification of the sample or duplicate against federal or provincial Guidance.

The calculated RPD for antimony in sample/duplicate pair BV-11BH-04M-3 / BV-DUP9 is 78%, which exceeds the target level of precision. Both the sample and duplicate concentration for antimony are well below the Federal Guideline and the BC CSR Standard for this parameter; therefore, the variability in the RPD is not materially significant with respect to classification of the sample or duplicate against federal or provincial Guidance..

Only 2 of the 10 duplicate samples analyzed in soil exceeded the targeted level of precision. Exceedances of the targeted level of precision do not indicate a systematic bias in the SSI soil sampling program on the following rationale:

- All other RPDs in soil samples collected on the same days (December 15 and 17, 2011) as the exceeding sample/duplicate pairs were well within the target levels of precision. Tabulated RPD data for the noted days are included in Appendix C.
- Lab reports for soil samples collected December 15 and 17, 2012 did not identify QA/QC comments related to sample quality or integrity.
- The noted RPD exceedances in soil metals and petroleum hydrocarbons is indicative of some variability in the dataset likely attributable to the following:

(1) natural heterogeneity of metals in soil, both sample and duplicate concentrations of antimony fall within the range seen in soil from adjacent locations in the Lot 6 area; and

(2) the fact that soil samples and duplicates were collected as co-located replicates under comparable conditions adjacent in time and space, as opposed to true duplicates from a homogenized sample. Soil replicates were collected during the program due to concerns with contaminant volatilization during homogenization for true duplicates. Therefore we expect replicate RPDs to be higher than typical duplicate RPDs.

Groundwater RPDs

Five sample/duplicate pairs were collected in groundwater. They are listed below:

- BV-11BH-02M / BV-GWDUP1
- MV-11BH-03M / MV-GWDUP2
- MV-11BH-14M / MV-GWDUP3
- MV-11BH-15M / MV-GWDUP4
- 3-BH10 / MV-GWDUP5

Duplicate analysis results for groundwater are presented in Appendix D. Duplicates were collected for VH, VPH/BTEX, PHC fractions 1-4, LEPH, EPH, dissolved metals, chloride, VOCs and chlorinated and non-chlorinated phenols.

RPDs were not calculated for VPH/BTEX, LEPH/HEPH, PHC fractions F1-F4, PAH, some dissolved metals, VOCs and phenols. For these parameters, sample and/or duplicate concentrations are less than 5x the RDL.

The calculated RPDs for dissolved molybdenum in sample/duplicate pair BV-11BH-02M / BV-GWDUP1 is 56%, which exceeds the target level of precision. Both the sample and duplicate concentration of molybdenum are well below the Federal Interim Guideline and the BC CSR Standard; therefore, the variability in the RPD is not materially significant with respect to classification of the sample or duplicate with respect to federal or provincial Guidance..

Only 1 of 5 duplicate samples analyzed in groundwater exceeded the targeted level of precision. Exceedances of the targeted level of precision do not indicate a systematic bias in the SSI groundwater sampling program on the following rationale:

- All other groundwater samples collected on the same day (February 2, 2012) as the exceeding sample/duplicate pair (BV-11BBH-02M/BV-GWDUP1) were well within the target levels of precision for this pair. Tabluated RPD data for February 2, 2012 is included in Appendix D.
- A review of the field notes and lab reports for samples collected February 2, 2012 did not identify any QA/QC comments related to sample quality or integrity with the potential to affect precision in the data set.

Representativeness

Representativeness is a measurement of how well the data collected represents the conditions at the Site. Representativeness was achieved through use of the standard FRANZ field, sampling, and analytical procedures and by an appropriate program design and implementation. All project data (analytical data, figures, tables, text, etc.) was reviewed by a qualified technical individual who was not part of the core project staff.

Sample Holding Times

Recommended sample holding times are set so that samples are analyzed before significant degradation of the sample and specific analyte of interest in the sample. None of the samples exceeded their respective holding times

QA/QC Summary

Based on a review of the QA/QC program and the data quality indicators discussed above, we conclude that the data quality objectives have been substantially achieved. Our validated dataset allows us to make valid inferences and conclusions regarding classification of the site soil and groundwater, in relation to the provincial Standards or federal Guidelines.

6.0 SUPPLEMENTAL SITE INVESTIGATION RESULTS

FRANZ's review of the historical reports and analytical data identified 34 APECs (30 onsite and 4 offsite). All APECs are presented on Figure 2b. Offsite investigation locations were discussed as they related to delineating onsite APECs. Offsite APECs were not investigated or discussed in the SSI as they are outside of the scope of work for this project. Soil and groundwater results are presented on Figures 3 through 14, and in full tabular form in Tables 2 through 78. Laboratory reports/analytical certificates are included in Appendix E (soil) and Appendix F (groundwater).

Soil and groundwater analytical results for each APEC are discussed separately in the following section. In some cases, when physical proximity and similar PCOCs allow it, APECs are discussed together. All of the investigation data is presented for soil and groundwater, including historical data from previous investigation/monitoring reports. Soil and groundwater investigation data collected in 2011 is considered to be the most representative of the Site conditions.

In some cases, actual reported concentrations for some parameters could not be retrieved from historical reports, because of the poor quality of the copies available. In select cases, results were identified greater than the BC CSR IL Standards in a highlighted cell, but because report is a black and white photocopy, the results are shown as a black cell in a table, and it is therefore impossible to retrieve a numerical value for them. Whenever this is the case, FRANZ has identified the investigation station as being greater than the applicable Standard or Guideline, by highlighting it in red on tables and figures. A star symbol (*) was used instead of a numerical value in the analytical tables.

Guidelines for petroleum hydrocarbon fractions F1-F4 and BTEX were developed according to the toxicological and physico-chemical properties of the different fractions. For fractions F1-F4, benzene, ethylbenzene, toluene, and xylenes the applicable guideline is dependent on soil texture. For the purposes of this report, sand and gravels were identified as coarse-textured soils and silt and clay as fine-textured soil, as per "The Summary of A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines" (CCME 2006).

For fractions F1-F4, the applicable guidelines are also dependent on sample depth. Samples collected between 0-3 m below ground surface (bgs) were considered surface samples, and samples collected deeper than 3 m bgs were considered to be subsoil samples.

PCOCs detected at concentrations greater than the applicable Guidelines and/or Standards are referred to as contaminants of concern (COCs). APECs where one or more COCs have been identified in any of the tested media are referred to as areas of environmental concern (AECs).

Lots 2/4 (APECs 1, 2, 26, 27)

Due to their physical proximity and similar PCOCs, investigation results for APECs in Lots 2/4 are presented in the same section.

				PCOCs									
APEC	**APEC Description**	**Substance**	**Media**	Metals	Sulfides	VOC s	F2/F3 (L/HEPH)	PAH	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
1	Former Leckie JW Co. Tannery	Tannery process chemicals: Chromium, Sulfides, Salts and solvents	**SOIL**	x	x	x						x	
			GW	x	x	x						x	
2	Lumber Storage Area	Wood treatment chemicals (CCA*, chlorophenols)	**SOIL**	x			x	x					x
			GW	x			x	x					x
26	Fill Lot 2/4	Metals, PAHs, petroleum hydrocarbons	**SOIL**	x			x	x	x	x			
			GW	x			x	x	x	x			
27	Historical Chromium soil stockpile Lot 2/4	Chromium	**SOIL**	x									
			GW	x									

Lots 2 and 4 (and their associated APECs) are located in the southwest section of the Site (see Figure 2). The two Lot areas are adjoining and currently paved; two office buildings (Apex Terminals) remain in the southeast corner of Lot 4. The remainder of the Lot 2/4 area is currently used for storage.

The footprint of the former tannery (APEC 1) is located in the southeast corner of Lot 4, adjacent to Tannery Road. According to previous investigation reports, a stockpile of chromium-impacted soil (approximately 150m^3), that was historically located on the Lot 2/4 area (APEC 27), originated from a former excavation on the west adjacent property. Soil excavated from this offsite location was subsequently stockpiled on the southwest side of the Lots 2/4 area (NEXT Environmental Inc,1998a,h). Given that these APECs and adjacent properties to the south and west are anticipated to have had similar land use history, chromium impacts were investigated across the Lots 2/4 area (NEXT Environmental Inc,1998a,h). Fill soil of unknown quality (APEC 26), and impacts from storage of treated lumber (APEC 2) have the potential to be present in various locations, thus PCOCs related to these APECs were also investigated across the Lots 2/4 area.

Prior to the 2011 SSI, 47 boreholes were drilled across Lots 2/4, 26 of which were finished as monitoring wells. One borehole, completed as a monitoring well, was drilled south of Lots 2/4. During the 2011 SSI, FRANZ drilled 1 borehole (MV-11BH-01M (onsite)) in the northwest corner

of the Lot 2/4 area, and 2 boreholes (MV-11BH-02M and MV-11BH-03M (offsite)) south-west of the Lots 2/4 area and adjacent to Tannery Road. All three boreholes were finished as monitoring wells. Soil and groundwater results for onsite and offsite investigation locations related to the Lots 2/4 area are presented in Figures 3 through 14 and Tables 2 through 22.

Soil Analytical Results

In some locations across Lots 2 and 4 soil pH was slightly acidic or slightly basic, but overall the mean soil pH of approximately 6.7, was within the normal range (pH 6-8) defined by CCME.

Soil samples were collected from across Lots 2 and 4 and analyzed for BTEX, VPH, styrene, metals, chlorophenols, PAHs, and VOCs. Soil from the two boreholes adjacent to (southwest of) Lots 2 and 4 were tested for metals, PAHs, VPH, BTEX, styrene, PHCs F1-F4, LEPH, HEPH, phenols and chlorophenols, chloride anion, sulphide, and VOCs.

Of the parameters analyzed soil anions, metals, and PAHs in onsite and offsite locations exceeded CCME guidelines and/or BC CSR Standards and require further discussion.

Anions (salts)

Chloride (Cl-) concentrations in offsite soil (MV-11BH-02M, south of Lots 2/4) exceeds BC CSR Schedule 7 Standards for relocation of soil to non-agricultural land. Based on this, if soil were to be excavated from the MV11-BH-02M area it would require a soil relocation agreement to be moved off the property. Although concentrations of chloride in offsite soil require a soil relocation agreement for removal from the area; as offsite chloride concentrations do not exceed applicable BC CSR IL Soil Standards, chloride contamination has not been identified for the area.

Metals

Soil in both Lots 2 and 4 exceed CCME IL (IL+) Guidelines for multiple metals (chromium (Cr), copper (Cu), cadmium (Cd), nickel (Ni), zinc (Zn), antimony (Sb) and arsenic (As)). Of these metals exceedances, chromium exhibits the highest concentrations in soil and the greatest area of impact. The vertical extent of the metals impact includes the sandy fill layer underlying the asphalt, down to the underlying silt layer; for an impacted layer about 4 m thick. The horizontal extent is localized to the area north-northwest of the tannery footprint (APEC1) extending further west to the banks of the Fraser River (an identified area of approximately 1.6 ha). The impact area is generally delineated by compliant soil results at the north and northeast boundaries of Lots 2 and 4.

Metal concentrations in the onsite impact area also exceed BC CSR IL Standards and Schedule 7 Relocation Standards for antimony, arsenic, cadmium, chromium, copper lead, and zinc. Tin concentrations in the impact area exceed BC CSR Schedule 7 Relocation Standards

only. Based on the Schedule 7 exceedances, removal of metals- impacted soil from Lots 2 and 4 area and transfer to offsite non agricultural land would require a soil relocation agreement.

Previous investigations on the southwest adjacent property have identified "metals impacted soil" in this offsite area (NEXT Environmental Inc,1998h). Offsite metals impacts (chromium) were confirmed on the southwest adjacent property during the 2011 SSI, where chromium concentrations exceeding CCME IL Guidelines, and BC CSR IL and BC CSR Schedule 7 Standards were identified in subsurface soil from the new MV-11BH-02M borehole (4.5-5 mbgs). Similar industrial activities have occurred at both the Site and the west adjacent property; as such metals impacts identified to the southwest are expected to be reflective of the previous industrial use of the west and southwest properties; and are not necessarily indicative of offsite migration.

PAHs

Concentrations of PAHs in soil (naphthalene and/or phenanthene) exceed CCME IL Soil Guidelines for protection of aquatic life, in all 4 locations tested on Lots 2 and 4. Total PAHs in onsite soil also exceed the calculated health based index of additive cancer risk (IACR) for protection of drinking water. The PAH impacted soil (0.6-2.4 m bgs) in this section is co-located to the metals impacted sandy fill and silt intervals discussed previously. Onsite soil PAH concentrations do not exceed BC CSR IL or Schedule 7 Relocation Standards. The low level PAH exceedances around the Lots 2/4 area have not been fully delineated; localized areas of low level PAH exceedances have been identified site wide.

PAH concentrations in soil from the area southwest of Lots 2/4 exceed BC CSR Schedule 7 Relocation Standards for benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and indeno [1,2,3,-c,d]pyrene in 1 of the 2 offsite locations tested (MV-11BH-02M, 5-6 m bgs), but are compliant with applicable BC CSR IL Soil Standards. Given the Schedule 7 exceedances, if soil from the PAH impact area southwest of Lots 2/4 were to be excavated it would require a soil relocation agreement to be transported to offsite non-agricultural land. Soil in the area southwest of Lots 2/4 also exceeds CCME IL Guidelines for Naphthalene, Phenanthrene, and/or PAH IACR in the silty sand unit (MV-11BH-02M, 4.5-6 m bgs, and MV11-BH-03M, 2-3 mbgs). Offsite PAH impacts are not fully delineated. Similar industrial activities have occurred at both the Site and the adjacent property; such that PAH impacts may not be indicative of offsite migration but rather reflective of the previous industrial use of the southwest properties.

Groundwater Analytical Results

Groundwater samples were collected from monitoring wells (8 within 10m of the high water mark, and 22 greater than 10m from the high water mark) across Lots 2 and 4 and were analyzed for VPH, BTEX, styrene, dissolved metals, chlorophenols and VOCs. Samples from select monitoring

wells on Lot 2 were also tested for chloride ion, sulphide, PAHs, phenols, L/HEPH, EPH, VH (C6-C10) and petroleum hydrocarbon fractions F1-F4.

Groundwater samples collected from new monitoring wells installed on the southwest adjacent property (one <10m from the high water mark, and one >10m from the high water mark) were analyzed for chloride ion, sulphide, BTEX, VPH, VH (C6-C10), styrene, dissolved metals, PAHs, phenols and chlorophenols, VOCs, L/HEPH, EPH, and petroleum hydrocarbon fractions F1-F4.

Concentrations of MAHs (toluene), VOCs (chlorobenzene), PAHs (pyrene), chlorophenols, and dissolved metals exceed applicable federal (CCME, FCSAP, or Health Canada DW quality) Guidelines and/or provincial (BC MOE Water Quality Guidelines (BC WQGs) or BC CSR Standards) Standards/Guidelines in various locations across Lots 2 and 4. Groundwater exceedances for the specified parameters are discussed below.

VOCs/MAHs

Groundwater exceeded CCME Guidelines for the protection of aquatic life for toluene and chlorobenzene in monitoring well 2-BH28 (last sampled July 1998) adjacent to the Fraser River. Chlorobenzene and toluene concentrations in this well also exceed BC WQGs. As toluene and chlorobenzene concentrations were less than CCME and BC WQG Guideline in adjacent wells groundwater exceedances for VOCs/MAHs are expected to be localized to an area of approximately 100m^2. The 2-BH28 well could not be accessed to be sampled during the current SSI program. Sampling of the nearby well MW2-30 during the SSI program indicated non-detect toluene and chlorobenzene concentration in groundwater. It is likely that these exceedances are from historical point sources and are no longer present onsite. Re-sampling or re-drilling a well in the 2-BH28 location is required to verify that VOC impacts do not remain in groundwater at this location.

PAHs

Groundwater exceeded CCME Guidelines for the protection of aquatic life for pyrene (MW2-30) in one of two wells tested on Lot 2. While only two wells were tested on the Lot, there remains a potential for low level PAH exceedances to be present in groundwater across the Lot 2/4 area based on the identified PAHs exceedances in soil across the Site. Pyrene concentrations in groundwater from this location also exceed BC Water Quality Guidelines. Pyrene impacts identified at Lot 2 are bounded to the Site by compliant groundwater from wells southwest and west of the Lot. Given that this well is within 10m of the surface water environment, a potential for offsite migration to the Fraser River remains. Re-sampling MW2-30 is required to verify this result in near shore groundwater.

Chlorophenols

Nine wells were tested and one groundwater sample (4-BH5, collected in July 1998) exceeds guidelines for pentachlorophenol (FCSAP AW Interim Groundwater Guidelines) and 2,3,4,6-tetrachlorophenol (FCSAP AW and Health Canada DW Guidelines). SSI sampling efforts in the

area were focused on delineating around the known exceedance rather than re-sampling within the historical impact area.

Pentachlorophenol and 2,4,5-trichlorophenol concentrations at 4-BH5 exceed BC CSR AW/DW Standards, however groundwater from offsite wells southwest of 4-BH5 are compliant with provincial Standards for chlorophenols. The chlorophenol impact area is bounded to the north, northeast and southwest, and expected to be localized to an approximate 1000m^2 area around Lot 4 (APEC 1).

Dissolved Metals

Dissolved metals were tested in 27 locations. Dissolved metal concentrations (aluminum, antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, titanium, zinc) in groundwater exceed applicable federal Guidelines in 17 of the 27 wells. Onsite groundwater also exceeds provincial Guidelines/Standards for aluminum, antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, nickel, and zinc.

Groundwater from the two offsite wells southwest of Lots 2 and 4 also exceed provincial guidelines/Standards (chromium, iron, manganese) and federal guidelines (arsenic, cadmium, chromium, iron, manganese, titanium, zinc) for metals.

The area of metals impacted groundwater is not delineated onsite, and is expected to be area-wide including on neighbouring properties.

A summary of environmental issues at Lots 2 and 4 to be carried forward into the subsequent risk assessment is presented in the table below.

Media	Contaminant (s) of Concern	Area (m^2)	Identified Depth (m bgs)	Volume (m^3)	Comments
Soil	Metals (Cr*, Cu*, Cd*, Ni*, Zn*, Sn*, Sb*, As*)	Estimated 1.6 ha	0.6-4.6	undefined	Metals above CCME and BC CSR IL Soil Standards (related to APECs 1,2 26 and 27) is generally bounded at the north and northeast of Lots 2/4.
	Naphthalene and Phenanthrene	site wide	0.6 – 2.4	undefined	PAHs above CCME IL Soil Standards was identified on Lots 2 and 4 (APECs 1, 2, 26, 27). Low level PAH impacts appear to be present across the Site

Groundwater	Metals (Al*, As*, Sb*, Ba*, Cd*, Cr*, Cu, Fe*, Pb*, Hg, Mn*,Ni*,Se, Ti, Zn*)	area wide	n/a	undefined	Dissolved metal impacts have not been delineated onsite and are expected to be area wide including on neighbouring properties.
Groundwater	Pentachlorophenol* 2,3,4,6 Tetrachlorophenol and 2,4,5 Trichlorophenol*	Estimated 1000m^2	n/a	undefined	The chlorophenol impact area is expected to be localized to the Lot 4 (APEC 1) area.
Groundwater	Toluene* and Chlorobenzene*	Estimated 100m^2	n/a	undefined	Localized to one near shore location in Lot 2 (APECs 2/26/27).
Groundwater	Pyrene*	Potential to be Site wide	n/a	undefined	Expected site-wide, given the potential for low level PAHs to be present in soil. A potential for offsite migration to the Fraser River remains for the impact in the nearshore Lot 2 area (APEC 2/26/27). Re-sampling MW2-30 is required to verify this result in near shore groundwater.
Offsite soil	Chloride* concentrations in soil from the southwest adjacent property (MV-11BH-02M, 4.5-5 m bgs) exceeded BC CSR Schedule 7 Standards. Chromium* concentrations at this location also exceed BC CSR IL and Schedule 7 Soil Standards. Chromium and chloride impacts have not been fully delineated. Impacts identified to the southwest may be reflective of the previous industrial use of the southwestern properties, and not necessarily indicative of offsite migration.				
Offsite groundwater	Metals (As, Cd, Cr*, Fe,* Mn*, Ti, Zn) impacted groundwater has not been delineated around offsite locations, and is expected to be area-wide including on neighbouring properties.				

