SUBSURFACE INVESTIGATION REPORT

Terminal 1 Property
Port of Vancouver, USA
100 Columbia Street
Vancouver, Washington

May 18, 2016

HAI Project No. 8832

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Prepared for:

Port of Vancouver, USA
Vancouver, Washington

Prepared by:

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1.0 SUMMARY OF FINDINGS

Subsurface investigation activities were performed at the 10.14 acre Port of Vancouver Terminal 1 property (the Site) located at 100 Columbia Street in Vancouver, Washington. The Site was formerly used as a World War I era shipyard; a municipal dock; and a lumber yard until it was developed in the 1960s for its current use as a hotel and small office complex.

In May and June 2015, a soil and groundwater investigation was conducted by Hahn and Associates, Inc. (HAI) to evaluate the current environmental condition of soils and groundwater at the Site, in particular regard to potential impacts of hazardous substances originating from historical uses at, and in the vicinity of, the Site and to target several areas of interest as were previously identified during a 2008 site-wide investigation conducted by Ecology and Environment, Inc, (E & E). The 2015 investigation included installation and sampling of a total of 11 soil borings, five of which were completed as monitoring wells. Results of the 2015 investigation were previously reported by HAI, with several recommended follow-up investigation activities being recommended: 1) provide additional contaminant delineation within soils, 2) conduct an additional round of groundwater monitoring, and 3) evaluate soil gas at the eastern portion of the Site.

The follow-up investigations activities were conducted in February and March 2016, and included the installation of 14 soil borings, 4 soil gas probes, as well as a full resampling of the groundwater monitoring well network.

A summary of the findings relating the HAI 2015 and 2016 subsurface investigation is presented below.

1) <u>Subsurface Conditions</u>

a) The northern Site area is underlain by fill including silts and gravelly silts with a few sand lenses, while the southern portion of the Site (closer to the Columbia River) is underlain by poorly graded sands to 45 feet below ground surface (bgs), the maximum depth explored. Overall it appears that the nature of the fill used at the site includes construction debris (brick and asphalt fragments)

or miscellaneous fill with a high silt fraction on the northern portion of the Site, while fill at the southern portion of the Site, especially below depths of 5 to 10 feet, may have been predominantly a dredged sand fill material – with the distinction between native and fill materials at this portion of the Site being difficult to ascertain.

b) Soils at select borings near the northeastern corner of the Site had a strong petroleum hydrocarbon odor, a rainbow-colored sheen, black discoloration, and asphalt fragments, ranging from depths to approximately 2.5 to 8 feet bgs, correlating with the greatest concentrations of petroleum contamination (greater than MTCA Method A Cleanup Levels for Industrial Properties). Several other zones with field screening evidence of potential contamination were observed at the Site, but were relatively minor, deep, and appeared associated with the zone of water table fluctuation.

c) Groundwater was encountered in soil borings at depths of approximately 20 to 25 feet bgs, where encountered during the 2015 investigation. During the 2016 investigation, groundwater was not encountered to the maximum depth explored of 20 feet bgs.

   Groundwater elevation measurements collected in June 2015 (dry season) suggests the predominant flow direction of the shallow groundwater beneath the Site is away from the Columbia River to the north, apparently in response to large volume pumping at water supply wells owned by the City of Vancouver located northwest of the Site.

   Groundwater elevation measurements in February 2016 (wet season) suggests the presence of a groundwater divide on the property, with groundwater on the northern portion of the site flowing away from the river (similar to 2015), while groundwater on the southern portion of the site (closest to the river) appears to be flowing toward the Columbia River.

2) <u>Soil Testing Results</u>

Soil samples were analyzed for gasoline-, diesel-, and oil-range petroleum hydrocarbons, volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls

(PCBs), and priority pollutant metals. Samples were analyzed to characterize near-surface soil quality at the Site and to support delineation of identified zones of PAH and lead-contaminated soils at the eastern portion of the Site.

a) Low-level diesel or oil-range total petroleum hydrocarbon (TPH) concentrations were detected in a majority of near-surface soil sampling locations, but with the exception of a single boring location near the northeastern corner of the Site (boring SB-012), all concentrations were all well below the 2,000 milligrams/kilogram (mg/kg) Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A Cleanup Levels for Unrestricted and Industrial Land Uses. The SB-012 zone of contamination (4,080 mg/kg of diesel- and 4,190 mg/kg of oil-range TPH) corresponds with soils exhibiting strong field screening evidence of impact (rainbow sheen, discoloration, odor) with incorporation of asphaltic debris that extended to a depth of approximately 8 feet below ground surface (bgs) at this location.

b) With the exception of the boring SB-012 shallow zone of contamination, gasoline-range TPH or VOCs were not detected in soil samples at concentrations greater than laboratory method detection limits (MDLs) in any soil sample. Gasoline-range TPH (3,020 mg/kg) and naphthalene (200 mg/kg) were detected in shallow soil (2.0 feet bgs) at the SB-012 zone of contamination at concentrations exceeding the MTCA Method A Cleanup Levels for Unrestricted and Industrial Land Use (100 mg/kg for gasoline; 5 mg/kg for naphthalene).

c) PCBs were not detected in any soil samples at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use.

d) One or more PAH compound was detected in 41 of the 57 soil samples analyzed as part of the 2015 and 2016 investigations. Of the 41 samples with detected PAH concentrations, 17 samples detected PAH concentrations greater than the 0.1 mg/kg MTCA Method A Toxicity Equivalence Factor (TEF) Cleanup Level for Unrestricted Land Use. Of these 17 samples, only two samples collected (from the shallow zone of soil contamination at the SB-012 and SB-020 soil boring locations) had TEF concentrations

(3.43 and 19.82 mg/kg, respectively) higher than the 2 mg/kg TEF MTCA Method A Cleanup Level for Industrial Properties.

In general, the areas of the Site with MTCA exceedances for PAHs in soil appear sporadically detected at the eastern portion of the Site, with a majority of the exceedances occurring within the gravel silt fill located near the northeastern portion of the Site.

e) With regard to metals, soil concentrations of lead higher than the 250 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use were detected at eight soil boring locations during the 2015 and 2016 investigations, with 821 mg/kg detected at SB-014 (1 to 2.5 feet bgs); 772 mg/kg at MW-1-37 (5 to 7 feet bgs); 545 mg/kg at MW-2-40 (0.2 to 1.2 feet bgs); 287 mg/kg at SB-015 (0.5 to 2.5 feet bgs); 467 mg/kg at SB-018 (6 to 8 feet bgs); 308 mg/kg at SB-022 (2.0 – 3.5 feet bgs); 980 mg/kg at SB-026 (6 to 7.5 feet bgs); and 471 mg/kg at SB-028 (10 to 11 feet bgs). During the 2009 investigation, total lead was detected exceeding the MTCA Method A Cleanup Level for Industrial Use (1,000 mg/kg) at two boring locations, SB-006 (1,100 mg/kg) and SB-010 (1,180 mg/kg). Total lead was not detected above the MTCA Method A Cleanup Level for Industrial Use in any soil samples collected during the 2015 and 2016 investigations. In addition to lead, mercury was also detected in the near-surface soil sample collected from the SB-014 soil boring location at a concentration (3.61 mg/kg), exceeding the 2 mg/kg MTCA Method A Cleanup Level for Unrestricted and Industrial Land Use for this metal (same cleanup level regardless of use).

   Follow-up testing for leachability did not find that any samples produced leachate at a concentration that would require soils to be designated as hazardous waste for lead and mercury leachability if excavated and requiring disposal.

   Total chromium was analyzed in near-surface soils at all 11 boring locations during the 2015 investigation as well as in select deeper soil samples. All detected total chromium concentrations were less than the 42 mg/kg state-wide default naturally-occurring background concentration for this metal and well below the 2,000 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use for this metal. Hexavalent chromium was not detected in any tested soil samples at concentrations above the 19 mg/kg MTCA

Method A Cleanup Levels for Unrestricted Land Use, with the maximum detected hexavalent chromium concentration of any sample being 2.18 mg/kg (MW-5-34).

As an overall summary, the table below summarizes all (E & E 2008 and HAI 2015 and 2016) soil testing results where a detected chemical concentration exceeded MTCA Method A Cleanup Levels for Unrestricted or Industrial Land Uses, with red font indicating soil samples with detections above Industrial Land Use MTCA levels.

Detections in Soil above MTCA Method A

Location	Depth (feet bgs)	Analyte	Detected Concentration (mg/kg)	MTCA-Unrestricted (mg/kg)	MTCA-Industrial (mg/kg)
SB-004	**26-28**	**Arsenic**	**25.6**	20	**20**
		Cadmium	**2.43**	2	**2**
SB-006	**6-8**	PAHs-TEF	0.13	0.1	2
		Lead	**1,100**	250	**1,000**
SB-007	**21-23**	**Cadmium**	**2.12**	2	**2**
SB-009	8-10	PAHs-TEF	0.36	0.1	2
SB-010	6-8	PAHs-TEF	0.11	0.1	2
	13-15	**Lead**	**1,180**	250	**1,000**
SB-011	1.5-3.5	PAHs-TEF	0.44	0.1	2
SB-012	**1.5-3.5**	**Diesel**	**4,080**	2,000	**2,000**
		Oil	**4,190**	2,000	**2,000**
		Gasoline	**3,020**	100	**100**
		Naphthalene	**200**	5	**5**
		PAHs-TEF	**3.43**	0.1	**2**
SB-014	**1-2.5**	PAHs-TEF	0.11	0.1	2
		Lead	821	250	1,000
		Mercury	**3.61**	2	**2**
SB-015	0.5-2.5	PAHs-TEF	0.24	0.1	2
		Lead	287	250	1,000
SB-017	1-2.3	PAHs-TEF	1.46	0.1	2
SB-018	6-8	PAHs-TEF	0.28	0.1	2
		Lead	467	250	1,000
SB-019	0-2	PAHs-TEF	0.17	0.1	2
	6-8	PAHs-TEF	1.76	0.1	2
SB-020	1-2.5	PAHs-TEF	**19.82**	0.1	**2**
	6-7	PAHs-TEF	0.38	0.1	2
SB-021	2-3.7	PAHs-TEF	0.17	0.1	2
SB-022	0-2	PAHs-TEF	0.15	0.1	2
	2-3.5	PAHs-TEF	0.16	0.1	2
		Lead	308	250	1,000
	5-7	PAHs-TEF	0.11	0.1	2
SB-023	5-6	PAHs-TEF	0.14	0.1	2
	8-10	PAHs-TEF	0.17	0.1	2
SB-026	6-7.5	Lead	980	250	1,000
SB-028	10-11	Lead	471	250	1,000
MW-1-37	5-7	PAHs-TEF	0.19	0.1	2
		Lead	772	250	1,000
MW-2-40	0.2-1.2	Lead	545	250	1,000

3) Groundwater Testing Results

Groundwater samples collected from all five newly installed monitoring well locations during June 2015 (dry season) and February 2016 (wet season), were analyzed for gasoline-range petroleum hydrocarbons, diesel- and oil-range petroleum hydrocarbons, PAHs, total and dissolved metals, and VOCs.

a) TPH and VOCs in groundwater, diesel- and gasoline-range TPH and naphthalene concentrations slightly exceeded the MTCA Method A Cleanup Level for Groundwater at a single location (well MW-3-35), located near the southeastern portion of the Site. Specifically, diesel-range petroleum hydrocarbons were detected at a concentration of 795 µg/L during 2015 and at a concentration of 858 µg/L during 2016 (MTCA Method A Cleanup Value of 500 µg/L); gasoline-range petroleum hydrocarbons were detected at a concentration of 1,360 µg/L during 2015 and at a concentration of 1,340 µg/L during 2016 (MTCA Method A Cleanup Value of 1,000 µg/L); and naphthalene was detected at a concentration of 227 µg/L during 2015 and at a concentration of 385 µg/L during 2016 (MTCA Method A Cleanup Value of 160 µg/L). Additionally, the naphthalene concentrations detected in groundwater at the MW-3-35 location were higher than the 8.93 µg/L MTCA Method B Screening Level for Vapor Intrusion into indoor air. No other VOCs detected in groundwater exceeded the MTCA Method B Screening Level for Vapor Intrusion into indoor air.

b) Total carcinogenic PAH TEF concentrations, although present sporadically in soil at concentrations greater than MTCA Cleanup Levels, were not detected in groundwater at any well location during 2015 and 2016 at concentrations exceeding the MTCA Method A Cleanup Value for Groundwater.

c) Total (unfiltered) arsenic was detected during 2015 above the 5 µg/L MTCA Method A Cleanup Value for Groundwater at well locations MW-2-40 (14 µg/L), MW-4-34 (5.38 µg/L), and MW-5-34 (5.5 µg/L). During 2016 total arsenic was detected above the 5 µg/L MTCA Method A Cleanup Value for Groundwater at MW-3-35 (6.56 µg/L), MW-4-34 (10.8 µg/L), and MW-5-34 (6.14 µg/l). In addition dissolved (field filtered) arsenic was detected above the 5 µg/L MTCA Method A Cleanup value for Groundwater at MW-4-34 (9.87 µg/L) and MW-5-34 (5.89 µg/L) during 2016.