*Exceeds BC CSR IL Standards and/or BC CSR Schedule 7 Standards for soil, or BC CSR AW/DW Standards or BC WQGs for groundwater.

Lot 3 (APECs 3, 4, 5, 6, 8, 7, 32, 9, 16, 19, 28)

Due to their physical proximity and similar PCOCs, investigation results for APECs in Lot 3 are presented in the same section.

				PCOCs									
APEC	APEC Description	Substance	Media	Metals	Sulfides	VOC s	F2/F3 (L/HEPH)	PAH	BTEX	F1 (VPH)	Glycols	F4	Phenols/ Chlorophenols
3	Paint AST in the east central portion of the main building	Paint, solvents	SOIL	x		x							
			GW	x		x							
4	Former Mill Service Shop	Oils, waste oil, hydraulic fluids, solvents, hydraulic hoists, metal machining (metals)	SOIL	x		x	x	x	x	x	x	x	
			GW	x		x	x	x	x	x	x		
5	Waste oil AST outside the Mill Service Shop	Waste oil, solvents	SOIL	x		x	x	x	x	x	x		
			GW	x		x	x	x	x	x	x		
6	Former fueling facility	Diesel, gasoline	SOIL				x	x	x	x			
			GW				x	x	x	x			
8	Septic UST	Waste disposal (paints, chemicals etc.)	SOIL			x	x	x	x	x	x		X
			GW			x	x	x	x	x	x		X
7	Main Building (Lumber Storage, Packaging, Application of PCP to lumber)	Wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x			x	x					X
			GW	x			x	x					X
32	Former Kiln B - Lot 3 (North)	Konus Oil	**SOIL**				x	x					
			GW				x	x					
9	Former Lumber Storage Area	Wood treatment chemicals (CCA, chlorophenols,)	**SOIL**	x			x	x					X
			GW	x			x	x					X
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR	Petroleum hydrocarbons (mineral oil and grease)	**SOIL**				x	x	x	x		x	
			GW				x	x	x	x			
19	Former Kiln A- Lot 3 (South)	Konus Oil	**SOIL**				x	x					
			GW				x	x					
28	Fill Lot 3	Metals, PAHs, petroleum hydrocarbons	**SOIL**	x			x	x	x	x			
			GW	x			x	x	x	x			

Lot 3 (and its associated APECs) is located in the south portion of the Site (see Figure 2b). Activities at Lot 3 have historically consisted of lumber manufacturing, staining, and storage. Lot areas not covered by building footprints are currently paved. The Canadian National Railway

(CNR) right of way borders Lot 3 to the east, and Timberland Road, Tannery Road, and Dyke Road border Lot 3 to the South and West. Lot 6 of the Site is directly north of Lot 3.

The Main Lumber Storage and Packaging Building, also referred to as the Imperial Lumber "A Mill", and Kiln Storage Buildings remain onsite. The rest of the Lot area is currently used as a lumber product storage area.

The potential for soil and groundwater impacts from chemical leaks and spills led to APEC identification in the following areas:

- A-Mill (APEC 7) was the storage area for processed lumber, and reportedly the location of "antisapstain (pentachlorophenol) application to lumber products" (SRK Robinson, 1994b; Next Environmental Inc., 1998e).
- Franz identified the footprints of the former Dry Kiln (APEC 19) and former Wet Kiln (APEC 32) for investigation based on the potential use of konus oil as a heating fuel for the kilns.
- a 2,250 L paint AST (APEC 3) "formerly used to contain paint for painting labels on lumber and lumber packaging" in the east –central portion of the A Mill building (NEXT Environmental Inc., 1998c).
- "Waste oil storage (APEC 5) and heavy oil staining" identified at the A Mill shop footprint (APEC 4) (NEXT Environmental Inc., 1998c).
- "Surface staining, a pump island barrel storage, and the presence of a diesel UST "in the vicinity of the former fueling facility (APEC 6) (NEXT Environmental Inc., 1998c).
- "A septic UST (APEC 8) identified on the east Side of the Lot", with the potential to release regulated substances to the subsurface (NEXT Environmental Inc., 1998c).
- Historical storage of lumber products (APEC 9) is localized to the southwest of this section (adjacent to Tannery Road).
- Historical mineral oil and grease impacts in surface soil (APEC 16) identified during subsurface investigations in the southwest of this section, as well as on the west adjacent property (SRK Robinson Inc, 1994a).
- Fill material of unknown quality (APEC 28) has the potential to be present in various locations across the Lot, thus PCOCs related to this APEC were investigated at stations across the Lot 3 area.

Prior to the 2011 SSI thirty-four boreholes were drilled in APEC areas across Lot 3, twenty- one of which were installed as monitoring wells. In 1998, one surface soil sample (3-S1) was collected from exposed soil in the vicinity of the former paint AST. Four surficial soil samples were also collected from drainage ditches northwest (samples S2 and S3, adjacent to Dyke Road), and west of the lot (S4 and S5, adjacent to Tannery Road) (NEXT Environmental, 1998e). One surface soil sample was (SS-2) was also historically collected from the offsite west adjacent property.

During the 2011 SSI, FRANZ conducted the following:

- drilled one borehole finished as a monitoring well for soil and groundwater characterization at newly identified APEC 34 (MV-11BH-17M).
- drilled one borehole completed as a monitoring well on the west adjacent (offsite) property (MV-11BH-04M) for horizontal delineation of identified site impacts. Offsite MV-11BH-04M was destroyed before groundwater could be collected from the well.
- drilled seven boreholes (MV-11BH-05, MV-11BH-06, MV-11BH-07M, MV-11BH-08, MV-11BH-09 and MV-11BH-10M, MV-11BH-14M) at and around APECs 9, 16, 19 and 28. Three of these boreholes (07M, 10M, and 14M) were installed as monitoring wells.

In 2012, FRANZ re-sampled six of the existing monitoring wells remaining around Lot 3 APECs 4,5,6,7,8 and 28 (3-BH10, 3-BH11, 3BH-31, MW07-9, OW5, and 3BH-29) and completed groundwater sampling at each of the newly installed monitoring wells (07M, 10M, 14M and 17M) around APECs 9, 16, 19, 28 and 34.

Soil and groundwater results for Lot 3 investigation locations are presented in Figures 2 through 13 and Tables 23 through 40.

Soil Analytical Results

Soil pH of fill and underlying silts in some locations across the lot was slightly acidic, but overall the mean pH of approximately 6.3, was within the normal range (pH 6-8) defined by CCME.

Soil samples were collected in surficial fill and underlying silt at locations on the east side of the A-Mill Building; around the former mill service shop (APEC 4), waste oil AST (APEC 5) former fueling facility (APEC 6) and septic UST (APEC 8). Representative samples were analyzed for EPH and L/HEPH (regulated under the BC CSR and applicable at offsite surrounding properties), metals, and PAHs. PAHs in soil around APEC 5 (waste oil AST) and metals in soil around APEC 8 (septic UST) exceeded CCME guidelines and/or BC CSR IL Soil Standards and require further discussion.

Soil samples were collected from the Dyke Road ditch, and in surficial fill and underlying silt at and around the paint AST footprint (APEC 3), the A-Mill Building footprint (APEC 7), and in the former kiln footprint north of A-Mill (APEC 32). Road ditch soils were analyzed for metals. Soil from the paint AST area was analyzed for VOCs, BTEX, styrene and VPH. Representative samples from around the A-Mill and former kiln footprints were analyzed for PHC fractions F2-F4, metals, PAHs, EPH, L/HEPH, and phenols/chlorophenols. Soil metals, chlorophenols, and PAHs exceeded CCME soil guidelines and/or BC CSR IL Soil Standards in various samples and require further discussion.

Soil samples were collected from the Tannery Rd. ditch, and surficial fill and underlying silt at and around the former kiln (APEC 19), former lumber storage area (APEC 9), and the identified oil and

grease impact area (APEC 16). Ditch soils were analyzed for EPH (C10-19) and (C19-32). Soil from the former kiln area was analyzed for metals, PAHs, and petroleum hydrocarbon fractions (PHCs) F2-F4, Samples from the former lumber storage area were analyzed for VPH, LEPH/HEPH, EPH (C10-19) and (C19-32), phenols/ chlorophenols and metals, Soil samples from the former oil and grease impact area were analyzed for VPH, LEPH/HEPH, PHCs F1-F4, BTEX, styrene, MTBE, and PAHs. Of the parameters analyzed soil petroleum hydrocarbon compounds (HEPH, EPH C19-32), metals, and PAHs exceeded CCME guidelines and/or BC CSR IL Standards in various samples from these APEC areas and require further discussion.

Surficial soil locations across the Lot 3 area were tested for unknown fill quality (APEC 28) PCOCs of metals, EPH, VPH, PHCs F1-F4, BTEX, PAHs as well as chlorophenols.

Metals

One of two surficial soil samples collected from the Lot 3 road ditch and analyzed for metals exceeded applicable CCME soil guidelines for arsenic, copper and zinc (S2, adjacent to Dyke Road). Soil samples also exceeded BC CSR IL Standards (applicable offsite) and BC CSR Schedule 7 Standards for arsenic (S2), copper (S2), and zinc (S2 and S3). These soil exceedances are currently not delineated, but are expected to be surficial and localized, as soil collected from nearby onsite boreholes and one offsite (MV-11BH-04M) borehole were IL- for metals. If arsenic/copper/zinc impacted soil is removed from the Lot 3 road ditch, a soil relocation agreement will be required to move material to an offsite location.

Chromium and lead concentrations around the septic AST (APEC 8) do not exceed applicable CCME IL soil guidelines, but do exceed BC CSR IL soil Standards for these parameters in one of three locations tested in the area east of A-Mill (3-BH-7,1.5 m bgs). Metal impacts remain to be delineated to the north/northeast, but are expected to be localized. Metals concentrations (chromium, lead, zinc) in surficial soil exceeding BC CSR IL Soil Standards were also identified around the former lumber storage area (APEC 9, 3-BH-2, 0.76 m bgs) and former kiln (APEC 19, 3-BH6, 0.6 m bgs) Again, metal concentrations in these locations do not exceed applicable CCME soil quality guidelines for the Site, and the BC CSR soil exceedances are delineated and expected to be localized.

High concentrations of chromium, lead and zinc in onsite Lot 3 soils appear to be surficial, limited to the upper 1 m of fill soil and sporadic (limited to localized hotspots) across the Lot 3 area. Concentrations of chromium, lead, and zinc in onsite soils not only exceed BC CSR IL Standards but also the BC CSR Schedule 7 Relocation Standard, such that removal of chromium/lead/zinc impacted soil from the Lot 3 area would require a soil relocation agreement for removal of material to an offsite location.

Lead concentrations in surficial soil sampled from the west adjacent property (SS-2) also exceeded BC CSR IL and Schedule 7 Standards, and within the same range of concentrations identified in soil onsite. Metals impacts identified offsite to the west are not necessarily

considered to be indicative of offsite migration but rather reflective of the previous industrial use of the western properties.

Pentachlorophenol

Pentachlorophenol soil concentrations in Lot 3 do not exceed applicable CCME IL soil guidelines, but do exceed BC CSR IL soil Standards and BC CSR Schedule 7 soil Standards in one location historically tested in the A-Mill footprint (APEC 7, 3-BH-4-SRK,0.3 m bgs). The pentachlorophenol impact is horizontally delineated, and expected to be a localized hotspot. If pentachlorophenol impacted soil were to be removed from this location, the material would require a relocation permit prior to being moved offsite.

Petroleum Hydrocarbons (EPH (C19-32), HEPH)

Soil exceeded BC CSR IL Standards for HEPH or EPH (C19-32) (as a measure of HEPH) in two of thirteen locations tested in this Lot (MV-11BH-07M, upgradient of APEC 16; and S4, ditch soil down-gradient of APEC 16). EPH and HEPH are not federally regulated, instead analytical results from these locations were compared to BC CSR IL Standards based on their proximity to the Site boundary, and the potential for impacts on adjacent properties. The vertical extent of hydrocarbon impacts in the borehole is limited to approximately 1.5 m bgs. Ditch soil impacts are also expected to be surficial. Impacted soil appears to be localized to approximately 500m^2 around MV-11BH-07M, and approximately 100m^2 around ditch sample S4.

Previous investigations identified concentrations of mineral oil and grease exceeding former BC Criteria Level C on the property adjacent to MV11BH-07M (SRK Robinson Inc, 1994a). Similar industrial activities have occurred at both the Site and the west adjacent property; as such, petroleum hydrocarbon impacts identified offsite to the west are not necessarily considered to be indicative of offsite migration but rather reflective of the previous industrial use of the western properties.

Soil around APEC 16 exceeds BC CSR Schedule 7 Standards for HEPH, EPH (C10-19), and EPH (C19-32) such that if petroleum hydrocarbon impacted soil around APEC 16 were to be excavated it would require a relocation permit to be moved offsite.

PAHs

Concentrations of naphthalene and phenanthrene in soil exceeded CCME IL Soil Guidelines for protection of freshwater aquatic life in one of two locations tested around APECs 4,5,6, and 8. The identified onsite PAH exceedance (3-BH8, 0.6 m bgs) is located adjacent to the waste oil AST. However, the soil PHCs (EPH, L/HEPH) at this location were non detect suggesting that the PAHs are not sourced from the AST.

Soil concentrations of PAHs (naphthalene) slightly exceed CCME IL Soil Guidelines for protection of aquatic life, in the one borehole at the former kiln (APEC 32). The onsite PAH exceedances (0.5-1 m bgs) is located in the footprint of the former kiln however, the soil PHCs (F2-F4, L/HEPH) at this location were very low or non-detect, suggesting that the PAHs are not sourced from kiln activities.

Concentrations of naphthalene and phenanthene in soil exceed CCME IL Soil Guidelines for protection of aquatic life in two of three locations tested in the APECs 9,16,19, 28 area. Identified onsite PAH exceedances (0.75-3 m bgs) at the former kiln (APEC 19, MV-11BH-10M) and former lumber storage area (APEC 9, MV11-BH07M) are located in the sandy fill and underlying silt and wood debris.

Identified Lot 3 PAH concentrations do not exceed BC CSR IL Standards, or Schedule 7 Standards for soil relocation permitting. The low level PAH exceedances around the Lot 3 waste oil AST, former kilns, and former lumber storage area have not been fully delineated; localized areas of low level PAH exceedances have been identified site wide.

Groundwater Analytical Results

Groundwater collected from wells around A Mill was analyzed for benzene, ethylbenzene, toluene, and styrene, metals, PAHs, EPH, L/HEPH, PHCs F2-F4 VH, VPH chlorophenols, phenols and methyl-tert-butyl ether (MTBE).

Groundwater from wells from around the former kiln footprints (APECs 19 and 32) were tested for BTEX, dissolved metals, PAHs, EPH, VH, VPH, L/HEPH, PHCs F2-F4 and MTBE.

Groundwater from wells around the the former mill service shop (APEC 4)/waste oil AST (APEC 5)/former fueling facility (APEC 6)/septic UST (APEC 8) area was analyzed for BTEX, styrene, dissolved metals, PAHs, EPH, L/HEPH, VPH, VH, VOCs and PHCs F1-F4.

Groundwater from wells around the oil and grease impact area (APEC 16) was analyzed for BTEX, styrene, PAHs, EPH, L/HEPH, VH.VPH, PHCs F1-F4 and MTBE.

Groundwater collected from wells around the former lumber storage area (APEC 9) was analyzed for BTEX, dissolved metals, PAHs, EPH, L/HEPH, PHCs F2-F4, phenols and chlorophenols.

Groundwater from wells across the Lot 3 area were tested for unknown fill quality (APEC 28) PCOCs of metals, PHCs F1-F4, BTEX, and PAHs.

Dissolved metals phenols, and chlorophenols, in onsite groundwater exceed federal guidelines and/or provincial Standards in various locations and require further discussion.

Dissolved Metals

Groundwater exceeded applicable federal guidelines as well as provincial Standards for dissolved iron and manganese in all wells tested across Lot 3.

In addition to the Lot wide iron and manganese impacts, groundwater in the north of Lot 3 exceeded applicable federal guidelines for the following parameters and areas:

- dissolved arsenic, aluminum, zinc, barium, copper, and lead in two of two wells tested around the A Mill footprint (APEC 7). Soil metals are compliant with federal guidelines and provincial Standards in the A Mill footprint, however road ditch soils in this area exceed federal guidelines and provincial standards for arsenic, copper and zinc.
- dissolved arsenic, aluminum, zinc, chromium and cadmium in two of two wells tested around the former mill service shop (APEC 4) /waste oil AST (APEC 5) /former fueling facility (APEC 6) /septic UST (APEC 8) area. Localized chromium and lead impacts (above BC CSR soil Standards only) were identified in surficial soil around the APEC 8 area.
- In addition to the Lot wide iron and manganese impacts, groundwater in the south of Lot 3 exceeded applicable federal guidelines for the following parameters and areas:
- dissolved arsenic, aluminum, zinc, copper cadmium, chromium in both wells tested around the former lumber storage area (APEC 9). A localized chromium, lead, and zinc hotspot (above BC CSR Soil Standards) was identified in surficial soil in the former lumber storage area.
- dissolved aluminum, zinc, titanium copper, cadmium in one well tested at the former kiln footprint (APEC 19).
- In addition to the Lot wide iron and manganese impacts, groundwater in the north of Lot 3 exceeded BC CSR AW/DW Standards for the following parameters and areas:
- dissolved barium and zinc in the A Mill footprint,
- dissolved arsenic in the former mill service shop/waste oil AST/former fueling facility/septic UST area.

Metals impacted groundwater at Lot 3 is not delineated onsite and is expected to be area-wide, including on neighboring properties.

Phenol and Chlorophenols

Groundwater samples exceeded applicable federal guidelines for pentachlorphenol and 2,3,4,6-tetrachlorophenol in one of (3-BH27, sampled 1998-2004) of the nine wells tested in the A Mill footprint (APEC 7). Concentrations of pentachlorophenol, 2,3,4,6-tetrachlorophenol, and total tetrachlorophenols in monitoring well 3-BH27 also exceed BC CSR DW/AW Standards. The area around 3-BH27 is also where localized pentachlorophenol impacts (concentrations exceeding BC CSR Standards) were identified in soil. The horizontal extent of chlorophenols impacted groundwater in this section has been delineated by wells screened within approximately the same interval (0.6-3.6 m bgs) as 3-BH27, to the south, north, and west of this location.

Groundwater also exceeded applicable federal guidelines for chlorophenols and phenols in two wells (of four wells tested) in the former lumber storage area (APEC 9) immediately south of the A-Mill. Monitoring wells MW3-29 (last sampled November 2009) and 3BH-29 (last sampled February 2012) exceed FCSAP AW Interim Groundwater Guidelines and/or Health Canada Drinking Water Quality Guidelines for 2,4-Dichlorophenol, 2,4,5-Trichlorophenol, 2,4,6- Trichlorophenol, 2,3,4,6-

Tetrachlorophenol, Pentachlorophenol and Phenol. Concentrations of 2,4,6- trichlorophenol, 2,3,4,6-tetrachlorophenol, pentachlorophenol, phenol, 2-methyl 4,6-dinitrophenol, 2,3,4,5-tetrachlorophenol, 3,4,5-trichlorophenol, total tetrachlorophenols, and total trichlorophenols in these wells also exceed BC CSR AW and DW Standards. Impacted groundwater has been generally delineated to the east, west, and northwest (generally cross gradient and down-gradient) of the MW3-29/3-BH29 area.

Chlorophenols impacts in the A Mill footprint (3-BH27) and wells immediately south of A Mill (3-BH29 and MW3-29) are expected to be related based on proximity to source, and similar identified groundwater COCs. Chlorophenol impacts in groundwater have not been fully delineated cross gradient or up-gradient of 3-BH29/MW3-29. Previous investigations in the area have identified the building area around this impact as the location where "PCP (antisapstain) spray was reportedly applied to lumber" (Next Environmental Inc.,1998e). The chlorophenols impact area is expected to be localized to the south-central portion of the Main Lumber Storage and Packaging Building/A-Mill (approximately 3,000-5000 m^2).

Summary

A summary of environmental issues at Lot 3 which will be carried forward into the subsequent risk assessment is presented in the table below.

Media	Contaminant (s) of Concern	Area (m^2)	Depth (m bgs)	Volume (m^3)	Comments
Soil	Naphthalene and Phenanthrene	site wide	0-3	undefined	Localized areas of low-level PAH exceedances in soil at the waste oil AST (APEC 5), former kilns (APECs 19 and 32) and former lumber torage area (APEC 9); low level PAH impacts appear to be present across the Site
	Metals (As*, Cu*, Zn*) (road ditch)	Assumed 10 at each location	undefined	undefined	Impact area in the road ditch currently not delineated.
	(Cr*, Pb*, Zn exceed BC CSR IL/ Schedule 7 Standards only)	Assumed 10 at each location	Up to 1	Up to 30	Localized areas of metals above BC CSR IL Standards in fill soil around the Lot 3 septic AST (APEC 8), former kiln (APEC 19) and former

					lumber storage area (APEC 9).
	HEPH* and EPH (C19-32)* (EPH (C10-19)* exceeds BC CSR Schedule 7 Standards ony)	Estimated 500 (07M) and estimated 100 (S4)	Up to 1.5	undefined	Expected to be localized hydrocarbon impacts around the oil and grease impact area (APEC 16). Impacts have not been delineated towards the west adjacent property (offsite).
	(Pentachlorophenol* exceed BC CSR IL/ Schedule 7 Standards only)	Assumed 10	undefined	undefined	Localized hotspot of pentachlorophenol above BC CSR IL Standards in the A Mill footprint (APEC 7).
Groundwater	Dissolved Metals (Al, As*, Ba*, Cu, Cd, Cr, Fe* , Pb, Mn*, Ti, Zn*)	area wide	n/a	undefined	Impacts have been identified across Lot 3; and have not been delineated onsite.
	Pentachlorophenol*, 2,3,4,6-Tetrachlorophenol* (total Tetrachlorophenols* also exceed BC CSR Standards only) (3-BH27) 2,4-Dichlorophenol, 2,4,5-Trichlorophenol*, 2,4,6-Trichlorophenol*, 2,3,4,6-Tetrachlorophenol*, Pentachlorophenol* and Phenol* (2-methyl 4,6-dinitrophenol, 2,3,4,5 tetrachlorophenol, 3,4,5-trichlorophenol*,	Estimated 3,000-5000	n/a	undefined	Impact area is expected to be localized to the south-central portion of the Main Lumber Storage and Packaging Building/A-Mill (APECs 7 and 9).

	total tetrachlorophenols, total trichlorophenosl also exceed BC CSR Standards only) (3-BH29 and MW3-29)				
Offsite Soil	Metals (Pb*)	Lead concentrations in soil from the west adjacent property (SS-2, 0.2 m bgs) exceeded BC CSR IL and Schedule 7 Standards. Offsite impacts have not been fully delineated. Impacts identified offsite to the west are not necessarily indicative of offsite migration but may be reflective of the previous industrial use of the western properties.			

*Exceeds BC CSR IL Standards and/or BC CSR Schedule 7 Standards for soil, or BC CSR AW/DW Standards for groundwater.

Lot 5 (APECs 10, 11, 12, 13, 14, 15, 20, 29, 31)

Due to their physical proximity and similar PCOCs, investigation results for APECs in Lot 5 are presented in the same section.

				PCOCs										
APEC	**APEC Description**	**Substance**	**Media**	Metals	F4	Sulfides	VOC s	F2/F3 (L/HEPH)	PAH	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
10	Gasoline UST	Gasoline	**SOIL**					x		x	x			
			GW					x		x	x			
11	Waste oil AST	Waste oil, solvents	**SOIL**	x	x			x	x	x	x	x		
			GW	x				x	x	x	x	x		
12	Area of disposal for former in-ground hydraulic hoists	Hydraulic fluid	**SOIL**		x		x	x						
			GW				x	x						
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)	Wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x	x			x	x					x
			GW	x				x	x					x
13	Former Green Chain and Planer	Wood treatment chemicals	**SOIL**	x				x	x					x

	Mill	(CCA, chlorophenols)	**GW**	x				x	x					x
15	Wood Chip and Wood Debris Area	Organic leachate: Phenolics, metals, wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x										x
			GW	x										x
20	Former Kiln - Lot 5	Konus Oil	**SOIL**					x	X					
			GW					x	X					
29	Fill Lot 5	Metals, PAHs, petroleum hydrocarbons	**SOIL**	x				x	x	x	x			
			GW	x				x	x	x	x			
31	Lumber Storage Area - Lot 5	Wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x				x	x					x
			GW	x				x	x					x

Most of the above APECs are localized near the northeastern and eastern boundaries of Lot 5 (see Figure 2b). APECs 29 and 31 are lot-wide APECs investigating soil quality across Lot 5.

Activities in Lot 5 have historically consisted of lumber manufacturing, staining/treatment, and storage, as well as truck and transport operations. APEC footprints are mainly located around the Imperial Lumber “B Mill” building (also referred to as the B Mill Waste Storage Shed) and the former Green Chain and Planer building.

The Lot is currently used for lumber storage, and remaining buildings include two storage sheds southwest of B-Mill, a work shed south of the B-Mill, and an office building southeast of B-Mill. Most of the Lot is paved with the exception of the B-Mill footprint which reportedly has a graveled floor (Next Environmental Inc.,1998d) and exposed surficial soil in the area around the two southern storage buildings. Lot 5 is bordered to the west by the CNR right of way, to the north by an offsite construction and storage company (RDM Enterprises- Imperial Yard (Next Environmental Inc, 1998d)), and to the east by up gradient and offsite APEC 17 (Auto Wrecking Yard).

The potential for soil and groundwater impacts from chemical leaks and spills led to APEC identification in the following areas:

- A Gasoline UST (APEC 10) with associated pump island located south of the B-Mill Building. The gasoline UST is understood to be no longer in use, but remains onsite. The size of the UST remains unknown (Next Environmental Inc.,1998d).
- A 1350 litre Waste Oil AST (APEC 11) with surficial soil staining, and used oil filters identified around the AST location, south of the B-Mill Building (Next Environmental Inc.,1998d).

- "Surface staining and corroded asphalt in the vicinity of the hydraulic hoist disposal area, on the southwest side of the B Mill Building" (APEC 12) (Next Environmental Inc.,1998d).
- "The former location of an aboveground chlorophenol dipping tank (operated by hydraulic hoists) in the B-Mill Building" (APEC 14) (Next Environmental Inc.,1998d).
- The potential for leaks and spills from "historical application of PCP to lumber in the former Green Chain and Planer building" (APEC 13) (Next Environmental Inc, 1998d).
- The potential for wood treatment chemicals (e.g. PCP) to be present on "wood chips and wood debris (APEC 15) identified in the northeast of the Lot" and adjacent to the Green Chain and Planer Mill Building (Next Environmental Inc, 1998d).
- A former Kiln footprint (APEC 20) where lumber was dried in a controlled environment, is located in the northeast corner of this Site section. This area was identified as an APEC based on the potential use of konus oil as a heating fuel for the kiln.

Lot-wide APECs (APEC 29 and APEC 31) were identified on the following basis:

- Imported fill of unknown origin and quality (APEC 29), was identified during drilling investigations encountering sandy fill extending 2-3 m below ground surface on Lot 5 (NEXT Environmental 1998).
- Historical storage of treated lumber (APEC 31) has the potential to impact underlying soil and groundwater in uncovered portions of the Site.

B-Mill Area (APECs 10,11,12,14): Historical soil and groundwater data from 23 boreholes (18 completed as monitoring wells) drilled in the B-Mill Area were used to support the investigation of APECs 10,11,12,and 14. During the 2011 SSI, FRANZ drilled 4 boreholes around these APECs (one onsite (MV-11BH-15M), and three offsite (MV-11BH-11M to 13M) to aid in horizontal delineation of impacts. All four boreholes were finished as monitoring wells. In February 2012, FRANZ sampled groundwater from all newly installed monitoring wells and one existing monitoring well (5-BH-23) onsite.

Former Green Chain and Planer Mill and Kiln Area (**APECs 13,15,20):** Historical soil and groundwater data from 11 boreholes (six completed as monitoring wells) drilled in the northeastern portion of the Lot support the investigation of APECs 13,15 and 20. As part of the 2011 SSI, FRANZ planned to drill and to install a monitoring well in the APEC 20 footprint. Due to ongoing Site operation, APEC 20 was not accessible and drilling at the proposed location was not possible.

Lot Wide Area (APECs 29,31): Historical soil and groundwater data from four test pits and 24 boreholes (10 completed as monitoring wells) located across Lot 5 support the investigation of APECs 29 and 31. During the 2011 SSI, FRANZ drilled one borehole in the centre of the Lot (away from building APECs), finished as a monitoring well (MV11-BH-16M) to further characterize soil fill/ and groundwater quality at Lot 5. In February 2012, FRANZ conducted groundwater sampling at this newly installed well.

Soil and groundwater results for Lot 5 investigation locations are presented in Figures 2 through 14 and Tables 41 through 60.

Soil Analytical Results

Soil samples collected from sand fill and underlying silt and organics layers around the Former Green Chain and Planer Mill and Kiln area (APECs 13,15, and 20) were compliant with applicable guidelines for BTEX, metals and chlorophenols/phenols; as well as VPH and EPH (C10-19) and (C19-32) which are regulated under the BC.CSR. PAHs were identified as a secondary PCOC for this area but were not historically tested in soil. This is not considered a significant data gap on the basis that EPH (a primary PCOC) concentrations were non-detect in soil collected from the Former Green Chain and Planer Mill and Kiln area.

Soil samples collected from fill and the underlying silt layer at locations across Lot 5 (APECS 29, and 31) were compliant with applicable guidelines and Standards for BTEX, PAHs, PHC F1-F4, chlorinated and non-chlorinated phenols, and metals, L/HEPH and EPH. Soil pH of sandy fill and underlying silts from locations across the lot was slightly acidic, with a mean pH of approximately 5.8, slightly below the normal range (pH 6-8) defined by CCME.

Onsite soil around the B Mill Building (APECs 10,11,12,14) was analyzed for PAHs, BTEX, PCBs VOCs, metals, EPH, L/HEPH, VPH and chlorinated and non-chlorinated phenolics. Soil sampled from offsite locations (north and adjacent to APECs 10,11,12, and 14) was analyzed for VOCs (MTBE), BTEX, Styrene, L/HEPH, VPH, petroleum hydrocarbon fractions F1-F4, PAHs, metals, and chlorinated and non-chlorinated phenolics.

Soil concentrations exceeded applicable CCME guidelines and/or CSR Standards (IL and Schedule 7) for the below listed parameters around the B-Mill Building, and are further discussed in the following sections.

- Xylenes, EPH(C10-19), VPH (onsite)
- Chlorophenols (onsite),
- PAHs (onsite and offsite),
- Toluene and zinc (offsite),

Xylenes / EPH (C10-19) / VPH

Soil in one (5-BH27, 0.6 m bgs) of 11 locations tested around B-Mill exceeds CCME IL (IL+) Guidelines, as well as BC CSR IL Standards for xylenes. Xylene impacted soil does not appear to extend offsite, and is bounded onsite to an estimated area of 400 m^2. The vertical impact extent has not been delineated but is expected to be limited to the sandy fill layer in this section (approximately 0-1.5. m bgs). VPH and EPH (C10-19) concentrations greater than BC CSR IL

Standards are co-located to the xylene impacted sandy fill layer at 5–BH27. VPH and EPH (C10-19) concentrations in cross gradient and downgradient locations are non-detect, and bound onsite PHC impacts in this area.

Soil at the 5-BH27 location also exceeds BC CSR Schedule 7 Standards, and based on the measured soil concentrations a soil relocation agreement would required to move the xylene, VPH, and EPH (C10-19)-impacted soil from this area to offsite non-agricultural land.

Chlorophenols

Of the nine locations tested onsite and offsite around B-Mill, soil exceeded CCME IL (IL+) Guidelines for pentachlorophenol and 2,3,4,6-tetrachlorophenol in the sandy fill layer at one location (5-BH27, 0.6 m bgs) where xylene, VPH, and EPH(C10-19) impacts were also identified.

Soil in the sandy fill layer also exceeds BC CSR IL and Schedule 7 Standards at 5-BH22 (pentachlorophenol, 0.46 m bgs) and 5-BH27 (pentachlorophenol and 2,3,4,6-tetrachlorophenol, 0.6 m bgs).

Chlorophenol impacts do not extend offsite, and are bounded cross gradient and downgradient of B-Mill for an estimated impact area of approximately 400 m^2. The vertical extent of impacts has not been delineated onsite. Due to exceedances of BC CSR Schedule 7 Standards, chlorophenol impacted soil around the B-Mill footprint would require a soil relocation agreement for removal to offsite non-agricultural land.

PAHs

Soil concentrations of naphthalene and phenanthene exceed CCME IL Soil Guidelines for protection of freshwater aquatic life, and the CCME calculated health based index of additive cancer risk (IACR) for protection of potable groundwater in two of four onsite locations tested around B-Mill (5-BH23 and 5-BH27). Onsite PAH concentrations (with impacts in the upper 1.5 m of soil) do not exceed BC CSR IL Standards or Schedule 7 Standards for soil relocation permitting. The low level PAH exceedances around the B-Mill footprint have not been fully delineated; localized areas of low level PAH exceedances have been identified site wide.

PAH concentrations in soil from offsite locations immediately north and adjacent to B-Mill (11M, 12M, and 13M, 0.5-2 m bgs) are above CCME Guidelines for acenaphthene, fluorene, naphthalene, phenanthrene, and PAH IACR; but are compliant with BC CSR IL and Schedule 7 Standards. PAH concentrations in soil from these offsite locations are generally 3-10x the concentrations identified in onsite soil; offsite impacts may not be originating from onsite source activities.

Zinc/ Toluene

Total zinc concentrations exceed CCME IL Guidelines, as well as BC CSR IL Standards for the protection of Aquatic Life in one offsite location (MV-11BH-12M, 0.5-1 m bgs) adjacent to B-Mill.

This offsite impact has been delineated down gradient (onsite), but not fully delineated crossgradient on the offsite property. Zinc concentrations in soil samples from the same interval onsite were one order of magnitude lower than concentrations observed at MV-11BH-12M, therefore it is unlikely that IL+ soil at MV-11BH-12M is originating from operations at the Site. Concentrations of zinc in surficial soil at this offsite location not only exceed BC CSR IL Standards but also the BC CSR Schedule 7 Relocation Standard, such that zinc impacted soil from this area would require a soil relocation agreement for removal of material offsite.

Toluene concentrations in surficial soil from two offsite locations (MV-11BH-11M and MV11-BH-12M, 0.5-1 m bgs) are greater than federal soil guidelines, but compliant with the applicable CSR IL and Schedule 7 Standards. Toluene concentrations at all tested locations on Lot 5 are compliant with CCME and BC CSR Standards/Guideline; offsite concentrations of toluene are not expected be originating from operations at the Site.

Groundwater Analytical Results

Groundwater from Lot 5 was analyzed for PHCs F1–F4, BTEX, styrene, PAHs, metals, chlorophenols, PHCs F2-F4, VPH, EPH, LEPH, HEPH, and VOCs. Concentrations of Ethylbenezene, LEPH, PAHs, chlorophenols and dissolved metals in onsite groundwater exceed federal guidelines and/or provincial Standards in various locations and require further discussion.

Groundwater collected from wells offsite and adjacent to Lot 5 was analyzed for BTEX, styrene, dissolved metals, MTBE, phenols and chlorophenols, PHCs F1-F4, EPH, VPH, VH (C6-C10), LEPH, and PAHs. Concentrations of LEPH, dissolved metals, and PAHs in offsite groundwater exceed BC CSR Standards and are also discussed in the following sections.

Ethylbenzene

BTEX concentrations in groundwater from the Lot wide area (APEC 29, 31) and Green chain, planer mill and kiln area (APEC 13,15,20) were compliant with applicable guidelines and Standards.

In the B-Mill area (APEC 10,11,12,14), ethylbenzene concentrations exceeded Canadian Drinking Water Guidelines as well as BC CSR DW Standards at one of seven locations tested (5-BH25,last sampled in 1998). Ethylbenzene concentrations do not exceed FCSAP Guidelines for the protection of freshwater/marine aquatic life.

The ethylbenzene impact area is located adjacent to the AST and UST in the B-Mill Area (APECs 10 and 11) and likely attributable to leaks from these sources. Ethylbeneze impacts do not appear to extend offsite. Impacted groundwater is generally delineated to the north south, and west of this location and represents a historical impact area of approximately 250 m^2.

LEPH

VPH, EPH, LEPH, and F2 concentrations in groundwater from the Lot wide area (APEC 29, 31) and Green chain, planer mill and kiln area (APEC 13, 15, 20) were compliant with applicable Guidelines and Standards.

VPH, EPH, F1 and F2 concentrations in groundwater around the B-Mill are compliant with current federal Guidelines and provincial Standards. However, historically a LEPH plume has been identified by SRK Robinson Inc. (1994), and Next Environmental Inc. (1998) at and down-gradient of the AST and UST in the B-Mill Area (APECs 10/11).

LEPH concentrations in groundwater from 5-BH25 (sampled 2001), and 5-BH27 (sampled 2001) exceed BC CSR AW/DW Standards. Groundwater concentrations of LEPH in 5-BH23 (down gradient of the AST/UST and IL+ in 2001) are currently less than BC CSR Standards. Offsite groundwater tested from a well adjacent to the AST and UST area (MV-11BH-11M, sampled 2012) also exceeds BC CSR Standards for LEPH. The LEPH plume has not been delineated offsite, although it has been delineated east (onsite MW5-20, up-gradient) and southwest (onsite 5-BH23, downgradient) of the APECs 10 and 11 location. The LEPH plume around MV-11BH-11M /5-BH25/5-BH-27 is expected to represent a localized impact area of approximately 900m^2. Further work is recommended to delineate the LEPH plume offsite.