During 2015, total chromium (319 µg/L) and total lead (34.4 µg/L) were detected at the MW-2-40 well location above the MTCA Method A Cleanup Values for Groundwater of 50 µg/L and 15 µg/L, respectively. With regard to total chromium and lead, these exceedances of total (unfiltered) metals were limited to well locations with limited water column and low yields during well purging which increased the solids component of the samples. Dissolved phase (field filtered) testing of these metals did not detect concentrations higher than MTCA Method A Cleanup Values. Hexavalent chromium was detected in unfiltered groundwater during 2015 (7 µg/L at MW-2-40) and during 2016 (0.0061 µg/L at MW-3-35). Both detected concentrations were well below the 48 µg/L MTCA Method B screening level.

The table below summarizes groundwater testing results where a detected chemical concentration exceeded MTCA Method A Cleanup Levels for Groundwater.

Detections in Groundwater above MTCA Method A

Location	Depth (feet bgs)	Analyte	Detected Concentration (µg/L) (2015 / 2016)	MTCA Method A Cleanup Value for Groundwater
MW-2-40	30-40	Total Arsenic*	14* / 2.19	5
		Total Chromium*	319* / U	50
		Total Lead*	34.4* / 0.211	15
MW-3-35	25-35	Diesel	795 / 858	500
		Gasoline	1,360 / 1,300	1,000
		Naphthalene	227 / 385	160
		Total Arsenic	4.53 / 6.56	5
MW-4-34	24-34	Total Arsenic	5.38* / 10.8 (9.87)	5
MW-5-34	24-34	Total Arsenic	5.5* / 6.14 (5.89)	5

Red font = concentration exceeds MTCA Method A Cleanup Value for Groundwater.
* = The dissolved concentration was below the MTCA Method A Cleanup Value for Groundwater.
(9.87) and (5.89) = field filtered (dissolved) arsenic concentrations.

4) Soil Gas Testing Results

Soil gas samples were collected to support a vapor intrusion assessment at the northeastern portion of the Site proximate to where shallow petroleum-related soil contamination was detected (SB-012, SB-020, and SB-022); and from the southeastern portion of the Site proximate to

where naphthalene impacts to uppermost groundwater were detected (MW-3-35).

As described in Ecology soil vapor intrusion guidance, deep soil gas samples are considered to be from depths of 15 feet bgs or greater, while shallow soil gas samples are considered to be from immediately beneath a building slab or from depths shallower than 15 feet bgs (when there is no building slab present). Ecology has different screening levels for soil gas screening, depending upon whether shallow or deep samples are being evaluated.

Analytical testing of deep soil gas samples collected at depths of 18.5 to 19 feet bgs near the water table (SG-1 and SG-2) at the southeastern portion of the property, did not detect VOCs or TPH fractions at concentrations greater than Ecology Deep Soil Gas Screening Level Values.

With regard to shallow soil gas sample SG-3 located on the northeastern portion of the Site, benzene (12 µg/m^3), naphthalene (27 µg/m3), and C8 to C12 aliphatic TPH (39,000 µg/m^3) were detected at concentrations greater than the Ecology Sub-Slab Soil Gas Screening Level Values for Vapor Intrusion (11 µg/m^3, 2 µg/m^3, and 4,700 µg/m^3, respectively). Shallow soil gas sample SG-4, located in the same general area, but closer to boring SB-012, detected 1,3-butadiene (6.9 µg/m^3) and 22,200 µg/m^3 C8 to C12 aliphatic TPH, exceeding the Ecology Soil Gas Screening Level Values for Vapor Intrusion (3 µg/m^3 and 4,700 µg/m^3, respectively).

5) Discussion of Findings

Soil

As documented during the 2015 and 2016 investigations, the presence of petroleum (TPH and PAH) and metals (primarily lead) impacts to soil are predominantly limited to the eastern portion of the Site.

In general, on-site petroleum impacts to soil at the northeastern portion of the Site were delineated and found primarily limited to the upper gravelly silt (fill), which thickens to the east. This petroleum-related contamination appears sporadically present throughout the fill material, with contaminant concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Use extending to approximately 4 to 5 feet bgs within the western portion of this area, and to a depth of between 9 and

10 feet across the eastern portion of this area, closest to the eastern property line.

With exception of near-surface soils at two locations at the northeastern property area (SB-012 and SB-020), contaminant concentrations were generally less than MTCA Method A Cleanup Levels as established for Industrial Land Use. With regard to SB-012, multiple contaminants (gasoline-, diesel-, oil-range TPH, naphthalene, and carcinogenic PAH TEF values) were detected in soil at this location at concentrations greater than industrial-based MTCA levels, while at SB-020 only PAH TEF values were detected at concentrations greater industrial-based MTCA levels.

Those zones of contamination with concentrations greater than MTCA Method A Cleanup Levels for Industrial Properties (as described above) were discernable from soils with lesser levels of contamination based on significant field screening evidence of contamination (rainbow sheen, discoloration, petroleum odor) or significant incorporation of asphaltic fragments. This field screening evidence of contamination was found to extend to a depth of approximately 8 feet bgs at boring SB-012 and to a depth of 2.5 feet bgs at boring SB-020.

Similar to the northeastern area described above, PAH and lead contamination (and mercury in a single case) was identified in soil at the southeastern portion of the Site, although with impacts being more limited in extent. Specifically, soils with PAH or lead concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use were identified at the SB-006A, SB-014, SB-026, and SB-028 boring locations. The vertical limits of lead or PAH contamination at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use appear limited to within the 5 to 10 foot depth interval everywhere with exception to SB-014, where the impacts appear limited to the upper 3 feet bgs. The single mercury MTCA exceedence (greater than Industrial Land Use levels) was co-located with the lead and PAH contamination detected in near-surface soils at the SB-014 location.

Soil sampling and delineation activities as completed to date support an estimation that there are approximately 8,900 in-place cubic yards of soils at the northeastern Site area contaminated at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use. Of these soils, it is estimated that 1,700 in-place cubic yards are

contaminated at concentrations greater than MTCA Method A Cleanup Levels for Industrial Land Use.

With regard to the southeastern Site area, it is estimated that there are approximately 1,800 cubic yards of in-place soils with contaminant levels above MTCA Method A Cleanup Levels for Unrestricted Land Use. Of these, it is estimated that approximately 500 cubic yards are present at concentrations greater than MTCA Method A Cleanup Levels for Industrial Land Use.

Contaminated soils at the preceding areas of the Site are presently capped with asphalt paving, preventing dermal contact and therefore do not present a current direct contact human health risk. The shallow nature of the impacts precludes contact with groundwater, which was not encountered at depths shallower than 20 feet bgs at any location.

Groundwater

With regard to groundwater quality, concentrations of petroleum-related contaminants at concentrations greater than MTCA Method A Cleanup Values (TPH and naphthalene) were limited to a single well (MW-3-35), located near the southeastern portion of the Site. The naphthalene concentrations detected in groundwater at this location were also higher than the Ecology Screening Level for Vapor Intrusion into indoor air. Soil gas sampling was completed to further evaluate this potential condition. The source for the groundwater contamination at this portion of the Site is not known, but it appears limited in overall magnitude and extent.

Total arsenic, chromium, and lead were detected above the MTCA Method A Cleanup Level for Groundwater at the MW-2-40 well location during the 2015 investigation, while total arsenic was detected at concentrations slightly above the MTCA Method A Cleanup Level at the MW-4-34 and MW-5-34 well locations in 2015. Hexavalent chromium was detected at concentrations well below applicable screening levels during 2015 or 2016. Dissolved concentrations for all metals at all locations were below MTCA Method A Cleanup Level for Groundwater during the 2015 event, suggesting sample turbidity was a function of the elevated detections at MW-2-40.

In 2016, both total and dissolved arsenic concentrations at the MW-4-34 and MW-5-35 well locations were greater than the MTCA Method A Cleanup Level, with no other metals concentrations at any other location exceeding MTCA Cleanup Levels.

Groundwater with elevated metals concentrations appears isolated to several well locations, with seasonal variability and sample turbidity likely being a factor. The elevated arsenic concentrations as detected at MW-4-34 and MW-5-35 during the 2016 event may be related to routine sample variability in conjunction with the heterogeneous nature of the metals content within fill soils at the Site.

Soil Gas

Laboratory testing of shallow soil gas samples collected from the northeastern portion of the Site at sampling locations SG-3 and SG-4 detected TPH, benzene, naphthalene, and 1,3-butadiene at concentrations greater than Ecology Soil Gas Screening Levels established for Vapor Intrusion into Indoor Air. Soil gas samples SG-3 and SG-4 were collected proximate to those soils with the greatest volatile constituent levels (e.g., gasoline-related TPH at SB-012) and where the most significant field screening evidence of soil contamination was observed (e.g., odor, sheen, elevated organic vapor headspace). Because there are currently no structures at this portion of the Site, the elevated TPH and volatile constituents in soil gas in this area do not represent a current unacceptable risk to indoor air.

Laboratory testing of deep soil gas samples collected from above the water table from the southeastern portion of the Site at sampling locations SG-1 and SG-2 did not detect concentrations of TPH or volatile constituents at concentrations greater than Soil Gas Screening Levels established for Vapor Intrusion into Indoor Air. These samples were collected from that portion of the Site where concentrations of naphthalene in groundwater (well MW-3-35) suggested the potential for the vapor intrusion to indoor air pathway to be of significance. The soil gas sampling as completed at this portion of the Site did not find that volatile constituents in groundwater are of significance with regard to a potential vapor intrusion source of contamination to indoor air. As such, mitigation measures or additional evaluation of vapor intrusion potential at the southeastern portion of the Site do not appear necessary.

6) Recommendations

a) Because concentrations of contaminants as detected in shallow soil near the northeastern and southeastern portions of Site exceed MTCA Method A Cleanup Levels for Unrestricted or Industrial Use, and with exception of those soils with contaminant levels contributing to a potential future vapor intrusion risk (Recommendation 2 below), these soils should either 1) remain capped to prevent future direct contact exposure, 2) be excavated to target levels and transported off-site for proper disposal either prior to, or as a component of, future Site development, or 3) be managed in accordance with appropriate protocols if exposed and removed as part of future site development, with undisturbed contaminated soils to remain capped under new structures or pavement.

b) Actions to address vapor intrusion potential resulting from those soils at the northeastern portion of the Site with the greatest volatile contaminant levels are recommended prior to future redevelopment involving construction of occupied structures in this area. Such actions could include removal of those contaminated soils that are contributing to the vapor intrusion potential (expected to correlate with the SB-012, SB-020, and SB-022 locations) and/or incorporation of engineering controls (e.g., vapor barrier) into future construction at the northeastern portion of the Site as needed to ensure mitigation of potential future indoor air inhalation risks.

2.0 INTRODUCTION

The Port of Vancouver, USA (port) retained HAI to complete subsurface investigation activities on a 10.14 acre property (the Site) located at 100 Columbia Street in Vancouver, Washington (Figures 1 and 2). HAI's first phase of investigation activities were completed in 2015, with results of that investigation documented in a January 2016 *Soil and Groundwater Investigation Report* (HAI 2016).

To address recommendations included within January 2016 *Soil and Groundwater Investigation Report*, HAI completed follow-up investigation activities at the Site in February and March 2016. The primary purpose for the 2016 investigation was to gather supplemental data to assist the port with planning as related to future Site redevelopment. Specifically, the 2016 investigation was completed to: 1) provide a more refined description of the extent of polynuclear aromatic hydrocarbon (PAH) and lead impacts as present on portions of the eastern property area; 2) conduct a vapor intrusion (VI) assessment with regard to petroleum impacts to uppermost groundwater at the southeastern portion of the Site and with regard to shallow soil at the northeastern portion of the Site; and 3) collect another round of groundwater quality data to support evaluation of potential seasonal variability in groundwater quality.

This report documents HAI's 2015 initial and 2016 follow-up investigation activities and is presented as an update to the previous *Soil and Groundwater Investigation Report* (HAI 2016). Additionally, subsurface investigation activities were completed by E & E in November 2008 on behalf of the port prior to HAI's 2015 and 2016 investigations. Results of the 2008 investigation were documented in a March 2009 report (E & E 2009), the results of which are also summarized herein.

3.0 SITE DESCRIPTION

The 10.14-acre Site consists primarily of a paved parking lot and a former (closed in November 2015) Red Lion hotel. Additionally, the parking lot serves the Columbia Shores commercial office building, which is located west of the hotel structure. A portion of the Site recently underwent construction with a new access roadway as part of the redevelopment of the former Boise Cascade lumber mill property immediately west of the Terminal 1 property. The former Boise Cascade property is not part of the Terminal 1

property and is proceeding through a separate development process by a private developer.

The Site, zoned City Center Mixed Use (CX) by the City of Vancouver, is bounded by Columbia Street to the east, an unnamed entrance road to the north, the Columbia River to the south, and the former Boise Cascade lumber mill property to the west, which is undergoing redevelopment with new commercial, urban residential, and green space uses.

The port is preparing a concept development plan for the 100 Columbia Street property (Site), focusing on development of a diverse commercial and public center with urban residential, commercial, and green space uses of the property. The Port's Board of Commissioners has emphasized the following goals for consideration in preparation of the Concept Development Plan for the Site:

- Provide public access to the water at all times
- Promote sustainable development and management of the port's land and facilities
- Incorporate the port's history at Terminal 1 – it's first marine terminal
- Incorporate existing assets of the Terminal 1 building, docks, and possibly the amphitheater into the development
- Allow for development that provides new revenue streams in balance with public asset development

The Waterfront Development Master Plan envisions the Site divided into four overall categories or zones of development, as follows:

- Zone 1: Mixed Use: Office, Retail, Urban Residential; Parking
- Zone 2: Hospitality: Hotel, Restaurant, Meetings, retail
- Zone 3: Multi-Purpose: Performance, Community Gathering Space, Office, Retail, Urban Residential
- Zone 4: Waterfront: Terminal 1 Marketplace, Retail/Office, Visitor Center, Outdoor Civic, Recreation

4.0 BACKGROUND

4.1 Site History

According to a summary of historical information provided in the 2009 E & E report, the earliest known development on the Site was in the early twentieth century when the port leased the land for use as a shipyard for construction of wooden and steel vessels related to the World War I effort. The Site was subsequently used as a city dock (eastern shoreline) or municipal dock (western shoreline). According to a report published by the U.S. Army Corps of Engineers and the U.S. Shipping Board, the municipal dock was used as "lumber and general cargo; foreign and domestic business, largely for consolidation of lumber shipments received by rail" (E & E 2009). The port accepted ownership of the municipal dock in 1925 and began operations at the Site as "Terminal 1" in December 1926 (Port 2015).

E & E review of a 1948 aerial photograph suggests that much of the Site was used as a lumberyard by the mid-1940s and that an asphalt plant was located immediately north of the Site during this timeframe. The Red Lion hotel, the tenant at the property until closing in November 2015, was constructed in the 1960s, at which time the entire Site, except for the far western area, was either paved or otherwise covered with hotel or office facilities. E & E describes the western portion of the Site, based on review of aerial photographs, as having been used as an outdoor staging or storage yard during this timeframe. The 2009 E & E report provides additional description of historical activities as well as the approximate locations / uses of former structures in the Site vicinity.

4.2 2008 Ecology and Environment (E&E) Investigation

As described above, E & E completed a subsurface investigation at the Site in November 2008, with results of that investigation documented in a March 2009 report.

The 2008 E & E investigation was designed for collection of soil and groundwater quality data spatially across the Site, with a focus on areas proximate to buildings that may have been associated with past chemical or fuel/metals contamination.

The E & E investigation included installation of 10 direct push boreholes (SB001 through SB010) to depths ranging from 16 to 29 feet below ground

surface (bgs). E & E had planned on collecting groundwater samples from temporary well points to be installed at three of the ten borehole locations, but groundwater sufficient for sampling was encountered at only one location (at SB003 below a depth of approximately 26 feet bgs). E & E concluded that the boring depths (with exception of SB003) were not sufficient to reach the water table at the time that the investigation occurred, possibly due to low tide conditions in the adjacent Columbia River. The approximate locations for E & E's 2008 direct push boring investigation are depicted on Figure 2.

Soil samples were collected by E & E from two depth ranges at all boring locations – with "shallower" samples collected at depths less than 10 feet bgs and "deeper" samples generally collected at depths greater than 16 feet bgs. Field boring logs provided by E & E indicate the presence of variable sands, silts, and gravelly sands across the depth horizons investigated, all reported as being apparent fill material. No field screening evidence of potential contamination was noted by E & E in soils at any of the 10 boring locations.

All soil samples and the single groundwater sample were analyzed for volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), and total priority pollutant metals. A sub-set of the soil samples also received follow-up testing for polychlorinated biphenyls (PCBs).

Results of the investigation were compared by E & E to Washington Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method A cleanup levels for both Unrestricted Land Use and for Industrial Properties.

As described in the referenced E & E report, no specific sources of contamination were identified during the assessment. However, soil samples from some boreholes detected concentrations of PAHs, petroleum hydrocarbons, and certain metals (above naturally-occurring background), with samples collected from the eastern portion of the property generally containing the highest concentrations. A brief summary of findings as presented in the E & E report is as follows:

- Gasoline-range petroleum hydrocarbons were not detected in any soil sample. Oil- and diesel-range petroleum hydrocarbons were detected in five of 20 soil samples (borehole locations SB006, SB008, SB009, and SB010), with all detections significantly lower than the 2,000 milligram per

kilogram (mg/kg) MTCA Method A cleanup levels. Gasoline- diesel-, and oil-range petroleum hydrocarbons were not detected in the groundwater sample (SB003 location).

- PCBs were not detected in any soil sample where analyzed.

- VOCs were detected only at a single soil sample location (toluene at SB010) but at a concentration well below the MTCA Method A cleanup level. Toluene was detected in groundwater at SB003, but this detection was similarly well below the MTCA cleanup level.

- PAHs were detected in seven of the 20 soil samples collected (borehole locations SB004, SB006, SB008, SB009, and SB010). Of the detections, concentrations of one or more PAH greater than MTCA cleanup levels as established for unrestricted land use were present in soil samples collected from borings SB006, SB009, and SB010. No PAHs were detected in any soil sample at a concentration greater than MTCA values established for industrial land use. PAHs were not detected in groundwater where analyzed at the SB003 location.

With regard to metals:

- Lead was detected at concentrations greater than default statewide background concentrations (17 mg/kg) and MTCA unrestricted and industrial levels (250 mg/kg and 1,000 mg/kg, respectively) in soil samples collected from the SB006 (1,100 mg/kg at 6 to 8 feet bgs) and SB010 (1,180 mg/kg at 13 to 15 feet bgs) boring locations.

- Elevated thallium and arsenic were detected in a soil sample collected from the SB004 boring location, with elevated arsenic (greater than the 7 mg/kg default background concentration) also being detected in samples collected from the SB003, SB005, SB006, SB007, and SB010 boring locations. As described by E & E, the elevated arsenic concentrations were generally limited to the deeper soil samples across the eastern portion of the property.

- Cadmium was detected at concentrations slightly greater than typical background concentrations and the MTCA value established for unrestricted land use in deep soil samples collected from the SB004 and SB007 boring locations.

- The maximum total chromium concentration detected in soil at any boring location was 46.4 mg/kg. The maximum detected total chromium concentration is in the range deemed typical for naturally-occurring levels in Washington (31.9 to 47.4 mg/kg). All total chromium concentrations in soil were well below the 2,000 mg/kg MTCA value established for the trivalent chromium (chromium III) at unrestricted or industrial properties, but exceeded the 19 mg/kg hexavalent chromium (chromium VI) value established for unrestricted or industrial properties. No speciation of chromium was completed as part of the 2008 investigation and therefore concentrations of trivalent and hexavalent chromium were not ascertained.

- The metals arsenic, copper, chromium, lead, nickel, and zinc were detected in the groundwater sample collected from boring SB003. None of the detected metal concentrations exceed MTCA Method A Cleanup Values for groundwater where established.

5.0 INVESTIGATION OBJECTIVES

The subsurface investigation activities as completed by HAI and described herein were completed in two phases, identified as the 2015 investigation (initial phase) and the 2016 investigation (follow-up phase). The overall objectives for both phases of investigation are described in Sections 5.1 and 5.2 below.

5.1 2015 Investigation (Initial Phase)

The overall objectives of the 2015 subsurface investigation activities were as follows:

- Provide lateral and vertical delineation of the lead and PAH contamination present within soil on a portion of the eastern Site area as described in the 2009 E & E report.

- Collection of speciated chromium (trivalent and hexavalent) data within soil and groundwater at the Site such that potential risks associated with this metal may be more fully evaluated.

- Collection of near-surface (e.g., upper 3 to 4 feet bgs) chemical data in soils to evaluate the potential surface soil exposure pathway as well as

potential future contaminated media management issues as may be related to future site re-development options.

- Collection of groundwater quality data at the Site to allow evaluation of whether soil impacts have adversely impacted groundwater beneath the Site.

5.2 2016 Investigation (Follow-up Phase)

The overall objectives of the 2016 follow-up phase of subsurface investigation activities were as follows:

- Provide a more refined lateral and vertical delineation of the lead and PAH contamination as identified on the northeastern and southeastern areas of the Site as described in the 2009 E & E report and the 2015 HAI report.

- Support evaluation of seasonal variability with regard to groundwater elevation and chemistry data by conducting a “wet season” monitoring event (February 2016) to compare with the previous “dry season” (June 2015) event.

- Collect soil gas samples to support completion of a vapor intrusion assessment with regard to petroleum-related VOCs detected in groundwater at the southeastern portion of the Site; and with regard to shallow soil in the area of greatest impact at the northeastern portion of the Site.

6.0 FIELD ACTIVITIES

Field activities as completed during HAI’s initial investigation in 2015 and the follow-up investigation completed in early 2016 are described in the sections below.

6.1 Soil Boring Location and Rationale

Six soil borings [SB-003A (formerly SB-015), SB-006A, and SB-011 through SB-014] and five monitoring wells (MW-1 through MW-5) were installed at the Site in May and June 2015 to address the investigation objectives described in Section 4.1. With regard to nomenclature, it is noted that the

2016 follow-up investigation inadvertently re-used the SB-015 boring identifier. To avoid confusion moving forward, the SB-015 identifier used for the earlier 2015 investigation was revised to the new designation SB-003A since this boring was otherwise an off-set for pre-existing boring SB-003.

Fourteen soil borings (SB-015 through SB-028) and four temporary soil gas points (SG-1 through SG-4) were installed at the Site in February and March 2016 to address the investigation objectives described in Section 5.2.

All soil boring, soil gas, and monitoring well locations are shown on Figure 3, and are described in the table below.