PAHs

PAH concentrations in groundwater from the Green Chain, Planer Mill and Kiln area (APECs 13,15,20) and in groundwater in the south and central areas of Lot 5 (APEC 29,31) were compliant with applicable federal guidelines, as well as being below BC CSR DW/AW Standards.

Groundwater tested from wells in the B-Mill Area (APECs 10,11,12,14) exceeded FCSAP Interim Groundwater Guidelines for Naphthalene (IL+) in three locations (5-BH25, 5-BH27 and MW5-20, collected in 1998 and 2009) adjacent to and west of the AST/UST onsite. Groundwater in this area also exceeds BC CSR AW/DW Standards for naphthalene (5-BH27 only). Monitoring well 5-BH23 (previously IL+ for naphthalene in 1998) was re-sampled by FRANZ in 2012 and all PAHs were less than the laboratory detection limit at this location. The reduction in concentrations could (in part) be attributed to a change in sampling methodology from sampling with waterra tubing or bailers by previous consultants to low flow sampling conducted by FRANZ. As a result, it is likely that the historical analytical results were influenced by a sampling artefact (high turbidity), which may have resulted in elevated reported concentrations.

Naphthalene impacted groundwater at the B-Mill area is co-located with localized ethylbenzene and LEPH impacted groundwater, suggesting that PAH impacts are potentially related to a historical fuel leak or spill from the AST or UST onsite (APEC 10 or 11). Naphthalene impacts in groundwater have been delineated west (downgradient) and southwest (cross-gradient) of these wells for a historical impact area of approximately 1,000 m^2.

Offsite groundwater, tested from a well adjacent to the AST and UST (MV-11BH-11M) had concentrations of benzo(a)pyrene, fluoranthene and pyrene greater than FCSAP guidelines for the protection of aquatic life, with concentrations of benzo[a]pyene also exceeding applicable BC CSR AW/DW Standards. PAH exceedances are not delineated offsite.

Benzo(a)pyrene, fluoranthene and pyrene concentrations in groundwater from onsite wells were all below laboratory detection limits, suggesting that PAH contamination at MV-11BH-11M is unlikely to be originating from operations at the Site. Re-sampling of onsite and offsite wells downgradient of APECs 10 and 11 (MV-11BH-11M, MW5-20, MV-11BH-12M, 5BH-27) should be conducted to confirm current groundwater PAH concentrations.

Metals

Groundwater tested in the following Lot 5 areas exceeded applicable federal guidelines for numerous metals:

- **Green Chain and Planer Mill and Kiln area:** Groundwater tested from MW5-12 (last sampled November 2009) exceeded FCSAP Aquatic Life Guidelines for dissolved chromium. The chromium concentration identified at MW5-12 does not exceed BC CSR DW and AW Standards. Chromium concentrations in wells downgradient of this location (BV11BH-03M, 04M, 09M), are compliant with the FCSAP AW Guideline however metals impacted groundwater has not been fully delineated onsite. This well has not been historically tested for any other metals than chromium, and there remains the potential for other exceeding metals concentrations in groundwater in this area.
- **Lot wide area:** Groundwater tested from 5-BH29, (last sampled in 1998) exceeded applicable FCSAP Aquatic Life Guidelines and/or Canadian Drinking Water Quality Guidelines for dissolved aluminum, arsenic, copper, iron, manganese, and zinc. Dissolved arsenic, iron, and manganese at this well also exceed BC CSR DW and AW Standards. During the 2011 SSI, monitoring well 5-BH29 was proposed to be re-sampled to confirm metals impacts, but the well could not be located amid debris and machinery in this portion of the Site.
- **B-Mill area:** Onsite groundwater tested from 5-BH27, (last sampled in 1999) exceeded applicable FCSAP Aquatic Life Guidelines and/or Canadian Drinking Water Quality Guidelines for dissolved aluminum, arsenic, cadmium, copper, iron, manganese, and zinc. Groundwater also exceeded BC CSR Aquatic Life and/ or Drinking Water Quality Standards for arsenic, cadmium, iron and manganese. Soil metals are compliant with federal and provincial standards in Lot 5.

Groundwater sampled from offsite wells adjacent to the B-Mill Area (MV-11BH-12M and MV11-BH13M, sampled in 2012) also have concentrations of aluminum, arsenic, cadmium, copper, iron, manganese, titanium, and zinc above federal groundwater guidelines. Offsite wells exceed applicable BC CSR AW and DW Standards for dissolved arsenic, iron, and manganese. Groundwater concentrations of metals in offsite wells are also generally greater than concentrations identified in onsite Lot 5 wells.

The area of metals impacted groundwater at Lot 5 is not delineated onsite, and is expected to be area wide including on neighboring properties.

Chlorophenols

Groundwater from six wells tested between 1994 and 2009 in the Green chain, planer mill, and kiln area (APEC 13/15/20) was compliant with federal Guidelines and provincial Standards for phenols and chlorinated phenols.

Lot 5 groundwater exceeded applicable federal guidelines for pentachlorophenol and 2,3,4,6-tetrachlorophenol in multiple locations across the Lot wide area and around B-Mill.

- **Lot Wide Area:** Seven wells were tested and groundwater samples from two locations (5-BH29 (collected in 2003) and 5-BH31 (collected in 1998)) exceeded applicable federal Guidelines for pentachlorophenol, and 2,3,4,6,-tetrachlorophenol. Pentachlorophenol concentrations exceed BC CSR Standards at 5-BH31. Concentrations of pentachlorophenol 2,3,4,6-tetrachlorophenol 2,3,4,5-tetrachlorophenol, 2,3,4-trichlorophenol, and 2,3,6,-trichlorophenol also exceed BC CSR Standards at the Site boundary (5-BH29).

  Pentachlorophenol impacted groundwater at well 5-BH31 is expected to be localized to an area of approximately 700m^2; and has been generally bounded by compliant results further up gradient and down gradient of this location. Full delineation remains to be conducted in this area.

  Under the BC CSR, AW Standards for chlorophenols vary with pH and temperature. As pH and temperature readings were not available for the December 2003 sampling event at 5-BH29, historical pH records from the July 1998 sampling event (pH 6.13), and mean Site wide groundwater temperature from a December 2007 sampling event (9.3°C) were used to determine appropriate CSR Standards with which to evaluate 2003 analytical results at the Site boundary well (5-BH29).

  Chlorophenol impacted groundwater at the Site boundary (5-BH29) is generally bounded by compliant results in wells northwest and northeast of this well for an estimated impact area of approximately 1250 m^2. The groundwater impact area at the boundary is not fully delineated and chlorophenol impacts may extend offsite and warrants additional investigation in this area.

- **B Mill Area:** Groundwater from 10 wells in this Site section were tested and six exceeded applicable federal guidelines for pentachlorophenol, 2,3,4,6-tetrachlorophenol, and 2,4,6-trichlorophenol around the northwestern portion of the B-Mill footprint, where a PCP dip tank was formerly located (5-BH27, BH32, BH33, BH34, MW5-13, MW5-32, last sampled 2003-2009). Groundwater concentrations of pentachlorophenol, tetrachlorophenols (2,3,4,5; 2,3,4,6; and 2,3,5,6, isomers) and trichloropenols (2,3,4-; 2,3,5-; 2,4,5-; 2,4,6-; 3,4,5- isomers) in the B-Mill area also exceed BC CSR AW/DW Standards. Chlorophenol impacted groundwater has been localized to the western portion of the B-Mill Building (approximately 1500 m^2). Based on 2011 SSI investigation results chlorophenol impacts do not extend offsite in this area.

Summary

A summary of environmental issues at Lot 5 which will be carried forward into the subsequent risk assessment is presented in the table below.

Media	Contaminant (s) of Concern	Area (m^2)	Depth (m bgs)	Volume (m^3)	Comments
Soil	Xylenes*, EPH(C10-19)*, VPH*	Estimated 400	undefined	undefined	Localized to the north side of the B-Mill footprint (APEC 14), and down gradient of the waste oil AST and gasoline UST (APECs 10 and 11). Does not extend off Site.
	Pentachlorophenol * and 2,3,4,6-Tetrachlorophenol*	Estimated 400	undefined	undefined	Localized to the north side of the B-Mill footprint where the dip tank was formerly located (APEC 14), Does not extend off Site.
	Naphthalene and Phenanthrene	site wide	0-1.5	undefined	Localized area of low-level PAH exceedances in soil at B-Mill; low level PAH impacts appear to be present across the Site. PAH concentrations in soil from offsite locations adjacent to B-Mill are generally 3-10x the concentrations identified in onsite soil, offsite PAH impacts may not be originating from onsite source activities.
Groundwater	Ethylbenzene*	250	n/a	undefined	Ethylbenzene impacts in groundwater are located adjacent to the AST and UST in the B-Mill Area (APECs 10 and 11) and likely attributable to leaks from these sources. Impact area does not extend off Site
	LEPH*	900	n/a	undefined	A LEPH plume (approximately 900 m^2), has been identified onsite and offsite at and down-gradient of the AST and UST in the B-Mill

					Area (APECs 10/11).
	Naphthalene*	Estimated 1,000	n/a	undefined	Some elevated historical concentrations might be the result of a sampling artefact. Napthalene exceedances are co-located with ethylbenzene and LEPH impacted groundwater, suggesting that PAH impacts may be related to a historical fuel leak/spill from the AST or UST onsite (APEC 10 or 11).
	Dissolved Al, As*, Cr, Cd*, Cu, Fe*, Mn* Ti, and Zn	area wide	n/a	undefined	Impacts have been identified across Lot 5 and not been delineated onsite. Concentrations of metals in offsite wells are generally greater than concentrations identified in onsite Lot 5 wells
	Pentachlorophenol*, and 2,3,4,6-Tetrachlorophenol* (Tetrachlorophenols (2,3,4,5; 2,3,5,6, isomers) and trichloropenols (2,3,4-; 2,3,5-; 2,4,5-; 2,4,6-; 3,4,5- isomers) exceed BC CSR AW/DW Standards here.) Pentachlorophenol* Pentachlorophenol* ,2,3,4,6-tetrachlorophenol*, (2,3,4,5-tetrachlorophenol*,	1500 Estimated 700 (5-BH31) Estimated 1250 (5-BH29)	n/a	n/a	Localized to the northwestern portion of theB-Mill footprint. Impacts in this area do not extend offsite. Identified in the west portion of the Lot. Impact area remains un-delineated but is expected to be localized Identified in the southeast portion of the Lot (adjacent to

	2,3,4-trichlorophenol*, and 2,3,6,-trichlorophenol* exceed BC CSR AW/DW Standards here)				Timberland Road). Impact area remains undelineated There is a potential for off Site impacts.
Off Site soil	IL+ soil (Zinc*) is present off Site (0.5-1 mbgs), at the Site boundary, This offsite impact has not been fully delineated, however it does not seem to be originating from operations occurring on Site. Toluene soil concentrations off Site (0.5-1 mbgs), at the Site boundary, are greater than CCME soil guidelines but compliant with CSR IL Standards. Toluene concentrations offsite do not seem to be originating from operations occurring on Site. PAH soil concentrations (naphthalene, phenanthrene, fluorene and acenaphthene) in offsite locations adjacent to B-Mill are greater than CCME guidelines, but compliant with applicable CSR IL Standards.				
Off Site groundwater	Groundwater with LEPH (approximately 900 m^2), has been identified onsite and offsite at the B-Mill area. Benzo(a)pyrene*, Fluoranthene and Pyrene concentrations greater than the applicable BC CSR Standards have been identified in an offsite well adjacent to the B-Mill area, PAH impacts in this well do not seem to be related to PAH contamination on Site. Groundwater from offsite wells adjacent to B-Mill also exceed federal and provincial Standards/Guidelines for dissolved aluminum, arsenic*, chromium, copper, iron*, manganese*, titanium, and zinc. Pentachlorophenol, 2,3,4,5-Tetrachlorophenol, 2,3,5,6-Tetrachlorophenol, 2,3,4-Trichlorophenol and 2,3,5-Trichlorophenol concentrations exceed BC CSR AW/DW Standards at the southeast Site boundary (5-BH-29). The impact area potentially extends offsite, thus warranting further investigation in the area.				

*Exceeds BC CSR IL Standards and/or BC CSR Schedule 7 Standards for soil, or BC CSR AW/DW Standards for groundwater.

Lot 6 (APECs 21, 22, 23, 25, 30, 34)

Due to their physical proximity, investigation results for APECs in Lot 6 are presented in the same section.

				PCOCs										
APEC	**APEC Description**	**Substance**	**Media**	Metals	Sulfides	VOC s	F2/F3 (L/HEPH)	PAH	BTEX	F1 (VPH)	Glycols	Salts	Phenols/ Chlorophenols
21	Oil Storage Shed - Brownsville	Konus Oil/Heating Oil	**SOIL**				x	x	x	x			
			GW				x	x	x	x			
22	Former Kiln - Brownsville	Konus Oil	**SOIL**				x	x	x	x			
			GW				x	x	x	x			
23	Former Green Chain - Brownsville	Wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x			x	x					x
			GW	x			x	x					x
25	Lumber Storage Area - Brownsville	Wood treatment chemicals (CCA, chlorophenols)	**SOIL**	x			x	x					x
			GW	x			x	x					x
30	Fill Lot 6	Metals, PAHs, petroleum hydrocarbons	**SOIL**	x			x	x	x	x			
			GW	x			x	x	x	x			
34	VPH and LEPH Plume by Warehouse-Lot 6	Petroleum hydrocarbon source	**SOIL**				x	x	x	x			
			GW				x	x	x	x			

Lot 6 (and its associated APECs) is located in the northwestern portion of the Site (Figure 2b). Historical and current land use in this area consists mainly of wood manufacturing/ processing, and lumber storage. Lot 6 is currently covered (paved) only in the southwest portion of the lot. The area is bordered to the east/southeast by the former Brownsville Rails Spur and CNR right of way, where a historical diesel spill from a train collision (offsite APEC 33) has been indicated to have occurred, and by the reported location of the former dip tank where PCP was applied to lumber (offsite APEC 24). The Fraser River foreshore borders the lot directly to the west.

At present the Lindal Cedar Homes Warehouse and Distribution Building (adjacent to APEC 34), the Oil Storage Shed where oil staining was identified during the 2006 Hemmera Site visit (APEC 21), the Former Kiln (APEC 22), the Sawmill Building, and office trailers remain onsite. The Green Chain where hydrocarbon staining was observed during the 2006 Hemmera Phase 1 ESA site visit (APEC 23) is no longer in use or present at the Site.

The historical Phase 1 ESA conducted at this lot identified “approximately 1m of wood waste (including hog fuel) in onsite fill” (Hemmera, 2006), as such fill of unknown origin and quality, was identified as a lot-wide APEC (APEC 30) to be investigated across Lot 6.

Historical storage of chlorophenol-treated lumber has the potential to impact soil and groundwater in uncovered portions of Lot 6, a lot wide APEC (APEC 25) has been identified to investigate this potential issue at Lot 6.

Prior to the 2011 SSI, nine boreholes were drilled in Lot 6, all of which were completed as monitoring wells. During the 2011 SSI, FRANZ drilled eight boreholes, each installed as monitoring wells (BV11-BH-01M to 05M along the western boundary of the Site, and BV-11BH-07M to 09M at or adjacent to APECs 21, 22, and 23). In February 2012, FRANZ completed groundwater sampling at all existing and newly installed monitoring wells at Lot 6. Soil and groundwater results for investigation locations related to the Lot are presented in Figures 2 through 14 and Tables 61 through 78.

Soil Analytical Results

Soil samples were collected in sandy fill mixed with wood debris, and underlying silt layers at the identified APECs. Representative soil samples were analyzed for BTEX, styrene, MTBE, metals, PHCs F1-F4, chlorinated and non-chlorinated phenols. Select soil samples were also analyzed for VPH, EPH, LEPH in this section, as LEPH and VPH soil and groundwater exceedances identified adjacent to the Warehouse building onsite (APEC 34) (Hemmera, 2006, 2008b).

Soil PAHs, and metals concentrations exceed CCME guidelines. VPH and metals concentrations in soil exceed BC CSR IL Standards and Schedule 7 Standards for relocation to non-agricultural land. Exceedances of various parameters are further discussed below.

PAHs

Concentrations of PAHs in soil (naphthalene and phenanthene) exceed CCME IL Soil Guidelines for protection of aquatic life at two building locations (the oils storage shed (APEC 21) and former green chain (APEC 23)) and at four (01M, 02, 04 and 05M) of five locations tested along the lot foreshore. In two of the foreshore locations (02M and 05M) PAH concentrations also exceed the calculated Index of Additive Cancer Risk (IACR) for protection of potable drinking water. Identified PAH exceedances (0-4 m bgs) are located in the sandy fill and underlying silt and wood debris layer.

Onsite PAH concentrations do not exceed BC CSR Standards and based on the current soil concentrations a soil relocation agreement would not required to move PAH -impacted soil from Lot 6 offsite to non-agricultural land.

The low level PAH exceedances in this lot have not been delineated, and are generally anticipated to be site wide. Soil PAH exceedances at the building location (oil storage shed and former green chain) may be contributed to by surface spills from historical fuel storage and handling activities

in these areas, as evidenced by PHC like odours and staining noted on the ground during previous investigations onsite (Hemmera, 2006), and identification of a small LEPH plume in groundwater at the oil shed location.

VPH

VPH, EPH, and LEPH are regulated under the BC CSR, which is not directly applicable at the Site under its current ownership. However it is of note that soil concentrations of VPH at three locations on the east side of the Lindal Warehouse Building (APEC 34, source not determined) (MW06-2, MW07-6, and BH08-12) exceed the CSR IL Standard for VPH and represent a localized impact area (approximately 400m^2) with a vertical thickness of about 1.5 m (approximately 1.0-2.5 m bgs). Soil in the VPH impact area also exceeds CSR Schedule 7 Standards, and would require a soil relocation agreement to move impacted material to offsite non-agricultural land. Concentrations of VPH, EPH, and L/HEPH in soil samples collected from fill and silt layers at down-gradient foreshore locations are all less than BC CSR Standards.

Metals

Subsurface soil concentrations of arsenic exceed CCME IL (IL+) Guidelines in two of five tested foreshore locations onsite (01M and 05M, 3-4 m bgs). Generally arsenic concentrations at Lot 6 appear to increase with increasing depth, with the highest concentrations identified in the underlying silt unit. The horizontal extents of IL+ soil for arsenic have not been fully delineated, but given that exceeding concentrations in sampled silts are less than 2x CCME Guidelines, they are expected to be localized around each of borehole BV-11BH-01M and BV011BH-05M.

Arsenic concentrations in the subsurface soil also exceeds BC CSR IL Standards and Schedule 7 Standards at BV-11BH-01M, such that arsenic impacted soil at this location would require a relocation permit if removed from the Site.

Groundwater Analytical Results

2012 groundwater samples were collected from Lot 6 monitoring wells along the foreshore and downgradient of the oil shed and green chain building APECs. Samples were analyzed for BTEX, styrene, MTBE, PHC fractions F1-F4, PAH and chlorinated/non-chlorinated phenols. Select groundwater samples from this Lot were also analyzed for VPH, EPH, LEPH, as LEPH and VPH soil and groundwater exceedances (APEC 34) have been identified east and adjacent to the Warehouse building onsite (Hemmera, 2006, 2008b).