Boring and Monitoring Well Rationale, Depth, Media Tested

Area of Interest, Phase, and Purpose	Boring	Depth (feet)	Media Tested		
			Soil	Groundwater	Soil Gas
Northeastern Property, Initial Phase (2015): Lateral and vertical characterization of PAH and lead contaminated soils as detected in 2008 E & E borings SB-009 and SB-010	SB-011	30	X		
	SB-012	30	X		
	MW-1-37	45	X	X	
	MW-2-40	40	X	X	
Southeastern Property, Initial Phase (2015): Lateral and vertical characterization of PAH and lead contaminated soils as detected in 2008 E & E borings SB-006	SB-006A	35	X		
	SB-013	30	X		
	SB-014	30	X		
	MW-3-35	30	X	X	
	MW-4-34	30	X	X	
Northeastern Property, Follow-up Phase (2016): Refinement of lateral and vertical delineation of PAH and lead contaminated soil as detected in 2008 E&E borings SB-009 and SB-010 and 2015 HAI borings SB-011, SB-012, MW-1-37, and MW-2-40	SB-015	15	X		
	SB-016	15	X		
	SB-017	15	X		
	SB-018	20	X		
	SB-019	20	X		
	SB-020	20	X		
	SB-021	20	X		
	SB-022	20	X		
	SB-023	20	X		

Southeastern Property, Follow-up Phase (2016): Refinement of lateral and vertical delineation of PAH and lead contaminated soil as detected in 2008 E&E boring SB-006 and 2015 HAI borings SB-006A and SB-014.	SB-024	20	X		
	SB-025	15	X		
	SB-026	15	X		
	SB-027	15	X		
	SB-028	15	X		
North-Central Property, Initial Phase (2015): Chromium speciation at 2008 E & E boring SB-003	SB-003A	13	X		
Western Property, Initial Phase (2015): Shallow soil and baseline groundwater quality at the western portion of the Site	MW-5-34	35	X	X	
Southeastern Property, Follow-up Phase (2016): Vapor intrusion assessment as related to naphthalene impacts in uppermost groundwater at well MW-3-35.	SG-1	19			X
	SG-2	19			X
Northeastern Property, Follow-up Phase (2016): Vapor intrusion assessment as related to shallow petroleum impacted soil proximate to the SB-012 boring location.	SG-3	6			X
	SG-4	3			X

6.2 Field Procedures

6.2.1 Subsurface Drilling Procedures

In May and June 2015, 11 direct push borings, five of which were completed as monitoring wells, were installed at the Site for the collection of soil and groundwater samples (Figure 3). Boring SB-003A was installed to a depth of 13 feet bgs for collection of a targeted-depth soil sample, while all remaining SB- or MW-series borings were installed to depths of between 30 and 45 feet bgs as described in Section 6.1.

In February 2016, 14 direct push soil borings were installed at the Site for the collection of soil samples (Figure 3). Soil borings were installed to depths ranging from 15 and 20 feet bgs. Additionally, 4 direct push borings (SG-1 through SG-4) were installed for the installation of temporary soil gas collection points.

All 2015 and 2016 borings and monitoring well installations were installed by Pacific Soil & Water, LLC of Tigard, Oregon with a truck-mounted Geo-Probe

Systems hydraulic hammer unit using 2-inch outside diameter (OD) hydraulically-driven steel rods.

An HAI geologist was present during all investigation activities to observe and document drilling and sample collection procedures, obtain field samples, perform field screening activities, select and prepare samples for laboratory analysis, and prepare lithologic logs for each boring. The boring logs, including a field estimate of the Unified Soil Classification System (USCS) of the soil types encountered, as well as the field screening results, are included in Appendix A.

Following completion of the soil boring activities (SB-003A, SB-006A, SB-011 through SB-028, and SG-1 through SG-4), the borings were backfilled with 3/8-inch bentonite chips to within 6 inches of the ground surface. Asphalt was placed in the upper six inches of each boring to match the surrounding surface. Monitoring wells were installed at MW-series boring locations as described in Section 6.2.3.

The borings and monitoring wells were completed in accordance with the Washington Administrative Code (WAC) for the Minimum Standards for Construction and Maintenance of Wells (WAC Chapter 173-160) and General Requirements for Resource Protection Well Construction and Geotechnical Soil Borings (WAC Chapter 173-160-400).

6.2.2 Soil Sampling and Screening Procedures

Continuous soil cores were collected at all SB-series boring locations using a 5-foot long, 2-inch OD Macro-Core Sampler. No soil sampling was conducted at soil gas sampling locations (SG-series borings), where soil gas samples were collected from equipment pushed directly to the targeted sampling depth in order to avoid potential connectivity with ambient air (see Section 6.2.6).

Near-surface soil samples were collected from each boring within the upper 5 feet bgs and subsurface soil samples collected approximately every 5 feet thereafter. Soil samples were also collected across any depth intervals where field screening indicated the possible presence of contamination. The properties of each soil core were noted in the field by the HAI geologist and recorded on the field logs.

Upon collection, each non-volatile soil sample was homogenized, placed in sample jars, and capped with Teflon-lined lids. The sample jars were then labeled and transferred to a chilled container for shipment to the analytical laboratory. Standard sampling protocols, including the use of chain-of-custody documentation, were followed for all sampling procedures.

Soil samples collected for potential analysis of volatile organic compounds (VOCs) or gasoline-range petroleum hydrocarbons were collected and preserved in the field with methanol in accordance with U.S. Environmental Protection Agency (EPA) Method 5035A.

The subsurface soil samples were field-screened for the presence of potential contamination by the visual, olfactory, sheen test, and headspace vapor methods. The presence of sheen was assessed by placing clean tap water in a black pan and introducing approximately 5 grams of disaggregated soil to the water. Screening for the presence of organic vapors was conducted by the headspace method using a photoionization detector (PID) equipped with a 10.6 eV lamp. The results of the headspace screening are recorded on the boring log in parts per million (ppm). The headspace method results should be considered a qualitative indicator of possible contamination and used for relative comparison purposes.

6.2.3 Monitoring Well Installation and Development

In order to evaluate site wide groundwater quality, five monitoring wells (MW-1-37 through MW-5-34) were installed at the Site. Monitoring well name designations include the depth of the base of the screen. For example, the base of the screen for monitoring well MW-1-37 is at a depth of approximately 37 feet bgs.

All wells were installed with use of a direct push drill rig to depths of 35 to 40 feet bgs. The monitoring wells were constructed with 10 feet of 2-inch inside diameter (ID) polyvinyl chloride (PVC) pre-packed 0.010-inch slotted screen surrounded by a stainless steel mesh. Filter pack silica sand (20/40 environmental grade) is packed between the slotted PVC and the stainless mesh prior to installation, with an appropriate well seal placed above the sand pack. Each well was completed with a flush traffic-grade monument and locking cap.

Monitoring well installation logs and construction detail summaries are included in Appendix A.

Monitoring well development activities were performed on June 9 and June 10, 2015 using a variety of pumping methods including electric submersible, peristaltic, and disposable bailer. Groundwater was purged from each well until relatively clear / low turbidity water was produced or the well purged dry. During development activities, monitoring wells MW-2-40 and MW-5-34 were purged to dryness. Water level, pH, conductivity, temperature, and turbidity were measured and recorded during the development process. All monitoring well development logs are included in Appendix B.

6.2.4 Boring and Monitoring Well Survey Activities

On June 24, 2015 and April 22, 2016, all monitoring wells and the 2015 and 2016 soil boring locations were surveyed on behalf of the port by HDJ Design Group, PLLC (HDJ) of Vancouver, Washington. The ground surface elevation was surveyed at boring (SB) locations while the elevation of the top of the PVC casing was surveyed at well (MW) locations. All survey data were collected within an accuracy of 0.01 feet vertically and feet horizontally. X and Y were surveyed using the Washington State Plane coordinate system (South Zone 4602), while the elevation was measured relative to mean sea level using the National Geodetic Vertical Datum 29 (NGVD29) (City of Vancouver Datum). The survey reports for the 2015 and 2016 investigations as prepared by HDJ, are included in Appendix A.

6.2.5 Groundwater Monitoring Activities

Groundwater Level Measurements

During 2015 and 2016 monitoring events, prior to any well purging or sampling activities, the static water levels in all five (5) monitoring wells were measured using a Solinst water level indicator (conductive probe), recorded to the nearest 0.01 feet. The wells were initially opened to permit equilibration with the ambient air pressure followed by one round of water level measurements. The water levels were measured from the north side of the casing, and were recorded on the Groundwater Level Measurement Field Log, which is included in Appendix B.

Monitoring Well Purging

Prior to the sampling of each monitoring well, the well casings were purged (where applicable) using low-flow purging methods, which is an U.S. Environmental Protection Agency (EPA)-approved groundwater sampling method that is designed to minimize turbidity and suspended solids in samples, allowing for collection of representative samples. During 2015 and 2016 sampling events, a peristaltic pump and dedicated high-density polyethylene (HDPE) tubing were used for purging each monitoring well prior to sampling. The pump was set to a target purge flow rate of approximately 200 ml per minute.

During 2015, low-flow purging was conducted for the collection of groundwater samples at the MW-1-37, MW-3-35, and MW-4-34 locations. Low-flow purging was not implemented at the MW-2-40 and MW-5-35 well locations, as drawdown of the water column was too great for this method. Instead, a new disposable plastic bailer was used for purging MW-2-40 and MW-5-35, with both wells purging to dryness.

During 2016, low-flow purging was conducted for the collection of all groundwater samples with the exception of MW-2-40. As in 2015, this particular well location purged to dryness and samples were collected the following day upon sufficient recharge.

Stabilization parameter measurements were collected during low flow purging and sampling with use of a flow-through cell and an in-line multi-probe meter, at approximate 3 to 5 minute intervals. Water levels within each well were also measured during the purging process to monitor drawdown. Purging continued until all parameters achieved the minimum stability criteria for three consecutive measurements, which were achieved at all well locations using low-flow purging. Parameter measurements recorded during purging were: time, purge volume, water level, temperature, specific conductivity, dissolved oxygen (DO), pH, oxygen reduction potential (ORP), and turbidity. Stabilization criteria are established as readings within 10% for DO and turbidity; within 3% for conductivity; within 0.1 pH units; and within 10 millivolts for ORP.

Monitoring Well Sampling

Once all monitoring parameters achieved the minimum stability criteria for three consecutive measurements, or purged dry and water recharge within

the well was adequate, sampling was conducted using the peristaltic pump. Flow rates did not exceed 200 ml per minute during sampling. The discharge end of the dedicated HDPE tubing was removed from the flow-through cell prior to sampling to ensure the sample was not cross-contaminated by the re-useable flow-through cell equipment.

During 2015, wells MW-2-40 and MW-5-35 were purged to dryness, with sampling conducted after sufficient recharge had occurred to allow sampling, which occurred the morning following the purging activities. These two wells were sampled using a Geotech stainless steel bladder pump and controller at a very low flow rate in an effort to minimize the turbidity of the sample.

During the 2016 sampling event, monitoring well MW-2-40 was purged to dryness and sampled with a new disposable plastic bailer upon sufficient recharge.

Laboratory-supplied containers appropriate for the analytical suite described in Section 7.0 were properly filled, labeled, and capped. All water samples were transferred into the appropriate sampling containers and were preserved as per method requirements. Samples collected for dissolved constituent analyses were field-filtered through a 0.45-micron in-line disposable filter prior to preservation and transferred into the appropriate sampling containers. All sampling containers were completely filled such that no headspace was present that would allow the loss of volatiles. The sample bottles were then labeled and transferred to a chilled container for shipment to the analytical laboratory.

6.2.6 Soil Gas Point Installation

A total of four (4) soil gas points (SG-1 through SG-4) were installed using a track-mounted AMS® 9500-VTR unit. The soil gas samples were collected using a GeoProbe® post-run tubing (PRT) system. Soil gas boring locations SG-1 and SG-2 were installed at the southeastern portion of the property with screen depths of 18.5 to 19 feet bgs , while soil gas borings locations SG-3 and SG-4 were installed at the northeastern portion of the subject property with screen depths of 5.5 to 6 feet bgs, and 2.5 to 3 feet bgs, respectively. As described in the draft Ecology document *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology 2009), deep soil gas sample depths are considered to be at depths of 15 feet bgs or deeper, while shallow soil gas

sample depths are considered to be immediately beneath a building slab or at depths shallower than 15 feet bgs when there is no building slab present.

Borings SG-1 and SG-2 were constructed to target soil gas proximate to a groundwater source of VI potential at the southeastern property area (water table at approximately 24 feet bgs), while borings SG-3 and SG-4 were constructed to evaluate a shallow zone (upper 8 feet) of contaminated soil as a source of VI potential at the northeastern portion of the Site.

Once the target sample depth at each boring was reached, the expendable drive point was disengaged and the probe rod was pulled back approximately six inches to expose the subsurface soils (i.e. 18.5 to 19 feet bgs). A surface seal, composed of hydrated bentonite was applied around the probe rod at the ground surface to prevent atmospheric leakage. New Teflon-lined polyethylene tubing (1/4-inch diameter) was utilized at each sample location.

The Teflon-lined tubing was connected to a post run tubing (PRT) adapter that was sent downhole to the expendable point holder located at the designated sample depth, where the adapter was threaded into the holder. The tubing was then cut at the surface and connected to a custom sample train manifold that allows for purging, real-time leak testing, and sampling without the disconnection of any components once assembled. A leak detection enclosure consisting of a clear, plastic shroud was installed over the probe head and sample train manifold, and the sample train was then readied for purging, leak testing, and sampling as discussed in Section 6.2.7.

6.2.7 Soil Gas Sample Collection

Prior to sampling, the soil gas sample points were purged of air through the sample manifold using a peristaltic pump at a low flow rate of 200 ml/minute. The air volume purge was the approximate equivalent of at least three system volumes (i.e. the volume of the open hole, tubing, and sample manifold). Soil gas sampling field logs are included as Appendix C.

Leak Detection

Real time leak tests were conducted at each location to ensure that valid soil gas samples were collected and the test results are useable. The leak test was conducted to verify that no breakthrough of atmospheric air occurred down the borehole or in the sample train. Two types of leak tests were conducted: 1) a vacuum tightness test of the sample manifold; and 2) a

tracer test using helium at the surface borehole seal and at other connection points not covered by the vacuum test. The tracer leak test consisted of introducing a tracer gas (in this case helium) inside of the plastic shroud where the probe head and sample train manifold were located. The tracer gas leak check was conducted following both the purging and the sampling activities. A helium detector was used in the field to check for tracer gas that may have been pulled into the borehole or sample train manifold through purging or sampling with the peristaltic pump. The helium reading is taken at the peristaltic pump discharge location. The maximum helium detected was 1.9% (sample station SG-2), which is below the generally accepted leak rate threshold of 5% (Table 6).

Soil Gas Sample Collection

Following purging and confirmation of an acceptable leak rate in the sample train, the soil gas samples were collected through the sample manifold directly into clean negative-pressurized 1-liter Summa canisters supplied by the laboratory. Sample collection was conducted at a low-flow rate of 200 ml/minute, which was regulated by a laboratory-supplied flow controller attached to each summa canister. The soil gas samples were packaged and transported to the analytical laboratory for testing.

6.2.8 Decontamination Procedures

All reusable drilling and soil sampling equipment was steam cleaned with potable water prior to use, and between boring locations, to prevent cross-contamination.

All reusable groundwater sampling equipment that contacted the sampled media (bladder pump at MW-2-40 and MW-5-35 only) was cleaned with an Alconox detergent and laboratory-provided distilled water prior to use and in between uses. A new disposable bladder was used at each location sampled with a bladder pump. During the 2015 and 2016 groundwater monitoring events, the conductive water level probe was cleaned with an Alconox detergent and laboratory-provided distilled water.

The soil gas sampling manifold, the only re-usable piece of equipment that comes in contact with the soil gas air flow, was decontaminated after each use by pumping ambient air through the sample manifold for over 4 minutes at a high rate (over 1 liter/minute). This process allows for over 100 manifold volumes of fresh air to pass through and decontaminate the system. Prior equipment blank testing of this manifold after collection of highly-

contaminated samples and manifold decontamination as described above shows that this decontamination procedure reduces potential cross-contamination to below detectable levels.

6.2.9 Investigative Derived Waste

During the 2015 soil and groundwater investigation, approximately 150 gallons (three 55-gallon drums) of soil cuttings and 110 gallons (two 55-gallon drums) of decontamination water, well development water, and purge water were generated. All containers were labeled and staged on-site pending the completion of profiling for disposal. The investigative derived waste (IDW) was profiled and picked up by WasteXpress Environmental Services, Inc. (WasteXpress) of Portland, Oregon on August 27, 2015 for permitted non-hazardous disposal. Profile documentation as well as the WasteXpress non-hazardous waste manifest documenting pick-up of all IDW is included within Appendix D.

During the 2016 subsurface investigation, approximately 55 gallons (one drum) of soil cuttings and approximately 55 gallons (one drum) of purge water and decontamination water were generated. Currently the wastes are stored on site pending permitting, transport, and disposal, which is currently scheduled to occur in May 2016.

7.0 ANALYTICAL TESTS

The soil and groundwater samples during the 2015 and 2016 investigations were shipped with chain-of-custody documentation in sealed and chilled containers to Apex Laboratories, LLC, a Washington-accredited analytical laboratory located in Tigard, Oregon.

During the 2015 soil and groundwater investigation, soil samples were submitted to the laboratory and selected for analysis based on visual observations, odors, the specific area being assessed, depth, and PID readings. With regard to depths, soil samples were targeted for collection and analysis from near-surface soils within the upper 5 feet as well as from depth intervals required to provide further delineation contamination identified during the 2008 E & E investigation. Select soil samples with the highest oil-range petroleum hydrocarbons were selected for polychlorinated biphenyl (PCB) follow-up testing and samples with the highest lead or

mercury concentrations were analyzed for leachability using the by Toxicity Characteristic Leaching Procedure (TCLP).

During the 2016 subsurface investigation, soil samples were targeted for collection and analysis to provide further delineation of PAH and lead contamination (only).

Soil samples as collected during the 2015 and 2016 investigations were analyzed for one or more of the following parameters:

- Diesel- and Oil-range Total Petroleum Hydrocarbons (TPH) by Northwest (NW) Method TPH-Dx (31 samples),
- Gasoline-range TPH by NW Method TPH-Gx (19 samples),
- Priority Pollutant 13 metals (total) by EPA Method 6020 (15 samples),
- Lead (total) by EPA Method 6020 (40 samples),
- Leachable lead by Toxicity Characteristic Leaching Procedure (TCLP) EPA Method 1311/6020 (4 samples),
- Leachable mercury by TCLP EPA Method 1311/6020 (1 sample),
- Hexavalent chromium by EPA Method 7196A (6 samples),
- Polynuclear Aromatic Hydrocarbons (PAHs) by EPA Method 8270D SIM (20 samples),
- Polychlorinated biphenyls (PCBs) by EPA Method 8082A (4 samples),
- Volatile Organic Compounds (VOCs) by EPA 8260B (10 samples).

Groundwater samples as collected from the five monitoring wells, installed and sampled in June 2015 and February 2016, were all analyzed for the following parameters:

- Diesel- and Oil-range Total Petroleum Hydrocarbons (TPH) by Northwest (NW) Method TPH-Dx,
- Gasoline-range TPH by NW Method TPH-Gx,
- Priority Pollutant 13 metals (total) by EPA Method 6020,
- Hexavalent chromium by EPA Method 7196A,

- Polynuclear Aromatic Hydrocarbons (PAHs) by EPA Method 8270D SIM,
- Volatile Organic Compounds (VOCs) by EPA 8260B.

Soil gas samples as collected from all four boring locations installed in March 2016 were analyzed by Eurofins Air Toxics, Inc. of Folsom, CA. All four soil gas samples were analyzed for VOCs (full list) by Modified TO-15 and for volatile petroleum hydrocarbon (VPH) fractions by Modified TO-15 APH (Air Toxics VPH) methodology.

Analytical results of the 2015 and 2016 investigations are summarized on Tables 1 through 4 (soil), Table 5 (groundwater), and Table 6 (soil gas). The laboratory reports and chain-of-custody documentation for the 2015 and 2016 investigation activities are included in Appendices E,F, and G respectively. For comparison purposes, results of the 2008 E & E investigation have also been tabulated on Tables 1 through 5.

8.0 RESULTS AND DISCUSSION

8.1 Subsurface Conditions

Soil Types

Soils observed beneath the site during the 2015 and 2016 investigation were predominantly silts, gravelly silts, and sands to the maximum depth explored (40 feet bgs). Soils at those borings installed closer to the Columbia River (southern Site area) were predominantly poorly graded sands with little to no silt to the maximum depth explored (35 feet bgs).

Evidence of fill debris including asphalt fragments in a gravelly silt matrix were observed near the northeastern corner of the property at the SB-012, SB-020, SB-023, MW-1-37, MW-2-40 locations to depths ranging from 2.5 feet at SB-020, to between 8 and 10 feet bgs at the SB-012 and MW-1-37 locations, respectively. Other evidence of fill, including brick and glass fragments were observed at these locations across similar depth intervals. Brick fragments were also present in soils within the upper 5 to 10 feet bgs at the SB-003A (northwestern Site area), SB-017 (northeastern Site area), and borings SB-014, MW-3-35, and SB-026 and MW-4-34 (southeastern Site area). Plastic fragments were identified at SB-023 at approximately 10 feet bgs. Wood fragments were identified at northeastern boring locations

SB-021 (5 to 7 feet bgs, 11 feet bgs, and 18.6 to 19 feet bgs), SB-022 (to 8 feet bgs), and SB-023 (8 to 8.2 feet bgs).

Based on the preceding, it appears that the nature of the fill used at the site included construction debris (brick and asphalt fragments) or miscellaneous fill with a high silt fraction on the northern portion of the property, while fill at the southern portion of the Site, especially below depths of 5 to 10 feet, may have been predominantly a dredged sand fill material – with the distinction between possible native and fill materials being difficult to ascertain.

Soil Field Screening

Field screening evidence of potential contamination was identified extending from immediately below ground surface to a depth of 8 feet bgs at boring SB-012, located at the northeastern corner of the Site. Specifically, soils across this depth interval had a strong petroleum hydrocarbon odor with a rainbow-colored sheen and black discoloration. Correlative with the strong petroleum odor across this depth interval was a relatively high organic vapor reading (171 parts per million) as measured in sample headspace with the PID. This zone of impact correlates with an apparent zone of asphalt / potential demolition debris incorporation into the fill at this area. Field screening evidence of contamination did not extend below a depth of 8 feet bgs at SB-012.

Field screening evidence of potential contamination was also identified at the SB-022 boring location to a depth of 2.5 feet bgs, correlating with a zone of gravely silt containing asphalt fragments throughout. Soils across this depth interval exhibited a rainbow sheen, petroleum odor, and a moderate PID reading (58 parts per million).

In addition to the preceding, deeper zones of potential soil contamination, as evidenced by petroleum hydrocarbon odor and sheen were identified at boring locations SB-013 and MW-4. Specifically, a zone of petroleum hydrocarbon odor and a rainbow-colored sheen was identified below the water table (25 to 29 feet bgs) at the MW-4 boring location, while a mild petroleum hydrocarbon odor and light sheen was observed between 20 to 25 feet bgs (immediately above the water table) at the SB-013 boring location. The screened interval for monitoring well MW-4-34 (24 to 34 feet bgs) was constructed across the zone of apparent impact as observed at this location.

No other zones with significant field screening evidence of contamination were observed during the investigation, with only minor indications of a very

light sheen (via sheen test) noted at several depth intervals within the following borings:

- SB-011 (9.5 feet bgs);
- SB-013 (5 to 15 feet bgs);
- SB-014 (0 to 2 and 5 to 15 feet bgs);
- SB-016 (5 to 6 feet bgs)
- SB-017 (5 to 15 feet bgs);
- SB-020 (5 to 7 and 15 to 15.7 feet bgs);
- SB-023 (0 to 1.2 feet bgs);
- SB-025 (0 to 14 feet bgs);
- SB-027 (0 to 13.3 feet bgs);
- MW-4 (7 to 15 feet bgs);
- MW-5 (5 to 8 feet bgs).

Groundwater

Groundwater was encountered at an approximate depth interval of between 20 to 25 feet bgs in soil borings installed at the Site. Measurements made in completed monitoring June 2015 identified the depth to groundwater as ranging from approximately 23 to 26 feet below ground surface at the Site, with measurements made in February 2016 identifying groundwater levels between 0.5 feet (MW-3-35) and 2.4 feet (MW-4-34) higher than as measured in June. A summary of depth to groundwater and correlating elevations (City of Vancouver datum), are included on Table 7.

As depicted on Figure 4a, interpretation of flow direction based on groundwater level measurements collected on June 16, 2015 (dry season) is suggestive of flow to the north, away from the Columbia River. This flow regime is contrary to the basic conceptual model, with the Columbia River being a regional groundwater discharge area.

As depicted on Figure 4b, interpretation of flow direction based on groundwater measurements collected on February 9, 2016 (wet season)

suggests the presence of a groundwater divide on the property, with groundwater on the southern portion of the property flowing towards the Columbia River and groundwater on the northern portion of the property flowing away from the Columbia River.