Dissolved metals and PAHs in groundwater exceed applicable CCME guidelines. Localized LEPH and VPH concentrations in groundwater exceed BC CSR Standards. Exceedances are further discussed below.

Dissolved Metals

Dissolved metals concentrations in groundwater exceeded FCSAP guidelines for the protection of freshwater/marine aquatic life (aluminum, arsenic, iron, manganese, titanium and zinc) and Drinking Water Quality Guidelines (arsenic, iron, manganese) at all five wells tested in this Lot.

Metals concentrations in groundwater (arsenic, iron, manganese) also exceed BC CSR DW and/or AW Standards in tested wells. The area of metals impacted groundwater is not delineated onsite, and is expected to be area-wide including on neighboring properties.

VPH,EPH, LEPH

VPH, EPH, and LEPH which are regulated under the BC CSR Standards are not directly applicable at the Site under its current ownership, but are of interest due to their applicability to groundwater at surrounding offsite properties.

2012 groundwater concentrations of LEPH exceeded the CSR AW Standard at BV-11BH-07M, and potentially represent a localized LEPH plume (estimate 100m^2) at the location of the oil shed onsite (APEC 21). LEPH in groundwater has been delineated downgradient of this location.

Groundwater concentrations of LEPH are currently 2-3x the CSR AW Standard at two well locations (MW06-2 and MW07-7) at the east side of the Lindal Warehouse building (APEC 34). The LEPH plume is currently delineated and expected to represent a localized impact area of approximately 200m^2. VPH (previously IL+) groundwater concentrations in this area have decreased over time and are currently compliant with BC CSR AW Standards.

Groundwater concentrations of VPH at monitoring well MW06-3, located southwest of the former kiln (APEC 22) historically exceeded CSR AW Standards (last sampled in 2006) despite soil being compliant at the location. This well was scheduled to be re-sampled during the 2011 SSI to confirm groundwater quality, but the well had been destroyed and paved over. The historical exceedance potentially represents a localized VPH plume (estimate 100 m^2) at this location. VPH in groundwater has been delineated downgradient of and crossgradient of this location.

PAHs

Groundwater exceeded FCSAP Interim Groundwater Guidelines for acridine, anthracene, benzo[a]anthracene, benzo[a]pyrene, fluoranthene, fluorene, phenanthrene and pyrene in two of ten locations tested in this Site section (at MW06-2 and MW07-7, last sampled in 2012). PAH impacted groundwater is co-located (and co-related) to wells where historical VPH impacts in soil (approximately 400 m^2) and LEPH impacts in groundwater approximately 200 m^2) have been identified. Benzo[a]pyrene, phenanthrene and pyrene concentrations in groundwater at these wells also exceeds BC CSR Standards.

PAH impacted groundwater has been delineated down-gradient and cross gradient of this location.

Summary

A summary of environmental issues at Lot 6 which will be carried forward into the subsequent risk assessment is presented in the table below.

Media	Contaminant (s) of Concern	Area (m^2)	Depth (m bgs)	Volume (m^3)	Comments
Soil	PAH (Naphthalene and Phenanthrene, calculated IACR)	site wide	0 - 4	undefined	Low-level PAHs in soil appear to be present across the Site.
	Arsenic*	Assumed 10 around each hotspot	3 - 4	2X10	Impact area is not delineated but expected to be localized at Lot 6.
	VPH*	400	1-2.5	600	Impact area appears to be localized to the east side of the Warehouse building (APEC 34) at Lot 6.
Groundwater	Metals (As*, Fe*, Mn*, Ti, Zn)	area wide	n/a	undefined	Impacts have not been delineated onsite.
	LEPH*	1x 200 1x 100	n/a	undefined	Impact areas appear to be localized to the east side of the Warehouse building (APEC 34), and at the oil storage shed (APEC 21) at Lot 6.
	VPH*	100	n/a	undefined	Impact area appears to be localized to an area southwest of the former kiln (APEC 22) at Lot 6.
	PAH (Acridine, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene*, Fluoranthene, Fluorene, Phenanthrene* and Pyrene*)	200	n/a	undefined	PAH impacts are localized to the east side of the Warehouse building (APEC 34) at Lot 6.

*Exceeds BC CSR IL Standards and/or BC CSR Schedule 7 Standards for soil, or BC CSR AW/DW Standards for groundwater.

7.0 SUMMARY OF AREAS OF ENVIRONMENTAL CONCERN

The results of the 2011 SSI and previous investigations at the Site have identified key localized and site-wide areas of environmental concern (AECs) which are summarized in the below sections and have been presented in Figures 15 to 18. These summary figures are organized by parameter group and illustrate soil and groundwater exceedances of federal Guidelines or provincial Guidelines/ Standards separately.

Site or Area Wide Issues

Metals in Groundwater - Concentrations of various metals (Al, As, Sb, Ba, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ti, Zn) in groundwater exceed Health Canada, FCSAP, or CCME Guidelines in monitoring wells across the Site. Tested offsite groundwater wells north and southwest of the Site also exceed federal guidelines for metals (Al, As, Cd, Cu, Cr, Fe, Mn, Ti, Zn). The metals impacted area remains undelineated and is expected area wide including on neighbouring properties. With exceeding metals concentrations identified in wells located near the western Site boundary (Lots 2 and 6); impacted groundwater may be reaching the Fraser River. Bearing this in mind, we recommend further investigation and characterization of groundwater and surface water interactions at the River.

Onsite groundwater also exceeds provincial Standards/ Guidelines for various metals (Al, As, Sb, Ba, Cd, Cr, Fe, Pb, Mn, Ni, Zn) including at upgradient northeast and southeast Site boundaries. Tested offsite groundwater wells north, southwest of the Site also exceed provincial Guidelines/Standards for various metals (As, Cr, Fe, Mn). Exceeding metals concentrations in groundwater are expected to be contributed to by numerous sources including naturally occurring background concentrations in area soils and groundwater, as well as potential impacts from surrounding up-gradient property activities. Figures 16a and 16b show the location and extent of metals contamination identified during this SSI.

PAHs in Soil - Concentrations of PAHs (naphthalene and phenanthrene) exceed CCME IL Soil Guidelines for the protection of aquatic life in numerous localized areas across the Site. These low level PAH impacts in soil are expected to be present site-wide. In select locations total PAHs in onsite soil also exceed the calculated health based index of additive cancer risk (IACR) for protection of potable groundwater. The vertical extent of PAH exceedances is generally limited to the sandy fill and upper silt intervals where wood debris is present (0-4m bgs). PAH concentrations in soil from offsite locations north of B-Mill (Lot 5) also exceed CCME IL Soil Guidelines for PAHs (naphthalene, phenanthrene, acenapthene, fluorene and IACR) however concentrations are generally 3-10x those identified in onsite Lot 5 soil. Offsite PAH impacts may not be originating from onsite source activities.

Tested onsite and offsite soil does not exceed provincial soil Standards for PAHs. As the BC CSR IL Standards are not as stringent as the CCME Guidelines for naphthalene and phenanthrene, IL+ soil for PAHs identified onsite is not anticipated to extend off Site, where the land is under

provincial jurisdiction. Figures 17a and 17b show the location and extent of PAH contamination identified during this SSI.

Localized Issues by Lot

Lots 2 and 4

Metals in Soil - Soil exceeding federal Guidelines for various metals (Cr, Cu, Cd, Ni, Zn, Sb, As) is present in the area north and west of the tannery (APEC 1) on Lot 4. The metals impacted area (1.6 ha) is generally limited by compliant soil at the north and northeast boundaries of Lots 2 and 4. Impacts were identified in fill and native silts at depths of 0.6-4.6 m bgs, for a potential volume estimate of approximately 64,000 m^3. In the impacted area, chromium exhibits the highest concentrations in soil and the greatest area of impact. Metals (chromium) exceeding federal Guidelines were also confirmed in the area southwest of Lots2/4 (offsite) during the 2011 SSI and remain to be horizontally or vertically delineated.

Onsite soil also exceeds provincial Standards for metals (Sb, As, Cd, Cr, Cu, Pb, Zn), as does soil tested from a location southwest of Lots 2 and 4. Exceeding chromium concentrations identified southwest of Lots 2 and 4 are expected to be reflective of the previous industrial use of the southwest properties, and not necessarily indicative of offsite migration. Figures 16a and 16b shows the location and extent of metals contamination identified during this SSI.

MAHs and VOCs in Groundwater - Groundwater exceeds CCME AW Guidelines for Toluene and Benzene in one near shore well in Lot 2, last, sampled July 1998. Chlorobenzene and toluene concentrations in this well also exceed provincial water quality guidelines. Impacted groundwater is delineated onsite and expected to represent a localized impact area of approximately 100 m^2. Based on current groundwater data in the area, it is likely that these exceedances are from historical point sources and are no longer present onsite. Figures 15a and 15b show the location and extent of MAH and VOC contamination identified during this SSI.

PAHs in Groundwater - Pyrene concentrations in one near shore well in Lot 2 slightly exceeds CCME AW Guidelines as well as BC Water Quality Guidelines. Low level PAH concentrations in soil are anticipated to be widespread across the Site and there remains a potential for low level PAH concentrations to be present in groundwater site-wide. Pyrene impacts identified at Lot 2 are bounded to the Site by compliant groundwater from wells southwest and west of the Lot. Given that this well is within 10m of the surface water environment, there remains a potential for offsite migration to the Fraser River. Re-sampling MW2-30 is required to verify this result in near shore groundwater. Figures 17a and 17b show the location and extent of PAH contamination identified during this SSI.

Chlorophenols in Groundwater - Groundwater concentrations of pentachlorophenol and 2,3,4,6-tetrachlorophenol exceed federal guidelines in one well (last sampled in 1998) at Lot 4. The

exceedance is generally delineated to an impact area of approximately 1000m^2. Groundwater at this location also exceeds provincial Standards for Pentachlorophenol and 2,4,5-trichlorophenol, but is compliant in offsite nearby wells. Chlorophenol impacts are not expected to be migrating off the Lot 2/4 area. Figures 18a and 18b show the location and extent of chlorophenol contamination identified during this SSI.

Lot 3

Metals in Soil – Soil exceeds CCME soil Guidelines for metals (As, Cu, Zn) in one of two locations tested from the Lot 3 road ditch adjacent to Dyke Road. The impact area is currently not delineated, but likely to be surficial and localized (for estimation purposes, we assume 10m^2) around the hotspot.

Soil from both tested road ditch locations exceeds BC CSR Standards for metals (As, Cu, and/or Zn) for an assumed impact area of approximately 10m^2 around each road ditch hotspot. Concentrations of metals (Cr, Pb and/ or Zn) in soil also exceed BC CSR Standards around the septic AST (APEC 8), former lumber storage area (APEC 9) and former kiln (APEC 19). The BC CSR soil exceedances are limited to the upper 1 m of fill soil and sporadic (for estimation purposes, assumed to be limited to 10m^2 around each hotspot) across the Lot 3 area.

Surficial soil from the property southwest of Lot 3 exceed BC CSR Standards for lead (Pb). Offsite impacts have not been fully delineated, and are not necessarily indicative of offsite migration, but may be reflective of the previous industrial use of the southwest properties.

Figures 16a and 16b shows the location and extent of metals contamination identified during this SSI.

EPH (C19-32) and HEPH in Soil – Soil exceeding BC CSR Standards for EPH(C19-32) and HEPH is present in one road ditch location (estimated 100m^2) downgradient of the mineral oil and grease spill (APEC 16) and one onsite location upgradient (estimated 500m^2) of APEC 16. The EPH/ HEPH impact area around each location has not been fully delineated towards the west adjacent property (offsite) but is expected to be localized and surficial (limited to < 1.5 m bgs). These areas together potentially represent a volume of 900 m^3 of EPH (C19-32) /HEPH impacted soil in Lot 3. Given the proximity of the impacts to the southern Site boundary, it is possible that soil exceeding BC CSR Standards for HEPH is present offsite in this area. Further investigation is recommended in the area of MV-11BH-07M to delineate HEPH impacts around the Site boundary.

Petroleum hydrocarbon impacts identified offsite of Lot 3 are not necessarily considered to be indicative of offsite migration; but rather reflective of the previous industrial use of the southwest properties.

Figure 15b shows the location and extent of EPH and HEPH contamination identified during this SSI.

Chlorophenols in Soil – Pentachlorophenol concentrations in surficial soil (0.3m bgs) exceed BC CSR Standards (but not federal guidelines) in one location in the A-Mill (APEC 7) footprint of Lot 3. The soil impact is horizontally delineated to an approximate 10m^2 area around this location. Impacts are not expected to be migrating offsite. Figures 18a and 18b show the location and extent of chlorophenol contamination identified during this SSI.

Chlorophenols in Groundwater – Groundwater concentrations of phenols and chlorophenols (Pentachlorophenol, 2,3,4,6-tetrachlorophenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, and phenol) exceed federal guidelines in wells at and immediately south of the A-Mill footprint (APECs 7 and 9). The groundwater plume remains to be fully delineated cross gradient and upgradient of this area, but is expected to be localized to an approximate 3000-5000 m^2 area.

Groundwater in this 3000-5000m^2 impact area also exceeds provincial Standards for phenols and chlorophenols (pentachlorophenol, 2,3,4,6-tetrachlorophenol, and total tetrachlorophenols, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, phenol, 2-methyl 4,6-dinitrophenol, 2,3,4,5-tetrachlorophenol, 3,4,5-trichlorophenol, and total trichlorophenols). Figures 18a and 18b show the location and extent of chlorophenol contamination identified during this SSI.

Lot 5

Xylenes/ EPH (C10-19)/ VPH/ Toluene in Soil - Xylene concentrations in soil at one location on the north side of the B-Mill footprint (APEC 14) and downgradient of the waste oil AST and gasoline UST (APECs 10 and 11) exceed federal soil Guidelines. Soil at this location also exceeds provincial soil Standards for Xylenes, EPH(C10-19) and VPH. The Xylenes/ EPH (C10-19)/ VPH soil impact is localized to an area of approximately 400m^2. Soil sampled from outside the Site boundaries is compliant with federal and provincial soil Standards/Guidelines, so impacts likely do not extend offsite. The vertical extent of impacts at this location has not been fully delineated but is expected to be limited to the sandy fill (approximately 1.5 m bgs) for a potential impacted soil volume of 600 m^3.

Toluene concentrations at two offsite locations adjacent to Lot 5 are greater than federal soil Guidelines, but compliant with provincial Standards applicable to the offsite area. Offsite concentrations of toluene are not expected be originating from operations at the Site. Figure 15b shows the location and extent of MAH, EPH and VPH contamination identified during this SSI.

Chlorophenols in soil - Pentachlorophenol and 2, 3, 4, 6-tetrachlorophenol concentrations in soil at one location in the north side of the B-Mill footprint (APEC 14) exceed federal soil Guidelines. Concentrations of 2, 3, 4, 6-tetrachlorophenol also exceed provincial soil Standards. Chlorophenol impacts are bounded cross gradient and downgradient of this location, for an identified impact area of approximately 400 m^2. Soil tested from the adjacent offsite area was compliant with federal and provincial Standards/Guidelines, so impacts are not likely to extend off Site. Figures 18a and 18b show the location and extent of chlorophenol contamination identified during this SSI.

Metals in Soil –Zinc concentrations exceeding federal and provincial Guidelines/Standards were identified in offsite soil (0.5-1 m bgs) adjacent to the Lot 5 boundary. The zinc impact has been delineated down gradient (onsite) but not fully delineated on the offsite property. As onsite concentrations of zinc are approximately one magnitude lower than identified offsite concentrations, it is unlikely that zinc impacts are originating from operations at the Site. Figures 16a and 16b shows the location and extent of metals contamination identified during this SSI.

MAHs in Groundwater – Groundwater concentrations of ethylbenzene exceeds federal and provincial Guidelines in a 250 m^2 impact area adjacent to the AST and UST (APECs 10 and 11) in Lot 5. Impacts are generally delineated to the north, south, and west of this area. Tested offsite groundwater was compliant with federal and provincial Guidelines/ Standards, and ethylbenzene impacted groundwater is not anticipated to extend offsite. Figures 15a and 15b show the location and extent of MAH contamination identified during this SSI.

LEPH in Groundwater - LEPH concentrations in groundwater exceed provincial groundwater Standards at three locations (1 offsite and 2 onsite) in the area at and downgradient of the AST and UST (APECs 10 and 11) in Lot 5. The LEPH plume has not been delineated offsite, but has been bounded to the east and south west onsite. The onsite AST/UST is a suspect historical source for the plume. The LEPH plume extends across the Site boundary and is expected to cover an impact area of approximately 900m^2. Further work is recommended to delineate the LEPH plume offsite. Figure 15b shows the location and extent of LEPH contamination identified during this SSI.

PAHs in Groundwater - Groundwater in Lot 5 exceeded federal groundwater Guidelines for Naphthalene in three locations at and downgradient (west) of the AST/UST (APECs 10 and 11) onsite. Napthalene concentrations in this area also exceeds BC CSR AW/DW Standards. Naphthalene impacts are co-located with historical ethylbenzene and LEPH impacted groundwater, and potentially related to a historical leak or spill from the AST or UST onsite. The naphthalene plume is delineated downgradient and cross-gradient (southwest) for an onsite impact area of approximately 1,000 m^2.

Benzo(a)pyrene, fluoranthene and pyrene concentrations in groundwater from one offsite well adjacent to the Lot 5 boundary exceeded federal Guidelines, with concentrations of benzo[a]pyrene also exceeding BC CSR Standards applicable offsite. Offsite PAH impacts are not delineated. As concentrations of these COCs onsite near the Lot 5 boundary are non-detect, the identified offsite contamination is unlikely to be originating from operations at the Site. Figures 17a and 17b show the location and extent of PAH contamination identified during this SSI.

Chlorophenols in Groundwater - Cholorophenol concentrations in groundwater exceed federal Guidelines at three areas in Lot 5: (1) the B-Mill footprint, (APEC 14) (2) the west portion of Lot 5 , (3) the southeast portion of Lot 5.

Chlorophenol (pentachlorophenol, 2,3,4,6-tetrachlorophenol, and 2,4,6-trichlorophenol) concentrations exceed federal guidelines in the northwestern portion of the B-Mill footprint

(APEC14) for an impact area of approximately 1500m^2. Concentrations of chlorophenols (pentachlorophenol, tetrachlorophenols (2,3,4,5; 2,3,4,6; and 2,3,5,6, isomers) and trichloropenols (2,3,4-; 2,3,5-; 2,4,5-; 2,4,6-; 3,4,5- isomers)) in this impact area also exceed provincial Standards applicable offsite. Based on 2011 investigation results, the chlorophenol plume does not appear to extend offsite in this area.

Pentachlorophenol concentrations exceed federal and provincial groundwater Guidelines/Standards at one location in the west of Lot 5 (5-BH31). Impacts are expected to be localized to an area of approximately 700m^2; with compliant results up gradient and down gradient of this location,

- Chlorophenol (Pentachlorophenol, 2,3,4,6-tetrachlorophenol) concentrations exceed federal Guidelines at the southeastern Lot 5 boundary (5-BH29). With compliant results in wells northwest and northeast of this well the impact area is expected to be approximately 1250 m^2. Chlorophenol concentrations (Pentachlorophenol, ,2,3,4,6-tetrachlorophenol, 2,3,4,5-tetrachlorophenol, 2,3,4-trichlorophenol, and 2,3,6,-trichlorophenol) in this well also exceed provincial Standards applicable offsite. The chlorophenol plume at the southeastern Lot 5 boundary is not fully delineated; there is a potential for offsite groundwater impacts in this area. Further investigation is recommended in the area of 5-BH29 to delineate chlorophenol impacts around the Site boundary.