With regard to flow direction, groundwater modeling work conducted on behalf of the Port in vicinity of the Site by Parametrix has predicted groundwater flow direction within the Troutdale and Unconsolidated Sedimentary Aquifers (deeper water-bearing zones) in the area of the Site to be from the south to the north, away from the Columbia River. Specifically, the model shows groundwater beneath the Terminal 1 property being recharged by the Columbia River, with flow to the north in response to large volume pumping that occurs at City of Vancouver water stations 1, 3, and 4 and possibly closer supply wells. For instance, the pumping of a groundwater supply well owned by The Columbian and located approximately 900 feet northwest of the Site (heating and cooling) could possibly have a localized influence on groundwater elevations. Information available from Ecology indicates the Columbian well is screened from between 74 and 130 feet bgs, with a yield of 1,250 gallons per minute resulting in a drawdown of 9 feet.

Based on the preceding, it appears that groundwater elevations as measured within shallow groundwater beneath the Site are likely influenced by regional pumping stresses, with the magnitude of such an influence likely fluctuating as a function of river stage in conjunction with fluctuations in groundwater withdrawal rates.

8.2 Screening Levels

To provide a framework for evaluating the significance of findings, site data were compared to various established risk-screening levels. The screening levels are listed on Tables 1 through 4 (soil); Table 5 (groundwater); and Table 6 (soil gas) for comparison purposes.

Exceeding one of the screening levels does not necessarily mean that cleanup is required or necessary, but would suggest that additional evaluation or investigation may be necessary to determine the need for remedial action.

Model Toxics Control Act (MTCA)

The results of soil and groundwater testing were compared to MTCA Method A Cleanup Levels that have been established for both Unrestricted Land Uses and Industrial Properties WAC 173-340-704 and WAC 173-340-900. Specifically, the results of soil analytical testing were compared to Table 740-1 Method A Soil Cleanup Levels (Unrestricted) and Table 745-1 Method A Soil Cleanup Levels (Industrial). MTCA Method A lookup tables provide cleanup levels that are protective of human health for 25 to 30 of the most common hazardous substances found in soil and groundwater. Soil results were compared to both "unrestricted" and "industrial" cleanup levels as a conservative measure and to provide context to the detected concentrations. The results of groundwater analytical testing were compared to Table 720-1 Method A Cleanup Levels for Groundwater.

In addition to the proceeding, concentrations of volatile constituents in groundwater were compared to MTCA Method B Groundwater Screening Levels (2015 revision) as established by Ecology in draft guidance for evaluation of the vapor intrusion to indoor air pathway (Ecology 2009).

Cleanup Levels and Risk Calculations (CLARC)

Where no Method A Cleanup Levels were available, analytical results were compared to Ecology Cleanup Levels and Risk Calculations (Ecology 2014). According to the Ecology website, CLARC is a web-based compendium of technical information related to the calculation of cleanup levels under the MTCA program. Ecology has compiled and calculated this technical information to assist in the development of cleanup levels. The formula values pre-calculated using MTCA Method B and provided in CLARC are not cleanup values and are used for comparison purposes only.

For metals in soil, in addition to screening against MTCA Method A Cleanup Levels for Unrestricted Land Use and Industrial Properties and CLARC screening level values, concentrations were also compared to regional background concentrations as established by Ecology (Ecology 1994).

Soil Gas Screening Levels

Soil gas analytical results were compared to soil gas screening levels as established by Ecology using MTCA Method B calculations for both carcinogenic and non-carcinogenic risks. The soil gas screening levels are described in the draft Ecology document, *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology

2009). The guidance provides screening levels for soil gas in soils immediately beneath a building slab (shallow soil gas), as well as at depths 15 feet or greater (deep soil gas). The screening levels were established such that concentrations at or below these levels in soil gas would not be expected to result in an exceedence of the air cleanup level in an overlying structure. Updated soil gas screening levels were developed by Ecology subsequent to issuance of the draft guidance, with these screening levels (dated April 2015), used herein.

8.3 Soil Testing Results

Soil samples, collected in 2015 and 2016 from near-surface and subsurface soils from multiple depths at 25 boring locations at the site (SB-003A, SB-006A, SB-011 to SB-028 and MW-1-37 to MW-5-35) were analyzed for one or more of the following: gasoline- diesel- and oil-range petroleum hydrocarbons, VOCs, PAHs, PCBs, and priority pollutant metals. Analytical results for these soil tests are summarized on Tables 1 through 4, with select results depicted on Figures 5 through 8. Laboratory reports and chain-of-custody documentation for soil samples collected during the 2015 and 2016 site investigations are included as Appendix E. Results are described in the following sections.

8.3.1 Diesel- and Oil-Range Total Petroleum Hydrocarbons

Diesel- or oil-range petroleum hydrocarbons were detected in 17 of the 31 soil samples tested in 2015, with detected concentrations present in shallow soils (less than 4 feet bgs) at 8 of the 10 tested boring locations (Table 1 and Figure 5). Of the detections, only one sample, collected from 1.5 to 3.5 feet bgs at the SB-012 location, detected diesel-range (4,080 mg/kg) and oil-range (4,190 mg/kg) petroleum hydrocarbons at concentrations higher than the 2,000 mg/kg MTCA Method A Cleanup Level for both Unrestricted Land Use and Industrial Properties.

The soil sample collected from a depth of 8 to 10 feet bgs at SB-012, which is immediately below the zone of field screening evidence of contamination (rainbow sheen, petroleum odor, asphalt fragments) at this location, did not detect diesel- or oil-range petroleum hydrocarbons at concentrations higher than laboratory method detection limits (MDLs).

Diesel- and oil-range petroleum hydrocarbons were not detected in any analyzed soil sample as part of the 2008 E & E investigation at concentrations higher than MTCA Method A Cleanup Levels.

Diesel- and oil-range petroleum hydrocarbons were not selected for testing during the 2016 subsurface investigation.

8.3.2 Gasoline-Range Total Petroleum Hydrocarbons

Gasoline-range petroleum hydrocarbons were detected in 1 of the 19 soil samples tested in 2015, with the single detection occurring in the same sample as described above with the highest diesel- and oil-range petroleum hydrocarbon concentrations (1.5 to 3.5 feet bgs at boring SB-012). The detected gasoline-range petroleum hydrocarbon concentration (3,020 mg/kg) exceeds the 100 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use or Industrial Properties. The chromatogram for the gasoline-range detection was noted by the laboratory as not being typical of the fuel standard used for quantitation, suggesting that the hydrocarbons present in this range may be attributable to overlap with diesel, heavy weathering, and/or be related to a source other than gasoline fuel.

As with the diesel- and oil-range petroleum hydrocarbons described above, the soil sample collected from a depth of 8 to 10 feet bgs at SB-012 (below the zone of field screening evidence of contamination) did not detect gasoline-range petroleum hydrocarbons at concentrations higher than laboratory MDLs (Table 1, Figure 6), suggesting the chemical contamination correlates well with the field screening evidence of impact.

Gasoline-range petroleum hydrocarbons were not detected in any analyzed soil sample as part of the 2008 E & E investigation (Table 1).

Gasoline-range petroleum hydrocarbons were not selected for testing during the 2016 subsurface investigation.

8.3.3 Polychlorinated biphenyls (PCBs)

As summarized on Table 1, PCBs were analyzed in the four soil samples with the highest detected oil-range petroleum hydrocarbon concentrations as detected during the 2015 investigation. Of the four analyzed samples PCBs were detected in only one sample, with a trace concentration (0.0149 mg/kg Aroclor 1260) detected in the soil sample collected from 1 to 2.5 feet bgs at

the SB-014 soil boring location. The detected total PCB concentration in this sample (0.0149 mg/kg) is well below the 10 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use.

PCBs were not detected in any analyzed soil sample as part of the 2008 E & E investigation (Table 1).

PCBs were not selected for analytical testing during the 2016 HAI subsurface investigation.

8.3.4 Volatile Organic Compounds (VOCs)

As summarized on Table 4, VOCs were analyzed in all 10 near-surface (upper 4 feet bgs) soil samples as collected at 10 of the 11 soil borings installed during the 2015 investigation (all but the SB-003A location). VOCs were detected in only one of the 10 soil samples. Specifically, VOC detections were limited to the shallow soil sample as collected from 1.5 to 3.5 feet bgs at boring SB-012, with only naphthalene at this location being detected at a concentration (200 mg/kg) higher than the 5 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use and Industrial Properties. Naphthalene, is also reported as a PAH, results of which are described in Section 8.3.5.

The single detected naphthalene concentration as described above was co-located with soil at the only area of the property where gasoline-, diesel-, and oil-range concentrations were similarly detected in excess of MTCA Method A Cleanup Level for both Unrestricted Land Use and for Industrial Properties (Figure 5).

VOCs were not detected in any analyzed soil sample as part of the 2008 E & E investigation at concentrations higher than MTCA Method A Cleanup Levels.

VOCs were not selected for analytical testing during the 2016 HAI subsurface investigation.

8.3.5 Polynuclear Aromatic Hydrocarbons

One or more PAH compound was detected in 41 of the 57 soil samples analyzed as part of the 2015 and 2016 investigations (Table 2). Of the 41 samples with detected PAH concentrations, seventeen samples (from boring

locations SB-011, SB-012, SB-014, SB-015, SB-017 through SB-023, and MW-1-37) detected carcinogenic PAH concentrations that were higher than 0.1 MTCA Method A Toxicity Equivalence Factor (TEF) Cleanup Level for Unrestricted Land Use. Naphthalene is not included in the PAH TEF calculations as naphthalene is not considered a carcinogenic PAH. Of these seventeen samples, two (1.5 to 3.5 feet bgs at SB-012 and 1 to 2.5 feet bgs at SB-020) had a TEF concentration (3.43 mg/kg and 19.82 mg/kg, respectively) higher than the 2 mg/kg TEF MTCA Method A Cleanup Level for Industrial Properties.

The SB-012 soil sample is the same sample with exceedances in the gasoline-, diesel-, and oil-range petroleum hydrocarbons and is representative of soils with a rainbow color sheen, discoloration, odor, and asphalt incorporation into the fill at the northeastern portion of the Site. Similarly, the SB-020 soil sample (1 to 2.5 feet bgs) was noted to have asphalt fragments incorporated throughout the upper 2.5 feet bgs at this location.

As depicted on Figure 7, areas of the Site with MTCA exceedances for PAHs in soil appear sporadically detected across the eastern portion of the Site, with a majority of the exceedances occurring within the gravel silt fill as present near the northeastern portion of the Site, with these exceedences generally limited to the upper 8 to 10 feet bgs.

8.3.6 Priority Pollutant Metals

As summarized on Table 3, one or more priority pollutant metal was detected above state-wide default naturally-occurring background concentrations in soil samples collected from 21 of the 25 soil boring locations sampled as part of the 2015 and 2016 investigations. Of these, only lead (eight boring locations) and mercury (one boring location) were detected at concentrations higher than MTCA Method A Cleanup Level for Unrestricted Land Use. These two metals are discussed below in the following sub-sections, as is chromium - which underwent speciated testing (trivalent and hexavalent) as part of the 2015 investigation.

In addition to the elevated lead and mercury mentioned above, elevated arsenic and cadmium concentrations were detected by E & E in a soil sample collected from 26 to 28 feet bgs at their SB-004 boring location. HAI installed a boring (MW-5-34) immediately adjacent to boring SB-004 as part of the 2015 investigation. It is noted that a soil sample collected by HAI

across the 26 to 28 foot bgs depth interval from the MW-5-34 boring in 2015 did not detect elevated arsenic or cadmium concentrations, suggesting that heterogeneities in the fill may play a significant role in metals distribution.

Lead

With regard to lead (Figure 8), soil concentrations higher than the 250 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use were detected at the following soil boring locations during the 2015 and 2016 investigations.

- SB-014 (821 mg/kg at 1 to 2.5 feet bgs);
- MW-1-37 (772 mg/kg at 5 to 7 feet bgs);
- MW-2-40 (545 mg/kg at 0.2 to 1.2 feet bgs);
- SB-015 (287 mg/kg at 0.5 to 2.5 feet bgs);
- SB-018 (467 mg/kg at 6 to 8 feet bgs);
- SB-022 (308 mg/kg at 2 to 3.5 feet bgs);
- SB-026 (980 mg/kg at 6 to 7.5 feet bgs);
- SB-028 (471 mg/kg at 10 to 11 feet bgs).

As summarized on Table 3, follow-up testing of these samples for leachability did not find that any of these samples produced leachate at a concentration greater than the Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic (TC) threshold value and as such it does not appear likely that these soils would be designated as hazardous waste for lead leachability if excavated and requiring disposal.

None of the analyzed samples collected during the 2015 and 2016 investigations detected lead concentrations higher than the 1,000 mg/kg MTCA Method A Cleanup Values for Industrial Properties, although two samples collected as part of the 2008 E & E investigation did exceed these levels (Table 3, Figure 8).

As with PAHs described in Section 7.3.5 above, it appears that areas with total lead concentrations greater than MTCA Method A Cleanup Values are

limited to the eastern portion of the Site, and are only sporadically present, either laterally or vertically (Figure 8).

Mercury

With regard to mercury (Table 3), soil concentrations higher than the 2 mg/kg MTCA Method A Cleanup Level for Unrestricted Land Use and for Industrial Properties was detected at a single location (3.61 mg/kg from 1 to 2.5 feet bgs at boring SB-014). The sample with the elevated mercury concentration similarly had elevated lead presence as described above. Similar to the findings with lead, follow-up testing of this sample for leachability did not detect concentrations greater than the RCRA TC threshold value for mercury and as such it does not appear likely that these soils would be designated as hazardous waste for mercury leachability if excavated and requiring disposal.

Chromium

Total chromium was analyzed in near-surface soils at all 11 boring locations during the 2015 investigation as well as in select deeper soil samples. All detected total chromium concentrations were below the 42 mg/kg state-wide default naturally-occurring background concentration for this metal (Table 3). Total chromium was not detected at any soil sample location at concentrations higher than the 2,000 mg/kg MTCA Method A Cleanup Value for the trivalent species of chromium. With the exception of total chromium concentrations at soil borings SB-011 (20.1 mg/kg) and SB-003A (21 mg/kg), all other detected total chromium concentrations were below the 19 mg/kg hexavalent chromium MTCA Method A Cleanup Value for Unrestricted Land Use.

In order to fully evaluate potential risks posed by chromium, selected soil samples were analyzed for hexavalent chromium species in order to allow a direct comparison with the corollary MTCA cleanup level. Specifically, hexavalent chromium was analyzed in soil samples collected from soil boring locations SB-012 (1.45 U mg/kg), SB-014 (1.18 U mg/kg), SB-003A (2.02 J mg/kg), MW-2-40 (1.42 J mg/kg), MW-3-35 (1.19 U mg/kg), and MW-5-34 (2.18 J mg/kg) with all detected concentrations well below the 19 mg/kg MTCA Method A Cleanup Values for Unrestricted Land Use for hexavalent chromium (Table 3). Estimated concentrations are lab-qualified using a “J” flag as shown above at soil boring locations SB-003A, MW-2-40, and MW-5-34. At these locations concentrations were detected below the method

reporting limit but above the method detection limit, thereby making the concentrations estimated values.

8.4 Groundwater Testing Results

During both the 2015 and 2016 monitoring events, groundwater samples, collected from uppermost groundwater as encountered at all five newly installed monitoring wells (MW-1 through MW-5) were analyzed for gasoline, diesel-, and oil-range total petroleum hydrocarbons, Priority Pollutant metals, PAHs and VOCs. Analytical results for these groundwater tests are summarized on Table 5, with select results depicted on Figures 9 through 13. Laboratory reports and chain-of-custody documentation for groundwater samples collected during the 2015 and 2016 investigations are included as Appendix F. Results are described in the following sections.

8.4.1 Diesel- and Oil-Range Total Petroleum Hydrocarbons

As summarized on Table 5 and Figure 9, during the 2015 investigation diesel-range petroleum hydrocarbons were detected in groundwater at three of the five monitoring well locations as follows: 140 micrograms per liter (µg/L) at MW-2-40; 795 µg/L at MW-3-35; and 120 µg/L at MW-4-34. Of the detections, only the sample collected from the MW-3-35 well location (southeastern portion of the Site) detected a diesel-range petroleum hydrocarbon concentration higher than the 500 µg/L MTCA Method A Cleanup Level for Groundwater. No field screening evidence of potential contamination was observed in soils at the MW-3-35 boring location. Further, the laboratory noted that the chromatographic pattern for the diesel-range hydrocarbons did not resemble the diesel fuel standard used for quantitation.

During the 2016 investigation diesel-range petroleum hydrocarbons were detected in groundwater only at the MW-3-35 well location, with the detected concentration (858 µg/L) being similar to that as detected at this location in June 2015.

Oil-range petroleum hydrocarbons were not detected above laboratory MDLs in groundwater samples collected from any of the five monitoring well locations during the 2015 and 2016 investigations (Figure 9).

8.4.2 Gasoline-Range Total Petroleum Hydrocarbons

As summarized on Table 5 and Figure 9, during the 2015 and 2016 investigations gasoline-range petroleum hydrocarbons were detected in groundwater only at the MW-3-35 well location with concentrations of 1,360 µg/L (June 2015) and 1,340 µg/L (February 2016).

The detected gasoline-range petroleum hydrocarbon concentrations exceed the 1,000 µg/L MTCA Method A Cleanup Level for Groundwater and correlates with the location of the diesel-range exceedence as described above in Section 8.4.1. The laboratory noted that the chromatographic pattern for the gasoline-range hydrocarbons did not resemble the gasoline fuel standard used for quantitation, suggesting a source of contamination other than relatively fresh gasoline or diesel fuel.

8.4.3 Volatile Organic Compounds

One or more VOC constituents were detected in groundwater samples collected only from the MW-2-40 and the MW-3-35 well locations during the 2015 and 2016 investigations.

Trace levels of acetone were detected at the MW-2-40 well location during both the 2015 and 2016 investigations at concentrations of 21 µg/L and 48.8 µg/L, respectively. In addition, a trace (estimated concentration) of chloroform was detected at well MW-2-40 during the 2015 investigation (0.88 µg/L). Neither chloroform nor acetone were detected at concentrations higher than MTCA Method A Cleanup Values.

With regard to the MW-3-35 well location, naphthalene was detected during the 2015 and 2016 investigations at concentrations of 227 µg/L and 385 µg/L, respectively. The naphthalene concentrations are higher than the 160 µg/L MTCA Method A Cleanup Value (Table 5 and Figure 10) and also higher than the 8.93 µg/L MTCA Method B Screening Level for Vapor Intrusion into indoor air. The detection at a concentration higher than the indoor air screening level suggests the need for further evaluation of the vapor intrusion pathway – completed as part of the 2016 investigation (see Section 8.5, Soil Gas Test Results).

The elevated naphthalene detection correlates with the location of the elevated gasoline- and diesel-range petroleum hydrocarbon detections as described in Sections 8.41 and 8.42 above.

No other VOCs were detected above laboratory MDLs in groundwater samples collected from any of the five well locations.

8.4.4 Polynuclear Aromatic Hydrocarbons

Sample results for the June 2015 sampling event detected low levels of one or more PAH compounds in groundwater samples collected from all five monitoring wells (Table 5). The highest PAH concentrations were detected at the MW-3-35 location, as would be anticipated based on the total petroleum hydrocarbon and naphthalene results as described above. Regardless, and as summarized on Table 5 and depicted on Figure 11, total TEF PAH results did not exceed MTCA Method A Cleanup Values for Groundwater in the sample collected from MW-3-35 or any of the other monitoring well locations.

With the exception of MW-1-37, low levels of one or more PAH compounds were detected in groundwater samples collected from all five monitoring wells during the February 2016 sampling event (Table 5). Similar to the 2015 groundwater results, the highest PAH concentrations were detected at the MW-3-35 location. As with the 2015 results, the 2016 TEF PAH results did not exceed MTCA Method A Cleanup Values for Groundwater at any well location.

8.4.5 Priority Pollutant Metals

2015 Groundwater Sample Results

Of the list of priority pollutant metals during the 2015 investigation, only arsenic (3 locations), lead (1 location), and chromium (1 location) were detected at concentrations higher than MTCA Method A Cleanup Levels, as summarized on Table 5 and described below.

As depicted on Figure 12, total arsenic was detected above the 5 µg/L MTCA Method A Cleanup Value at well locations MW-2-40 (14 µg/L), MW-4-34 (5.38 µg/L), and MW-5-34 (5.5 µg/L). Dissolved arsenic testing at these well locations did not detect arsenic concentrations higher than the MTCA Method A Cleanup Value, suggesting that the elevated total arsenic concentrations may be attributable to suspended solids incorporated into the sample container as a function of sampling-induced turbidity resulting from the low yield and limited water column at these locations at the time of sample collection.

Total lead was detected at a concentration of 34.4 µg/L at the MW-2-40 well location, above the 15 µg/L MTCA Method A Cleanup Value (Table 5, Figure 12). Total lead was not detected at any other location at a concentration higher than the referenced MTCA level. Dissolved lead testing at the MW-2-40 well location did not detect a concentration above the laboratory MDL suggesting that the elevated total concentration may be attributable to suspended solids incorporated into the sample container as a function of sampling-induced turbidity as described above.

Total chromium was detected at a concentration of 319 µg/L at the MW-2-40 well location during the 2015 investigation (Table 5, Figure 13). The detected total chromium concentration at the MW-2-40 well location was the only of the five well locations where the 50 µg/L MTCA Method A Cleanup Values for total chromium was exceeded (Figure 13). Dissolved chromium testing at the MW-2-40 well location did not detect chromium above laboratory MDLs, suggesting that the elevated detection was a function of sampling induced turbidity at this low yield location.

Hexavalent chromium was detected at a concentration of 7 µg/L in the unfiltered groundwater sample collected from the MW-2-40 well location. There is no MTCA Method A Cleanup Value established for hexavalent chromium in groundwater, but the detected concentration was well below the 48 µg/L MTCA Method B Cleanup Value for Groundwater (Unrestricted Land Use). As described above, chromium (of any speciation) was not detected in the dissolved groundwater sample collected from the MW-2-40 well location. Further, hexavalent chromium was not detected in groundwater samples collected from any other well location.

2016 Groundwater Sample Results

With regard to the 2016 investigation analytical testing results, of the list of priority pollutant metals, only arsenic (3 locations) was detected at concentrations higher than MTCA Method A Cleanup Levels at any well location, as summarized on Table 5 and described below.

As depicted on Figure 12, total arsenic was detected above the 5 µg/L MTCA Method A Cleanup Value at well locations MW-3-35 (6.56 µg/L), MW-4-34 (10.8 µg/L), and MW-5-34 (6.14 µg/L). Results of dissolved arsenic testing detected similar concentrations as the testing for total arsenic, with arsenic concentrations at MW-4-34 and MW-5-34 remaining at levels higher than the MTCA Method A Cleanup Value.

Based on the 2015 and 2016 testing, it appears that although some of the arsenic detected in groundwater may be attributable to suspended solids, arsenic is also present in the dissolved phase near the southeastern portion of the Site (MW-3-35 and MW-4-35) at concentrations greater than MTCA Cleanup Levels.

8.5 Soil Gas Testing Results

Two deep soil gas samples (SG-1 and SG-2, both from 18.5 to 19 feet bgs) were collected at the southeastern portion of the Site during the 2016 follow-up investigation in order to evaluate the potential for uppermost groundwater in the MW-3-35 area to be a vapor intrusion concern with regard to indoor air. As summarized on Table 6 and depicted on Figure 14, no VOCs or volatile petroleum hydrocarbons (VPH) fractions were detected at either location at concentrations above Ecology Method B Screening Level Values for evaluation of potential indoor air concerns.

Additionally, two shallow soil gas samples (SG-3 and SG-4) were collected at the northeastern portion of the property, co-located in the area where the greatest petroleum hydrocarbon impacts to soil were detected (e.g., proximate to the SB-012 location). Of these two soil gas samples, one (SG-3) was collected across a depth interval of 5.5 to 6 feet bgs, and the other (SG-4), was collected across a depth interval of 2.5 to 3 feet bgs. These soil gas samples were collected within or above zones of soil contamination, based on available site data and field screening of soil conditions at adjacent boring locations.

With regard to shallow soil gas sample SG-3, benzene (12 µg/m^3) and naphthalene (27 µg/m3) were detected at concentrations higher than the Ecology Soil Gas Screening Level Value for Vapor Intrusion (established at 11 µg/m^3 and 2 µg/m^3, respectively). TPH fraction testing of shallow soil gas sample SG-3 also detected aliphatic hydrocarbons (>C8-C12) at 39,000 µg/m^3, exceeding the 4,700 µg/m^3 Vapor Intrusion screening level.