Figures 18a and 18b show the location and extent of chlorophenol contamination identified during this SSI.

Lot 6

Metals in Soil - Soil exceeding federal Guidelines is present at depths of 3-4 m bgs in two foreshore locations (BV-11BH-01M and BV-11BH-05M) at Lot 6. Arsenic soil impacts are expected to be localized at these two onsite locations, and assumed to be representative of an impact area of 10 m^2 around each identified hotspot, and total impact soil volume of 20m^3.

Arsenic soil concentrations at one of the foreshore locations (BV-11BH-01M) also exceeds provincial Soil Standards applicable offsite. Figures 16a and 16b shows the location and extent of metals contamination identified during this SSI.

VPH in Soil - Soil concentrations of VPH at three locations on the east side of the Lindal Warehouse Building (APEC 34) in Lot 6 (MW06-2, MW07-6, and BH08-12) exceed the CSR IL Standard for VPH and represent a localized impact area of approximately 400m^2, with a vertical thickness of about 1.5 m (approximately1.0-2.5 m bgs). Figures 15a and 15b show the location and extent of VPH contamination identified during this SSI.

VPH in Groundwater - Groundwater concentrations of VPH at one well southwest of the former kiln (APEC 22, MW06-3) exceeded provincial Standards (last sampled in 2006). The historical exceedance potentially represents a localized VPH plume (estimate 100 m^2) at this location. VPH in

groundwater has been delineated downgradient of and crossgradient of this location. Figures 15a and 15b show the location and extent of VPH contamination identified during this SSI.

LEPH in Groundwater – LEPH groundwater concentrations exceed provincial Standards in two areas of Lot 6. A localized LEPH plume (estimate 100m^2) is identified at the location of the oil shed onsite (APEC 21, BV-11BH-07M). LEPH in groundwater has been delineated downgradient of this location. A LEPH plume is also identified at the east side of the Lindal Warehouse building (APEC 34, MW06-2 and MW07-7). The Warehouse LEPH plume is delineated and expected to represent a localized impact area of approximately 200m^2. Figures 15a and 15b show the location and extent of LEPH contamination identified during this SSI.

PAHs in Groundwater - Groundwater concentrations of PAHs (acridine, anthracene, benzo[a]anthracene, benzo[a]pyrene, fluoranthene, fluorene, phenanthrene and pyrene) exceed federal guidelines in two wells at the east side of the Warehouse Building (APEC 34, MW06-2 and MW07-7). Benzo[a]pyrene, phenanthrene and pyrene concentrations in groundwater at these wells also exceeds BC CSR Standards. The PAH plume is bounded to an approximate 200m^2 area. Figures 17a and 17b show the location and extent of PAH contamination identified during this SSI.

8.0 PROPOSED REMEDIAL/ RISK MANAGEMENT OPTION

From a site-wide perspective, FRANZ's proposed remedial/risk management option is to complete a Human Health and Ecological Risk Assessment (HH-ERA) for the identified AECs onsite. This preference is due to logistical difficulties in conducting an *ex-situ* remediation within an active area such as the Surrey Brownsville Site.

Unacceptable risks identified from the subsequent risk assessment can then be addressed through localized remediation or long term risk management options.

9.0 PROFESSIONAL STATEMENT

Pursuant to the requirements of Part 16 of the CSR, FRANZ affirms that:

- This documentation has been prepared in accordance with all requirements of the Waste Management Act and Regulations.
- The persons signing this report have demonstrable experience with this type of investigation and the site conditions.

The FRANZ personnel conducting this investigation were:

Viviane Dubois Cote, M.Sc, P.Geo.
Ms Viviane Dubois-Côté, formerly of Franz Environmental Inc. coordinated the 2011 field investigation and assisted with the preparation of this supplemental site investigation (SSI) report. Ms. Dubois Cote is an Intermediate Environmental Geoscientist with Franz Environmental Inc. with 6 years of experience in the assessment and remediation of contaminated Sites. Ms. Dubois-Côté has worked on numerous Stage I, II and DSI Environmental Site Assessments and remedial activities on a variety of residential, industrial and commercial sites in Quebec, New-Brunswick, the Yukon, Nunavut and British Columbia.

Amanda Salway, B.Sc, G.I.T.
Ms. Salway co-authored this SSI report and conducted the 2011 field investigation. Ms. Salway is a junior environmental scientist with five years of experience. She has worked on a variety of projects involving the different aspects of contaminated site management including: phased environmental site assessment (ESA), remediation, risk assessment, data management, communications and project management. She is experienced in environmental field activities, follow-up reporting, project budgeting, scheduling, and delivery.

Meagan Gourley, M.E.T, EPt.
Ms. Gourley co-authored this SSI report. Ms. Gourley is an environmental scientist with four years of experience conducting ecological and human health risk assessment and environmental site assessment (Phase I and Phase II). Ms. Gourley has also contributed to the development of media sampling protocols and procedures, conducted multiple data gap analyses, and designed and executed field programs(soil, groundwater, sediment and soil vapor) in remote or challenging locations on a variety of wildlands, commercial and industrial sites. Investigations have been in support of risk assessment, ex-situ remediation, and phased environmental site assessments for federal government and private clients in Alberta, British Columbia, Yukon Territory, Nunavut, and the Northwest Territories. Ms. Gourley has a background in pharmacology, human health and eco-toxicology where she has designed and conducted research experiments investigating xenobiotic cellular defense and detoxification mechanisms, and contaminant mechanisms of action in invertebrate, mammalian, and piscine organisms

Nick Dayal, Eng.L.

Mr. Dayal provided senior review for the SSI report. Mr. Dayal has more than 20 years of experience in the areas of contaminated sites management, environmental site assessments, contaminant hydrogeology, remedial options assessment, and remediation. He has managed numerous Phase I, II and III Environmental Site Assessments on a variety of industrial and commercial properties, and reviewed hundreds of reports including Phase I, II and III ESAs, risk assessments, remedial actions plans, and confirmation of remediation. Nick has conducted detailed quantitative human health/ecological risk assessments for petroleum hydrocarbon and metals impacted sites. He has conducted hazard assessments by reviewing chemical properties and identifying suitable toxicity estimates, calculated exposure and risk for humans using Johnson/Ettinger soil vapour intrusion model.

10.0 STANDARD LIMITATIONS

This report has been prepared exclusively for the Vancouver Fraser Port Authority (VFPA). Any other person or entity may not rely upon the report without the express written consent from Franz Environmental Inc. and VFPA.

The conclusions presented represent the best judgment of the assessors based on current environmental standards and on the site conditions observed in 2011. Due to the nature of the investigation and the limited data available, the assessors cannot warrant against undiscovered environmental liabilities.

The material in this report reflects Franz Environmental Inc.'s judgment in light of the information available to us at the time of preparation. Should additional information become available, FRANZ requests that this information be brought to our attention so that we may re-assess the conclusions presented herein.

There is no warranty, expressed or implied that the work reported herein has uncovered and resolved all potential environmental liabilities associated with the subject site, nor does the report preclude the possibility of contamination outside of the areas of investigation. The findings of this report were developed in a manner consistent with a level of care and skill normally exercised by members of the environmental science and engineering profession currently practicing under similar conditions in the area. The undersigned believe this report to be accurate, however they cannot guarantee the completeness or accuracy of information supplied to them.

Any use of which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibility of such third parties. The authors accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

A potential remains for the presence of unknown, unidentified, or unforeseen surface and sub-surface contamination. Any evidence of such potential site contamination would require appropriate surface and sub-surface exploration and testing. If new information is developed in future work (which may include excavations, borings, or other studies), FRANZ should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Yours truly,

Franz Environmental Inc.

Prepared by:

Amanda Salway, B.Sc, G.I.T
Environmental Scientist

Meagan Gourley, M.E.T., EPt.
Environmental Scientist

Reviewed By:

Nick Dayal, Eng.L
Senior Environmental Scientist

11.0 REFERENCES

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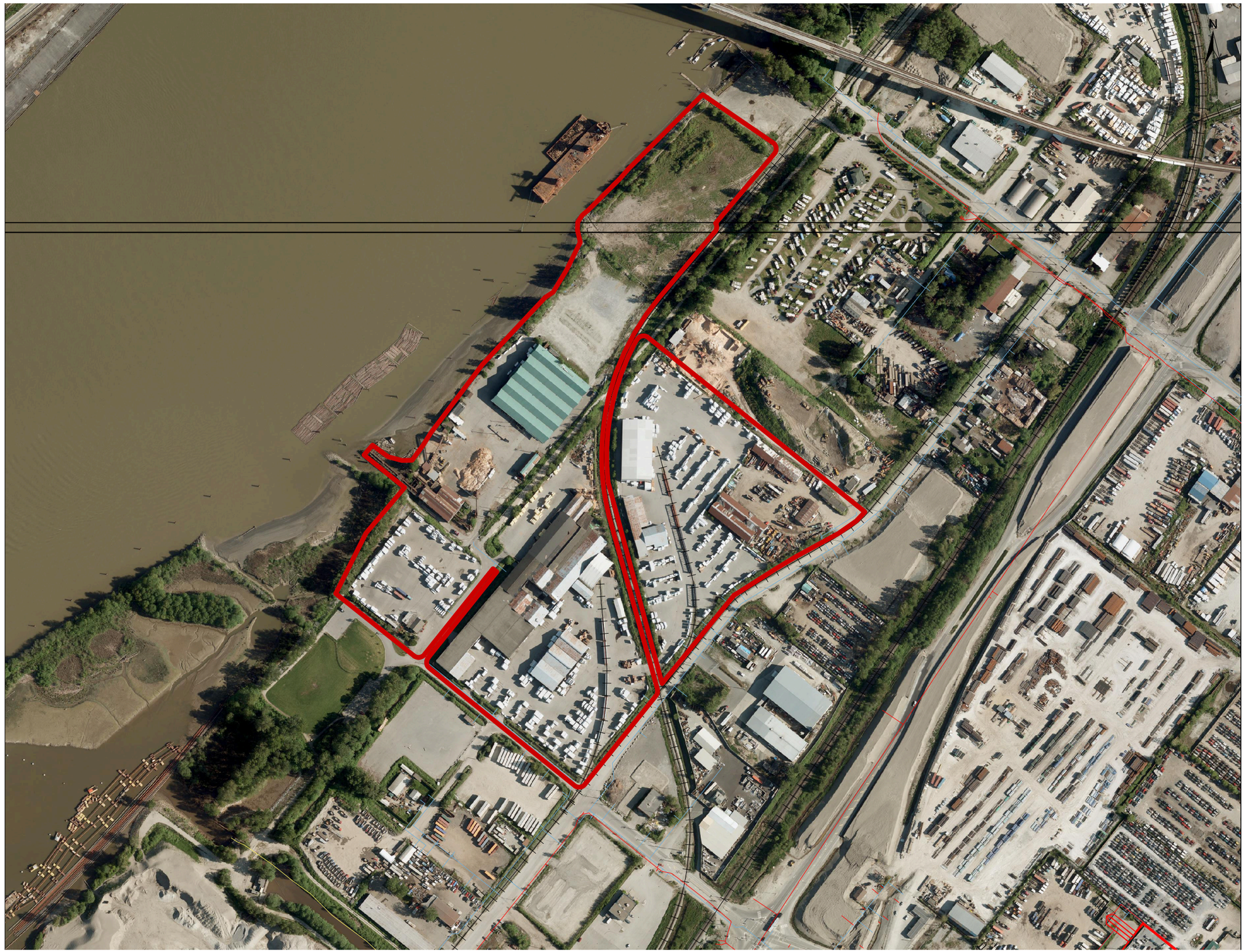
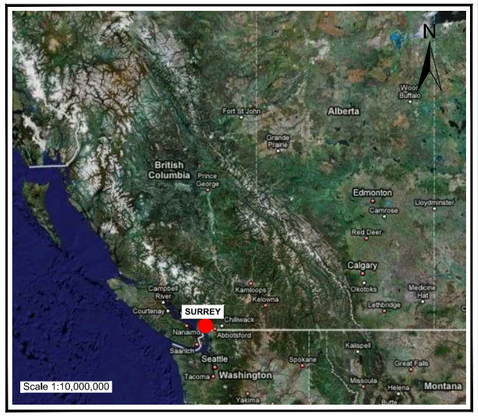
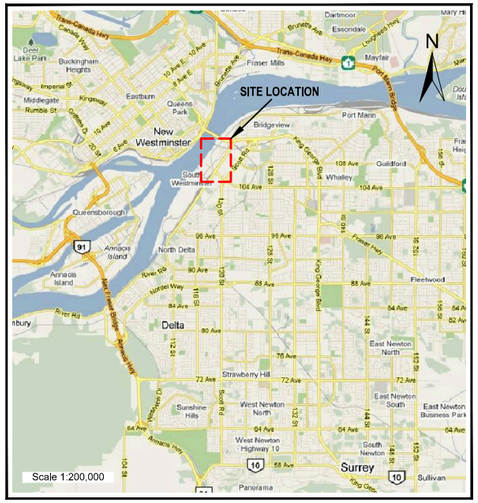
FIGURES







LEGEND

Site Boundary

Scale 1:4,000

80 60 80 0 40 80

metres

Title:

SITE LOCATION

Project:

DATA GAP ANALYSIS
MOUNTAINVIEW RELOAD/BROWNSVILLE AREA
SURREY, BC

Owner:

VANCOUVER FRASER PORT AUTHORITY

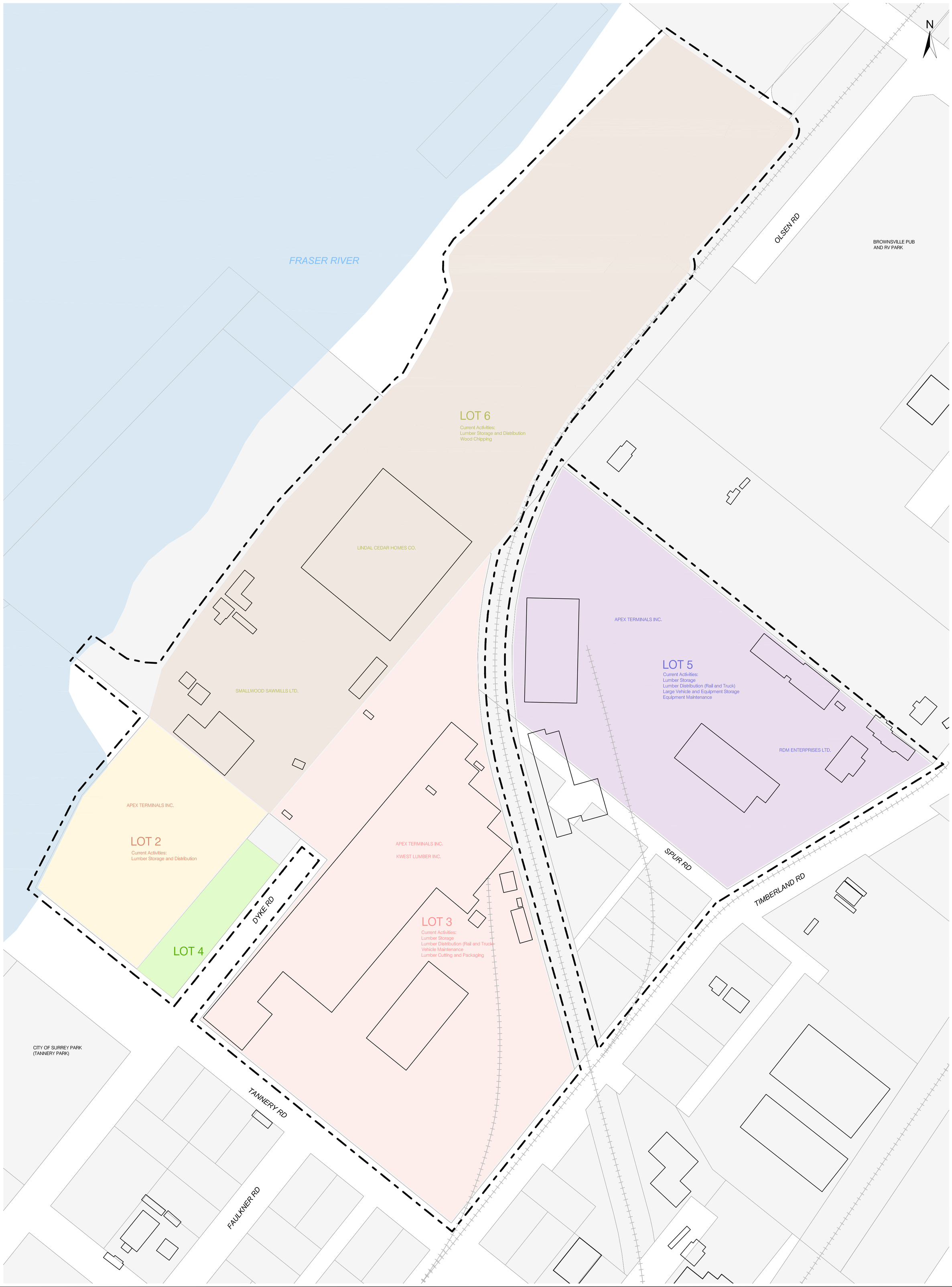
FRANZ ENVIRONMENTAL INC.
◆ CONSULTING ◆ ENGINEERING ◆ TECHNOLOGIES ◆

Date: APRIL 2012

FIGURE 1

Original in colour
Source Image: Airphoto R9C15 and R10C15

2090-1101/CAD/NR/Data Gap - APECs.dwg



LEGEND

- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

Scale 1:1000

40 20 0 20 40

metres

Title:

LOTS AND CURRENT SITE USE

Project:

DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:

VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.

♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

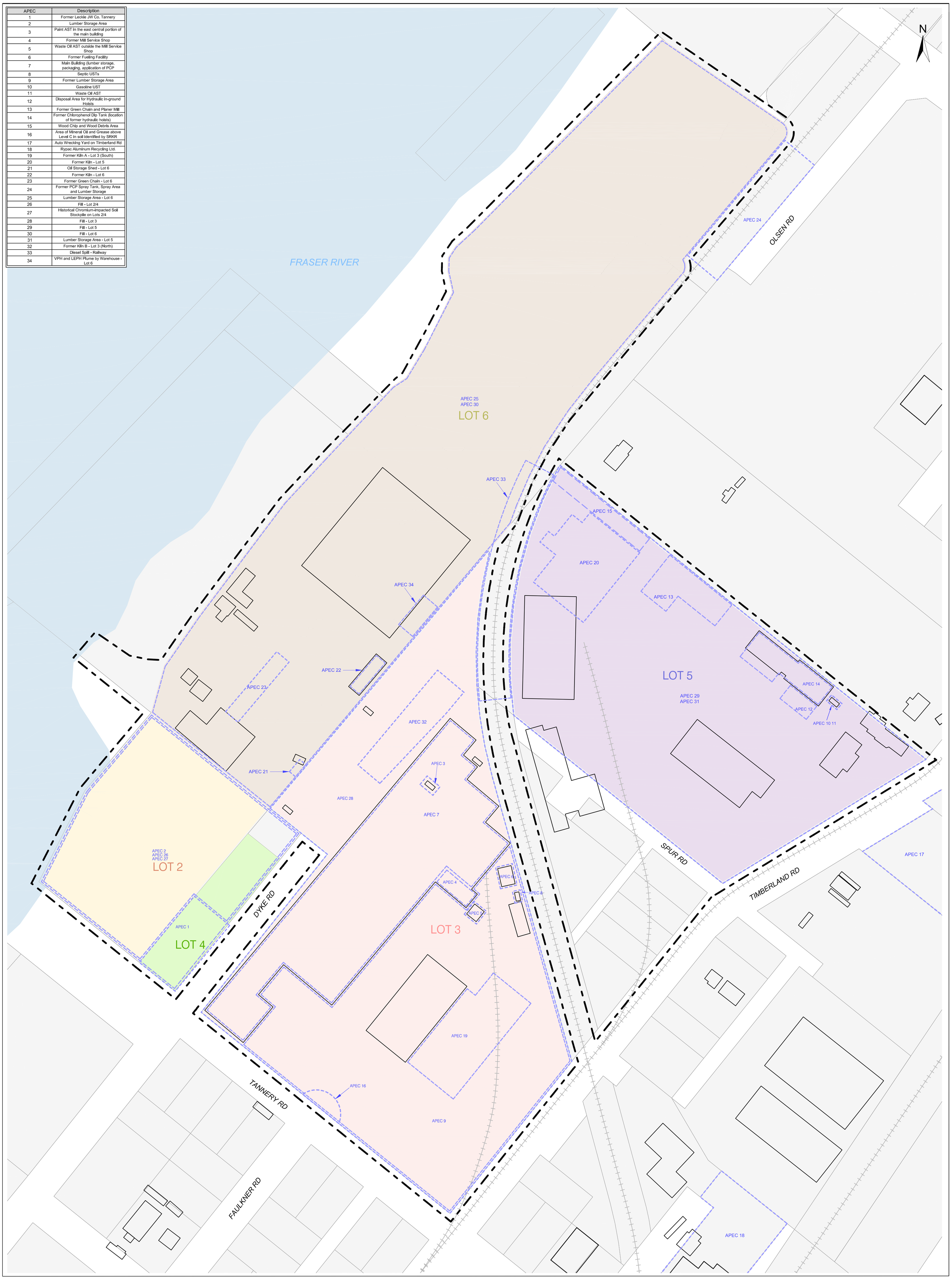
Date:

MAY 2013

FIGURE 2A

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
10	Gasoline UST
11	Waste Oil AST
12	Disposal Area for Hydraulic in-ground Hoists
13	Former Green Chain and Planer Mill
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)
15	Wood Chip and Wood Debris Area
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
23	Former Green Chain - Lot 6
24	Former PCP Spray Tank, Spray Area and Lumber Storage
25	Lumber Storage Area - Lot 6
26	Fill - Lot 2/4
27	Historical Chromium-impacted Soil Stockpile on Lots 2/4
28	Fill - Lot 3
29	Fill - Lot 5
30	Fill - Lot 6
31	Lumber Storage Area - Lot 5
32	Former Kiln B - Lot 3 (North)
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6



LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

Scale 1:1000

40 20 0 20 40

metres

Title: **LOTS AND AREAS OF POTENTIAL ENVIRONMENTAL CONCERN**

Project: DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client: VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: MAY 2013

FIGURE 2B

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
10	Gasoline UST
11	Waste Oil AST
12	Disposal Area for Hydraulic in-ground Hoists
13	Former Green Chain and Planer Mill
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)
15	Wood Chip and Wood Debris Area
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
23	Former Green Chain - Lot 6
24	Former PCP Spray Tank, Spray Area and Lumber Storage
25	Lumber Storage Area - Lot 6
26	Fill - Lot 2/4
27	Historical Chromium-impacted Soil Stockpile on Lots 2/4
28	Fill - Lot 3
29	Fill - Lot 5
30	Fill - Lot 6
31	Lumber Storage Area - Lot 5
32	Former Kiln B - Lot 3 (North)
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6

Area ID					LOT 5	LOT 5	LOT 5	LOT 5
Station ID					5-BH27	MV-11BH-11M	MV-11BH-11M	MV-11BH-12M
Field label					BH27-27.1 @ 2'	MV-11BH-11M-1	MV-Dup4	MV-11BH-13M-1
Duplicate ID						MV-Dup4	MV-11BH-11M-1	
Date					20/Jul/98	14/Dec/11	14/Dec/11	14/Dec/11
Lab report ID					8080642-sc6	11V559640	11V559640	11V559640
Consultants					NEXT	Franz	Franz	Franz
Depth (m)					0.6	0.5 – 1	0.5 – 1	0.5 – 1
Grain Type					coarse	fine	fine	fine
Toluene	0.08	0.37	0.08	2.5	<0.5	0.09	0.10	0.20
Xylenes (total)	2.4	11	2.4	20	64	<0.05	<0.05	<0.05

LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Test Pit
- Borehole
- Monitoring Well
- Surface Soil Sample

- One or more analytical parameters are greater than the applicable BC CSR Soil Standards
- All analytical parameters are less than the applicable BC CSR Soil Standards
- One or more analytical parameters are greater than the applicable CCME Soil Standards
- All analytical parameters are less than the applicable CCME Soil Standards

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

NOTES
- All units in ug/g.
- "-" indicates that there is no applicable standard or analyses were not performed.
- Red cells indicates parameter exceeds CCME IL (Fine, Surface). (Current as of 9-November-2012)
- Bold indicates parameter exceeds CCME IL (Coarse, Surface). (Current as of 9-November-2012)- Coloured rings represent most recent sampling date.
- Underline indicates parameter exceeds CCME IL (Fine, Subsoil). (Current as of 9-November-2012)
- Refer to Tables for Full Soil Results.

Scale 1:1000
40 20 0 20 40
metres

Title:
ANALYTICAL RESULTS - MAHs IN SOIL

Project:
DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:
VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: MAY 2013

FIGURE 3

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
10	Gasoline UST
11	Waste Oil AST
12	Disposal Area for Hydraulic in-ground Hoists
13	Former Green Chain and Planer Mill
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)
15	Wood Chip and Wood Debris Area
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
23	Former Green Chain - Lot 6
24	Former PCP Spray Tank, Spray Area and Lumber Storage
25	Lumber Storage Area - Lot 6
26	Fill - Lot 2/4
27	Historical Chromium-impacted Soil Stockpile on Lots 2/4
28	Fill - Lot 3
29	Fill - Lot 5
30	Fill - Lot 6
31	Lumber Storage Area - Lot 5
32	Former Kiln B - Lot 3 (North)
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6

Area ID	CCME IL	BC CSR IL	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2
Station ID			LI15	LI15	LI16	LI16	LI17	LI17	LI17	LI18	2-BH1	2-BH1	MV-11BH-02M
Field label			15-Feb	LI 15-3	16-Feb	16-Mar	17-Jan	17-Feb	17-Mar	18-Jan	BH1-2A	BH1-2B	BH1-2B-dup	MV-11BH-02M-5
Duplicate ID													BH1-2B-dup	BH1-2B	
Date			21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	15/Jul/98	15/Jul/98	15/Jul/98	17/Dec/11
Lab report ID			1675-K	1675-K	1675-K	1675-K	1675-K	1675-K	1675-K	1675-K	J-NEXT_CanTest-1998-soil, NEXT_CanTest-1998-soil	NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	11V560614
Consultants			SRK	SRK	SRK	SRK	SRK	SRK	SRK	SRK	NEXT	NEXT	NEXT	Franz
Depth (m)			2.2 – 2.4	2.4 – 3.3	2.2 – 2.4	2.4 – 3.3	0.75 – 1.5	2.3 – 2.4	2.3 – 2.4	0.6 – 0.9	1.1	1.1	1.1	4.5 – 5
Chromium	87	60	**17600**	**323**	**4130**	**135**	**625**	**410**	**106**	**117**	*	**1380**	*	**885**

Area ID	CCME IL	BC CSR IL	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2
Station ID			2-BH1	2-BH1	2-BH1	2-BH10	2-BH11	2-BH11	2-BH12	2-BH12	2-BH13
Field label			BH1-3A	BH1-3B-dup	BH1-4A	BH10-5	BH11-4	BH11-5	BH12-5	BH12-6	BH13-3
Duplicate ID			BH1-3B-dup	BH1-3A							
Date			15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98	15/Jul/98
Lab report ID			J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil
Consultants			NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT
Depth (m)			1.8	1.8	2.4	3.8	3	3.7	3.8	4.6	2.4
Cadmium	22	1.5 to 150	*	*	0.5	<0.3	<0.3	0.4	<0.3	0.5	*
Chromium	87	60	*	*	*	*	*	*	*	*	*
Copper	91	100 to 250	35	54	33	28	18	38	40	53	127
Lead	600	100 to 2000	**589**	**556**	<30	<30	<30	<30	66	<30	572
Nickel	50	500	49	48	32	49	40	44	31	73	44
Zinc	360	150 to 600	*	*	167	61	69	140	134	108	**489**

Area ID	CCME IL	BC CSR IL	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2
Station ID			2-BH13	2-BH14	2-BH16	2-BH27	2-BH19	2-BH2
Field label			BH13-4	BH14-4	BH16-3	BH27-5	BH19-4A	BH2-2A
Duplicate ID								
Date			15/Jul/98	15/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	15/Jul/98
Lab report ID			J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil
Consultants			NEXT	NEXT	NEXT	NEXT	NEXT	NEXT
Depth (m)			3	2.7	2.3	3.8	2.7	1.1
Antimony	40	40	<10	*	<10	<10	<10	<10
Arsenic	12	15	<10	*	<10	<10	<10	<10
Cadmium	22	1.5 to 150	*	4.4	<0.3	<0.3	<0.3	<0.3
Chromium	87	60	*	*	51	*	*	*
Nickel	50	500	52	25	53	39	50	5
Zinc	360	150 to 600	*	545	68	76	68	109

Area ID	CCME IL	BC CSR IL	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 2	LOT 4
Station ID			2-BH28	2-BH28	2-BH29	2-BH29	2-BH6	2-BH9	4-BH1
Field label			BH28-5	BH28-6	BH29-5	BH29-6	BH6-5	BH9-4	BH1-1-2 @ 5'
Duplicate ID									
Date			16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	15/Jul/98	15/Jul/98	16/Jul/98
Lab report ID			J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	J-NEXT_CanTest-1998-soil	8072728
Consultants			NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT
Depth (m)			3.7	4.6	3.5	4.3	3.7	3	1.5
Chromium	87	60	*	*	*	*	*	*	**74**
Lead	600	100 to 2000	<30	<30	<30	<30	<30	**103**	**218**
Nickel	50	500	46	45	**58**	43	41	29	46
Zinc	360	150 to 600	65	66	82	93	126	*	**228**

Area ID	CCME IL	BC CSR IL	LOT 4	LOT 4	LOT 4	LOT 4	LOT 4	LOT 4	LOT 4	LOT 4
Station ID			4-BH3	4-BH3	4-BH3	4-BH4	4-BH4	4-BH4	4-BH4	4-BH4
Field label			BH 3 3-2 @ 4'	BH3 3-3 @ 7.5'	BH 3 3-4 @ 10'	BH 4 4-2A @ 5'	BH 4 4-3A @ 7'	BH 4 4-3B @ 7'-duplicate	BH 4 4-4A @ 9'	BH 4 4-4A @ 9'-duplicate
Duplicate ID										
Date			16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98	16/Jul/98
Lab report ID			8072728	8072728	8072728	8072728	8072728	8072728	8072728	8072728
Consultants			NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT	NEXT
Depth (m)			1.2	2.3	3	1.5	2.1	2.1	2.7	2.7
Antimony	40	40	**4520**	<10	<10	<10	<10	**3260**	<10	<10
Arsenic	12	15	<10	<10	<10	<10	<10	**15.35**	<10	<10
Cadmium	22	1.5 to 150	**67.7**	<0.3	<0.3	<0.3	0.5	1.0	<0.3	<0.3
Chromium	87	60	**42500**	**1520**	**1879**	**128**	**391**	**26500**	**121**
Copper	91	100 to 250	**124**	14	33	13	**1240**	**657**	25
Zinc	360	150 to 600	**385**	80	65	33	136	**300**	62

Area ID	CCME IL	BC CSR IL	LOT 6	LOT 6	LOT 6
Station ID			BV-11BH-01M	BV-11BH-01M	BV-11BH-05M
Field label			BV-11BH-01M-5	BV-Dup5	BV-Dup10
Duplicate ID			BV-Dup5	BV-11BH-01M-5	BV-11BH-05M-5
Date			15/Dec/11	15/Dec/11	15/Dec/11
Lab report ID			11V559640	11V559640	11V560784
Consultants			Franz	Franz	
Depth (m)			3 – 4	3 – 4	3 – 4
Arsenic	12	15	**17.2**	**17.5**	**14.6**

Area ID	CCME IL	BC CSR IL	LOT 5
Station ID			MV-11BH-12M
Field label			MV-11BH-12M-1
Duplicate ID			
Date			14/Dec/11
Lab report ID			11V559640
Consultants			Franz
Depth (m)			0.5 – 1
Zinc	360	150 to 600	**446**

Area ID	CCME IL	BC CSR IL	LOT 3	LOT 3	LOT 3	LOT 3	LOT 3	LOT 3	LOT 3
Station ID			S2	S3	3-BH2	3-BH6	3-BH7	SS-2	
Field label			S2 Sediment	S3 Sediment	BH2 2-1 @ 2.5'	BH6 6-1 @ 2'	BH7 7-2 @ 5'	SS2	
Duplicate ID									
Date			22/Jul/98	22/Jul/98	22/Jul/98	22/Jul/98	17/Jul/98	14/Sep/94	
Lab report ID			8073131-sediment	8073131-sediment	8073131-soil	8073131-soil	8073131-soil	E3921	
Consultants			NEXT	NEXT	NEXT	NEXT	NEXT	SRK	
Depth (m)					0.76	0.6	1.5	0.2	
Arsenic	12	15	**63**	<10	<10	<10	<10	7.02	
Chromium	87	60	58	37	**70**	**64**	**64**	20.7	
Copper	91	100 to 250	**92**	22	36	20	33	24.7	
Lead	600	100 to 2000	87	<30	**159**	<30	**106**	**124**	
Zinc	360	150 to 600	**4270**	**250**	**172**	102	136	98.5	

LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Test Pit
- Borehole
- Monitoring Well
- Surface Soil Sample

- One or more analytical parameters are greater than the applicable BC CSR Soil Standards
- All analytical parameters are less than the applicable BC CSR Soil Standards
- One or more analytical parameters are greater than the applicable CCME Soil Standards
- All analytical parameters are less than the applicable CCME Soil Standards

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

NOTES
- All units in ug/g.
- "-" indicates that there is no applicable standard or analyses were not performed.
- Red cells indicates parameter exceeds CCME IL. (Current as of 13-November-2012).
- Bold indicates parameter exceeds BC CSR IL. (Current as of 13-November-2012)
- Coloured rings represent most recent sampling date.
- Black stations were not tested for parameters presented in current drawing.
- Refer to Tables for Full Soil Results.

Scale 1:1000
40 20 0 20 40
metres

Title: **ANALYTICAL RESULTS - METALS IN SOIL**

Project: DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client: VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date: MAY 2013

FIGURE 4

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
10	Gasoline UST
11	Waste Oil AST
12	Disposal Area for Hydraulic in-ground Hoists
13	Former Green Chain and Planer Mill
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)
15	Wood Chip and Wood Debris Area
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
23	Former Green Chain - Lot 6
24	Former PCP Spray Tank, Spray Area and Lumber Storage
25	Lumber Storage Area - Lot 6
26	Fill - Lot 2/4
27	Historical Chromium-impacted Soil Stockpile on Lots 2/4
28	Fill - Lot 3
29	Fill - Lot 5
30	Fill - Lot 6
31	Lumber Storage Area - Lot 5
32	Former Kiln B - Lot 3 (North)
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6

Area ID	CCME IL	BC CSR IL	LOT 2	LOT 2	LOT 4	LOT 4	LOT 2	LOT 2	LOT 4
Station ID			LI15	LI16	LI17	LI18	MV-11BH-02M	MV-11BH-02M	MV-11BH-03M
Field label			15-Feb	16-Feb	17-Feb	LI 18-1	MV-11BH-02M-5	MV-11BH-02M-6	MV-11BH-03M-3
Duplicate ID									
Date			21/Mar/94	21/Mar/94	21/Mar/94	21/Mar/94	17/Dec/11	17/Dec/11	17/Dec/11
Lab report ID			1675-K	1675-K	1675-K	1675-K	11V560614	11V560614	11V560614
Consultants			SRK	SRK	SRK	SRK	Franz	Franz	Franz
Depth (m)			2.2 – 2.4	2.2 – 2.4	2.3 – 2.4	0.6 – 1.2	4.5 – 5	5 – 6	2 – 3
Grain Type			coarse	coarse	coarse	coarse	coarse	coarse	coarse
Naphthalene	0.013	50	0.12	0.10	0.07	0.17	0.05	0.45	0.03
Phenanthrene	0.046	50	0.09	0.20	<0.05	0.15	0.09	1.08	0.04
Total PAHs IACR (Calculated) - Calculated	1	-	0.754	1.73	0.727	1.12	0.569	39.06	0.569

Area ID	CCME IL	BC CSR IL	LOT 6	LOT 6	LOT 6	LOT 6	LOT 6
Station ID			BV-11BH-01M	BV-11BH-02M	BV-11BH-02M	BV-11BH-04M	BV-11BH-05M
Field label			BV-11BH-01M-5	BV-11BH-02M-2	BV-11BH-02M-3	BV-11BH-04M-1	BV-11BH-05M-5
Duplicate ID							
Date			14/Dec/11	16/Dec/11	16/Dec/11	17/Dec/11	17/Dec/11
Lab report ID			11V559640	11V560614	11V560614	11V560784	11V560784
Consultants			Franz	Franz	Franz	Franz	Franz
Depth (m)			3 – 4	0.5 – 1	1.5 – 2	0 – 0.5	3 – 4
Naphthalene	0.013	50	0.13	0.02	0.10	0.02	0.01
Phenanthrene	0.046	50	0.04	0.02	0.17	0.04	0.06
Total PAHs IACR (Calculated) - Calculated	1	-	0.569	0.569	3.271	0.579	1.310

Area ID	CCME IL	BC CSR IL	LOT 6	LOT 6	LOT 6	LOT 6
Station ID			BV-11BH-07M	BV-11BH-07M	BV-11BH-07M	BV-11BH-09M
Field label			BV-11BH-07M-2	BV-DUP8	BV-11BH-07M-3	BV-11BH-09M-1
Duplicate ID			BV-DUP8	BV-11BH-07M-2		
Date			17/Dec/11	17/Dec/11	17/Dec/11	14/Dec/11
Lab report ID			11V560784	11V560784	11V560784	11V559640
Consultants			Franz	Franz	Franz	Franz
Depth (m)			0.5 – 1	0.5 – 1	1.5 – 2	0 – 0.5
Naphthalene	0.013	50	0.02	0.02	0.07	0.09
Phenanthrene	0.046	50	0.07	0.07	0.05	0.02

Area ID	CCME IL	BC CSR IL	LOT 5	LOT 5	LOT 5	LOT 5	LOT 5	LOT 5
Station ID			5-BH23	5-BH27	MV-11BH-11M	MV-11BH-11M	MV-11BH-12M	MV-11BH-13M
Field label			BH23-23-2 @ 7	BH27-27-1 @ 2	MV-11BH-11M-1	MV-Dup4	MV-11BH-12M-1	MV-11BH-13M-2
Duplicate ID					MV-Dup4	MV-11BH-11M-1		
Date			20/Jul/98	20/Jul/98	14/Dec/11	14/Dec/11	14/Dec/11	14/Dec/11
Lab report ID			B080642-soil	B080642-soil	11V559640	11V559640	11V559640	11V559640
Consultants			NEXT	NEXT	Franz	Franz	Franz	Franz
Depth (m)			0.9	0.6	0.5 – 1	0.5 – 1	0.5 – 1	1.5 – 2
Acenaphthene	0.28	-	<0.05	<0.05	0.23	0.30	0.02	<0.01
Fluorene	0.25	-	<0.05	<0.05	0.31	0.44	0.06	<0.02
Naphthalene	0.013	50	0.05	0.12	0.32	0.37	0.69	0.02
Phenanthrene	0.046	50	<0.05	0.21	1.20	1.90	0.52	0.04
Total PAHs IACR (Calculated) - Calculated	1	-	0.866	2.23	10.53	14.33	2.04	0.569

Area ID	CCME IL	BC CSR IL	LOT 3	LOT 3	LOT 3	LOT 3
Station ID			3-BH8	MV-11BH-07M	MV-11BH-10M	MV-11BH-17M
Field label			BH8 8-1	MV-11BH-07M-4	MV-11BH-10M-1	MV-11BH-17M-1
Duplicate ID						
Date			17/Jul/98	14/Dec/11	12/Dec/11	16/Dec/11
Lab report ID			B073131-soil	11V559248	11V559211	11V560203
Consultants			NEXT	Franz	Franz	Franz
Depth (m)			0.6	2 – 3	0.75	0.5 – 1
Naphthalene	0.013	50	0.16	<0.01	0.10	0.02
Phenanthrene	0.046	50	0.08	0.11	<0.02	0.04

LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Test Pit
- Borehole
- Monitoring Well
- Surface Soil Sample

- One or more analytical parameters are greater than the applicable BC CSR Soil Standards
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- One or more analytical parameters are greater than the applicable CCME Soil Standards
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- Lot 2
- Lot 3
- Lot 4
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NOTES
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- Bold indicates parameter exceeds CSR IL. (Current as of 9-November-2012)
- Coloured rings represent most recent sampling date.
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Scale 1:1000
40 20 0 20 40
metres

Title:
ANALYTICAL RESULTS - PAHs IN SOIL

Project:
DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:
VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
MAY 2013

FIGURE 5

2090-1103/CAD/CB/Analytical Posters.dwg

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2	Lumber Storage Area
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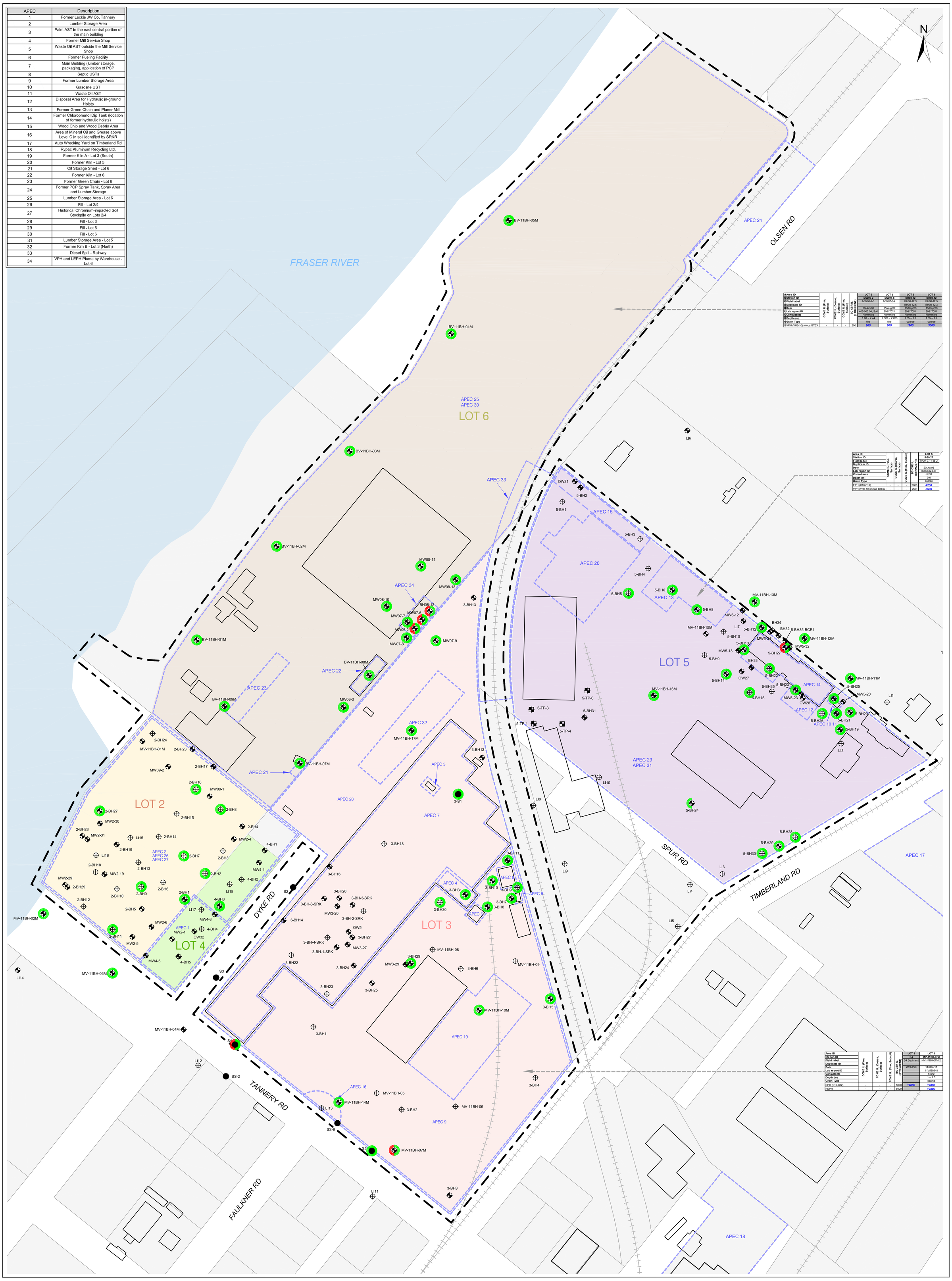
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6



LEGEND

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- All analytical parameters are less than the applicable CCME Soil Standards

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

NOTES
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- Red cells indicates parameter exceeds CCME IL (Fine, Surface). (Current as of 9-November-2012)
- Bold indicates parameter exceeds CCME IL (Coarse, Surface). (Current as of 9-November-2012)
- Underline indicates parameter exceeds CCME IL (Fine, Subsoil). (Current as of 9-November-2012)
- Coloured rings represent most recent sampling date.
- Refer to Tables for Full Soil Results.

Scale 1:1000

40 20 0 20 40

metres

Title:
ANALYTICAL RESULTS - PHCs IN SOIL

Project:
DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:
VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
MAY 2013

FIGURE 6

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
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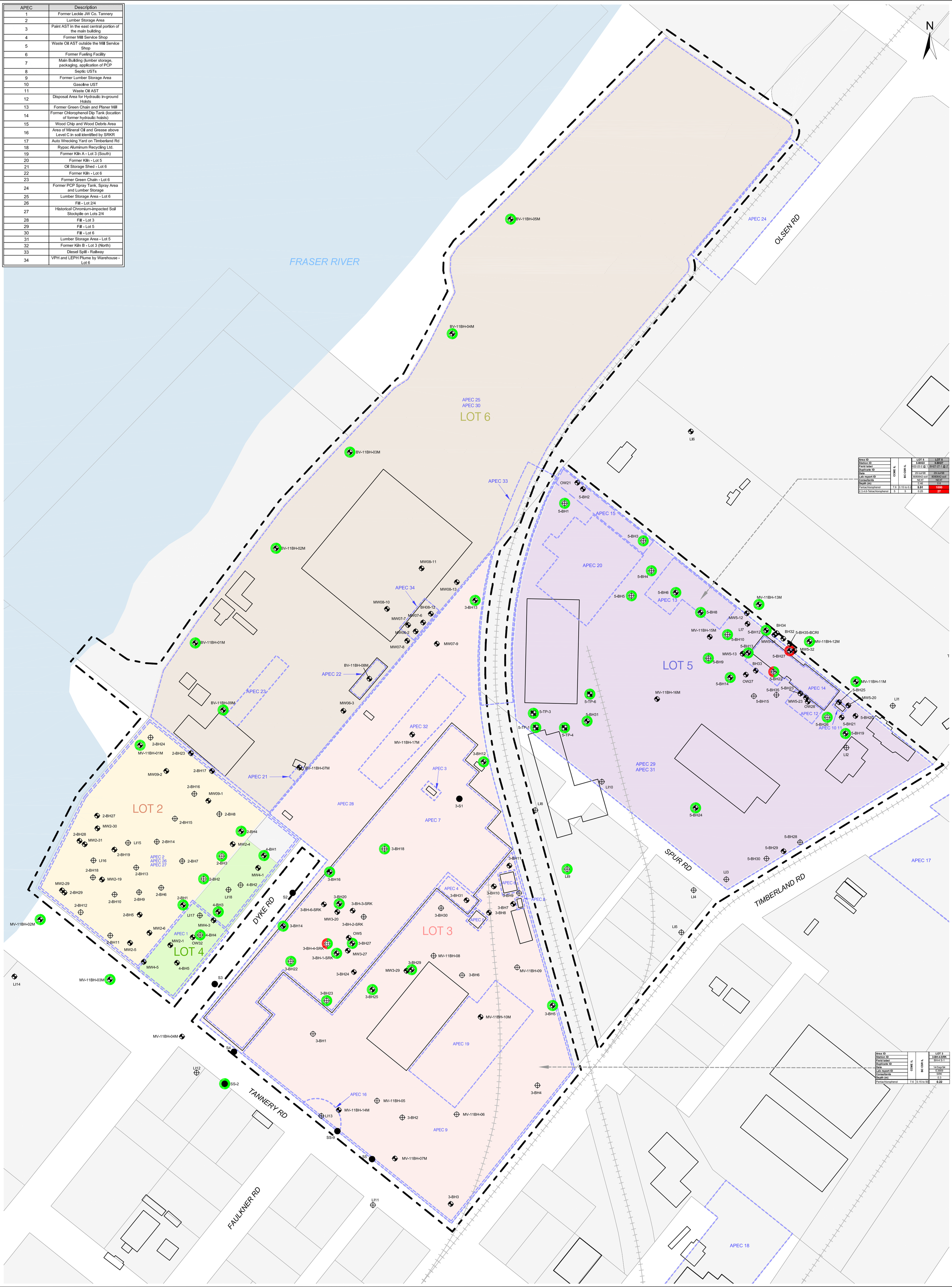
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
23	Former Green Chain - Lot 6
24	Former PCP Spray Tank, Spray Area and Lumber Storage
25	Lumber Storage Area - Lot 6
26	Fill - Lot 2/4
27	Historical Chromium-impacted Soil Stockpile on Lots 2/4
28	Fill - Lot 3
29	Fill - Lot 5
30	Fill - Lot 6
31	Lumber Storage Area - Lot 5
32	Former Kiln B - Lot 3 (North)
33	Diesel Spill - Railway
34	VPH and LEPH Plume by Warehouse - Lot 6



Area ID			LOT 5
Station ID			5-BH25
Field label			Y22-22-2 @ 1
Duplicate ID			
Date			20/Jul/98
Lab report ID			8080642-soil
Consultants			NEXT
Depth (m)			0.46
Pentachlorophenol	7.6	0.15 to 0.2	**5.91**
2,3,4,6-Tetrachlorophenol	5	5	0.25

Area ID			LOT 5
Station ID			5-BH27
Field label			BH27-27-1 @ 2
Duplicate ID			
Date			20/Jul/98
Lab report ID			8080642-soil
Consultants			NEXT
Depth (m)			0.6
Pentachlorophenol	7.6	0.15 to 0.2	**1000**
2,3,4,6-Tetrachlorophenol	5	5	**27**

Area ID			LOT 3
Station ID			3-BH-4-SRK
Field label			BH4-S-1
Duplicate ID			
Date			14/Sep/94
Lab report ID			E3909
Consultants			SRK
Depth (m)			0.3
Pentachlorophenol	7.6	0.15 to 50	**0.22**

LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Test Pit
- Borehole
- Monitoring Well
- Surface Soil Sample

- One or more analytical parameters are greater than the applicable BC CSR Soil Standards
- All analytical parameters are less than the applicable BC CSR Soil Standards
- One or more analytical parameters are greater than the applicable CCME Soil Standards
- All analytical parameters are less than the applicable CCME Soil Standards

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

NOTES
- All units in ug/g.
- "-" indicates that there is no applicable standard or analyses were not performed.
- Red cells indicates parameter exceeds CCME IL. (Current as of 9-November-2012)
- Bold indicates parameter exceeds BC CSR IL. (Current as of 9-November-2012)
- Coloured rings represent most recent sampling date.
- Refer to Tables for Full Soil Results.

Scale 1:1000

40 20 0 20 40 metres

Title:
ANALYTICAL RESULTS - PHENOLS/CHLOROPHENOLS IN SOIL

Project:
DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:
VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
MAY 2013

FIGURE 7

2090-1103/CAD/CB/Analytical Posters.dwg

APEC	Description
1	Former Leckie JW Co. Tannery
2	Lumber Storage Area
3	Paint AST in the east central portion of the main building
4	Former Mill Service Shop
5	Waste Oil AST outside the Mill Service Shop
6	Former Fueling Facility
7	Main Building (lumber storage, packaging, application of PCP
8	Septic USTs
9	Former Lumber Storage Area
10	Gasoline UST
11	Waste Oil AST
12	Disposal Area for Hydraulic in-ground Hoists
13	Former Green Chain and Planer Mill
14	Former Chlorophenol Dip Tank (location of former hydraulic hoists)
15	Wood Chip and Wood Debris Area
16	Area of Mineral Oil and Grease above Level C in soil identified by SRKR
17	Auto Wrecking Yard on Timberland Rd
18	Rypac Aluminum Recycling Ltd.
19	Former Kiln A - Lot 3 (South)
20	Former Kiln - Lot 5
21	Oil Storage Shed - Lot 6
22	Former Kiln - Lot 6
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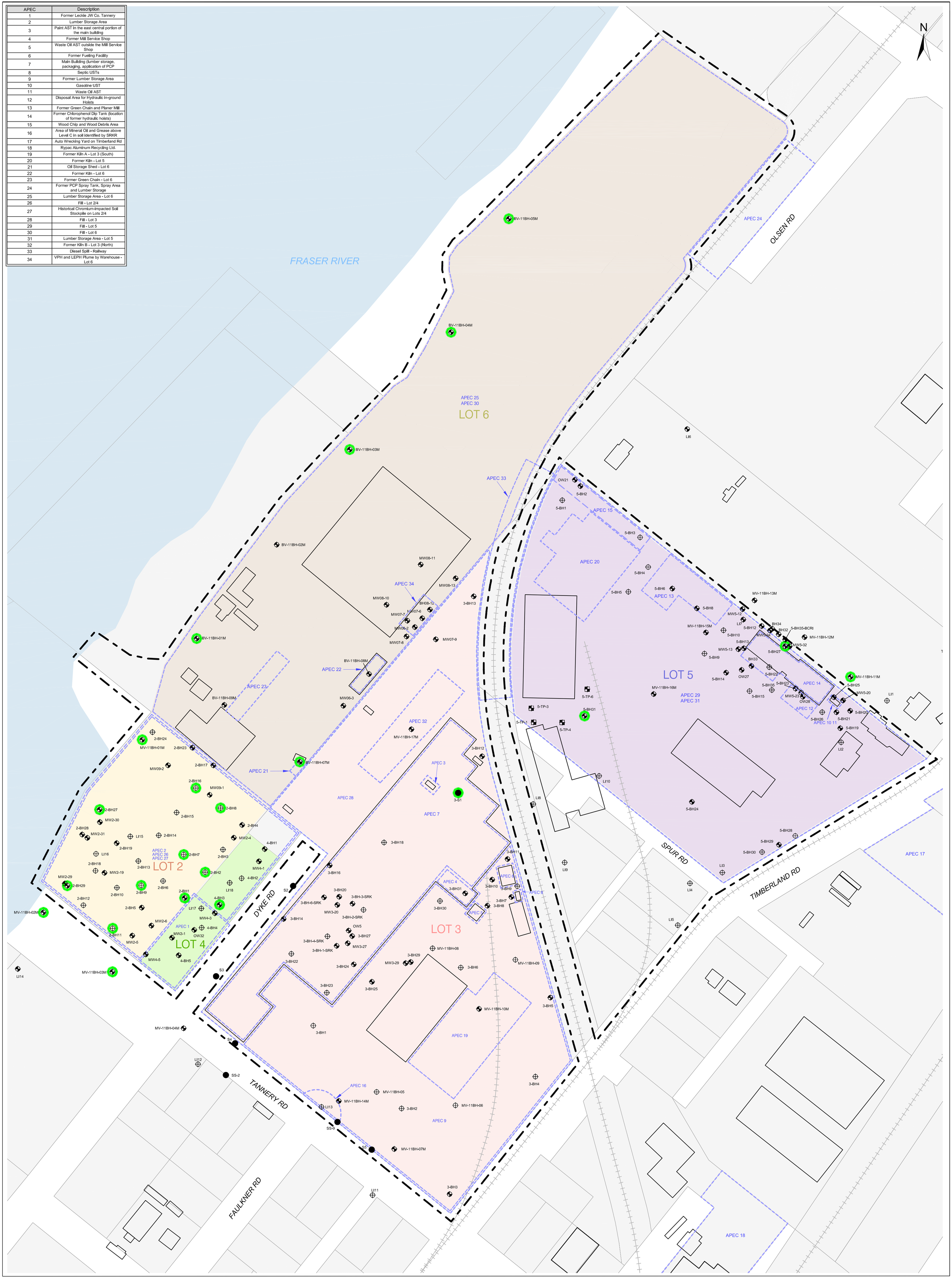

LEGEND

- Area of Potential Environmental Concern (APEC)
- Railway
- Site Boundary
- Existing Structure
- Property Boundary
- Test Pit
- Borehole
- Monitoring Well
- Surface Soil Sample

- One or more analytical parameters are greater than the applicable BC CSR Soil Standards
- All analytical parameters are less than the applicable BC CSR Soil Standards
- One or more analytical parameters are greater than the applicable CCME Soil Standards
- All analytical parameters are less than the applicable CCME Soil Standards

- Lot 2
- Lot 3
- Lot 4
- Lot 5
- Lot 6

NOTES
- Coloured rings represent most recent sampling date.
- Refer to Tables for Full Soil Results.

Scale 1:1000
40 20 0 20 40
metres

Title:
ANALYTICAL RESULTS - VOCs IN SOIL

Project:
DATA GAP ANALYSIS
SURREY-BROWNSVILLE, SURREY, BC

Client:
VANCOUVER FRASER PORT AUTHORITY

FRANZ ENVIRONMENTAL INC.
♦ CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Date:
MAY 2013

FIGURE 8

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