Shallow soil gas sample SG-4, located approximately 70 feet west-southwest of SG-3, detected 1,3-Butadiene (6.9 µg/m^3) above the Ecology Soil Gas Screening Level for Vapor Intrusion (3 µg/m^3). Additionally, and similar to the SG-3 location, TPH fraction testing detected aliphatic hydrocarbons (>C8-C12) at 22,200 µg/m^3, exceeding the 4,700 µg/m^3 Vapor Intrusion screening level.

Analytical results for soil gas tests are summarized on Table 6, with all results greater than Ecology Screening Levels for vapor intrusion to indoor air, being depicted on Figure 14.

8.6 Discussion of Findings

As documented during the 2015 and 2016 investigations and described herein, the presence of petroleum and metals-related impacts to soil appears limited to the eastern portion of the Site. Due to differences in type and distribution of contaminants in soil, the eastern portion of the Site can be further subdivided into the Northeastern Site Area and the Southeastern Site Area for discussion purposes.

8.6.1 Soil - Northeastern Site Area

Petroleum impacts to soil at the northeastern portion of the Site were found primarily within the upper gravelly silt (fill), which generally thickens to the east. Of the petroleum constituents, PAHs (as carcinogenic TEF values) were found to have the greatest lateral and vertical presence in soil at concentrations greater than MTCA Method A Cleanup Levels.

In general, the petroleum-related contamination appears sporadically present throughout the fill material at the northeastern portion of the Site, with contaminant concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Use extending to approximately 4 to 5 feet bgs within the western portion of this area, and to a depth of between 9 and 10 feet across the eastern portion of this area (Figure 15).

With exception of near-surface soils at two locations (SB-012 and SB-020), contaminant concentrations were generally less than MTCA Method A Cleanup Levels as established for Industrial Land Use. With regard to SB-012, multiple contaminants (gasoline-, diesel-, oil-range TPH, naphthalene, and carcinogenic PAH TEF values) were detected in soil at this location at concentrations greater than industrial-based MTCA levels, while at SB-020 only PAH TEF values were detected at concentrations greater industrial-based MTCA levels.

Those zones of contamination with concentrations greater than MTCA Method A Cleanup Levels for Industrial Properties (as described above) were discernable from soils with lesser levels of contamination based on significant field screening evidence of contamination (rainbow sheen, discoloration, petroleum odor) or significant incorporation of asphaltic fragments. This field screening evidence of contamination was found to

extend to a depth of approximately 8 feet bgs at boring SB-012 and to a depth of 2.5 feet bgs at boring SB-020. Similar field screening evidence of contamination (rainbow sheen, petroleum odor) was identified in the upper 2.5 feet bgs at SB-022, located midway between SB-012 and SB-020, although contaminant levels at this location (tested for PAHs and lead only) did not exceed industrial-based MTCA levels.

Lead concentrations at several locations within the northeastern portion of the Site were greater than MTCA Method A Cleanup Levels for Unrestricted Use, with these detections being sporadic in the fill. With exception of SB-010 from the 2008 E & E investigation, lead concentrations were less than industrial-based MTCA levels and were co-located with PAH-contaminated soils as described above. The single exception to the preceding as related to the northeastern portion of the Site was the presence of lead in a sample from 13 to 15 feet bgs at the SB-010 location, where this metal was detected at a concentration (1,180 mg/kg) slightly greater than the industrial-based MTCA level (1,000 mg/kg) and not otherwise co-located with petroleum-contaminated soil.

Figure 15 depicts an estimation of those portions of the Site where soil contamination within the fill occurs at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Property Use. Figure 16 depicts an estimation of those portions of the Site where soil contamination within the fill occurs at concentrations greater than MTCA Method A Cleanup Levels for Industrial Property Use. As depicted on Figure 15, and assuming contaminant concentrations greater than MTCA Levels (Unrestricted Use) extend to an average depth of 5 feet at the western portion of the area and to an average depth of 10 feet bgs at the eastern portion of the area (where the gravelly silt fill thickens), then it is estimated that there are approximately 8,900 in-place cubic yards of contaminated soils (above MTCA Unrestricted Land Use Levels) at the northeastern portion of the Site.

With regard to those soils present at concentrations greater than MTCA Method A Cleanup Levels for Industrial Land Use, and as depicted on Figure 16, it is estimated that there are approximately 1,700 in-place cubic yards of soil that meet this criteria. The preceding assumes this higher level of contamination extends to approximately 4 feet bgs near the SB-020 and SB-022 boring areas, and to a depth of approximately 8 feet bgs at the extreme northeast corner of the Site (see Figure 16).

Contaminated soils at the northeastern portion of the Site are presently capped with asphalt paving and used as a parking lot, preventing dermal

contact and therefore do not present a current direct contact human health risk. The shallow nature of the petroleum impacts (shallower than 8 to 10 feet bgs) precludes contact with groundwater, which was not encountered at depths shallower than 20 feet bgs at any location. Vapor intrusion potential with regard to contaminated soils at this portion of the property (of concern only if occupied structures are built in this area) is discussed below in Section 8.6.5.

8.6.2 Soil – Southeastern Site Area

Similar to the northeastern area described above, PAH and lead contamination (and mercury in a single case) was identified in soil at this portion of the Site. However, unlike the northeastern area, soils with contaminant concentrations greater than MTCA Method A Cleanup Values for Unrestricted Use are more limited in extent. Specifically, soils with PAH or lead concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use were identified at the SB-006A, SB-014,SB-026, and SB-028 boring locations. The vertical limits of lead or PAHs at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted Land Use appear to be limited to within the 5 to 10 foot depth interval everywhere with exception to SB-014, where the impacts appear limited to the upper 3 feet bgs. The single mercury MTCA exceedence (greater than Industrial Land Use levels) was co-located with the lead and PAH contamination detected in near-surface soils at the SB-014 location.

Figure 15 depicts the estimated extend and volume of soils in the southeastern portion of the Site with contaminant concentrations greater than MTCA Method A Cleanup Levels. As indicated on this Figure, approximately 1,800 cubic yards of soils at this portion of the Site are estimated as having contaminant levels above MTCA Method A Cleanup Levels for Unrestricted Land Use.

With regard to the extent and volume of soils exceeding MTCA Method A Cleanup Levels for Industrial Land Use, it is estimated that approximately 500 cubic yards are present, coinciding with the upper 4 feet bgs surrounding the SB-014 location and the 5 to 10 foot depth interval surrounding the SB-006A boring location (See Figure 16).

Contaminated soils at the southeastern portion of the Site are presently capped with asphalt paving and used as a parking lot, preventing dermal contact and therefore do not present a current direct contact human health risk. The shallow nature of the petroleum impacts (shallower than 8 to 10

feet bgs) precludes contact with groundwater, which was not encountered at depths shallower than 20 feet bgs at any location. Vapor intrusion with regard to soils at this portion of the site is not of concern, as the impacts are low-level / not volatile. Vapor intrusion potential with regard to groundwater beneath this portion of the Site is discussed below in Section 8.6.5.

8.6.3 Soil – Other Site Areas

MTCA Method A Cleanup Levels for Industrial Properties were exceeded in soil samples collected from 26 to 28 feet bgs at SB-004 (arsenic and cadmium), and from 21 to 23 feet bgs at SB-007 (cadmium), both collected from the western portion of the property (Figure 16). The isolated nature and great depth of these soils (greater than 20 feet bgs) are not suggestive of a concern about potential future exposure and do not appear to pose an unacceptable human health risk. No other constituents, except as described in Sections 8.6.1 (Northeastern Site Area) and 8.6.2 (Southeastern Site Area), have been detected in soil samples anywhere on site at concentrations greater than MTCA Method A Cleanup Levels for Unrestricted or Industrial Land Use.

8.6.4 Groundwater

With regard to groundwater quality, concentrations of petroleum-related contaminants at concentrations greater than MTCA Method A Cleanup Levels (TPH and naphthalene) were limited to a single well (MW-3-35) located near the southeastern portion of the Site. Additionally, the naphthalene concentration detected in groundwater at the MW-3-35 location was higher than the MTCA Method B Screening Level for Vapor Intrusion into indoor air. No other VOCs were detected in groundwater that exceeded the MTCA Method B Screening Level for Vapor Intrusion into indoor air. The source for the groundwater contamination at well MW-3-35 is not known, but it appears limited in overall magnitude and extent. Vapor Intrusion potential with respect to groundwater was assessed as part of the 2016 investigation (Section 8.6.5).

Total arsenic, chromium, and lead were detected above the MTCA Method A Cleanup Level for Groundwater at the MW-2-40 well location during the 2015 investigation, while total arsenic was detected at concentrations slightly above the MTCA Method A Cleanup Level at the MW-4-34 and MW-5-34 well locations. Hexavalent chromium was detected at concentrations well below applicable screening levels. Dissolved concentrations for all

metals at all locations were below MTCA Method A Cleanup Level for Groundwater during the 2015 event, suggesting the elevated detections at MW-2-40 were a function of sample turbidity .

In 2016, both total and dissolved arsenic concentrations at the MW-4-34 and MW-5-35 well locations were higher than the MTCA Method A Cleanup Level, with no other metals concentrations at any other locations exceeding MTCA Cleanup Levels.

Groundwater with elevated metals concentrations appears isolated to several well locations, with seasonal variability and sample turbidity likely being a factor. The elevated arsenic concentrations detected at MW-4-34 and MW-5-35 during the 2016 event may be related to routine sample variability in conjunction with the heterogeneous nature of the metals content within fill soils at the Site.

8.6.5 Soil Gas – Vapor Intrusion Assessment

Laboratory testing of shallow soil gas samples collected from the northeastern portion of the Site at sampling locations SG-3 and SG-4 detected TPH, benzene, naphthalene, and 1,3-butadiene at concentrations greater than Ecology Soil Gas Screening Levels established for Vapor Intrusion into Indoor Air. Soil gas samples SG-3 and SG-4 were collected proximate to those soils with the greatest volatile constituent levels (e.g., gasoline-related TPH at SB-012) and where the most significant field screening evidence of soil contamination was observed (e.g., odor, sheen, elevated organic vapor headspace). Because there are currently no structures at this portion of the Site, the elevated TPH and volatile constituents in soil gas in this area do not represent a current unacceptable risk to indoor air.

Laboratory testing of deep soil gas samples collected from the southeastern portion of the Site at sampling locations SG-1 and SG-2 did not detect concentrations of TPH or volatile constituents at concentrations greater than Soil Gas Screening Levels established for Vapor Intrusion into Indoor Air. These samples were collected from that portion of the Site where concentrations of naphthalene in groundwater (well MW-3-35) suggested the potential for the vapor intrusion to indoor air pathway to be of significance. The soil gas sampling as completed at this portion of the Site did not find that volatile constituents in groundwater present a significant risk of vapor intrusion to indoor air. As such, mitigation measures or additional evaluation

of vapor intrusion potential at the southeastern portion of the Site do not appear necessary.

8.7 Recommendations

1. Because concentrations of contaminants as detected in shallow soil near the northeastern and southeastern portions of Site exceed MTCA Method A Cleanup Levels for Unrestricted or Industrial Use, and with exception of those soils with contaminant levels contributing to a potential future vapor intrusion risk (Recommendation 2 below), these soils should either 1) remain capped to prevent future direct contact exposure, 2) be excavated to target levels and transported off-site for proper disposal either prior to, or as a component of, future Site development, or 3) be managed in accordance with appropriate protocols if exposed and removed as part of future site development, with undisturbed contaminated soils to remain capped under new structures or pavement.

2. Actions to address vapor intrusion potential resulting from those soils at the northeastern portion of the Site with the greatest volatile contaminant levels are recommended prior to future redevelopment involving construction of occupied structures in this area. Such actions could include removal of those contaminated soils that are contributing to the vapor intrusion potential (expected to correlate with the SB-012, SB-020, and SB-022 locations) and/or incorporation of engineering controls (e.g., vapor barrier) into future construction at the northeastern portion of the Site as needed to ensure mitigation of potential future indoor air inhalation risks.

9.0 REFERENCES

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10.0 LIMITATIONS AND SIGNATURES

The information presented in this report was collected, analyzed, and interpreted following the standards of care, skill, and diligence ordinarily provided by a professional in the performance of similar services as of the time the services were performed. This report and the conclusions and/or recommendations contained in it are based solely upon research and/or observations, and physical sampling and analytical activities that were conducted.

The information presented in this report is based only upon activities witnessed by HAI or its contractors, and/or upon information provided to HAI by the Client and/or its contractors. The analytical data presented in this report document only the concentrations of the target analytes in the particular sample, and not the property as a whole.

Unless otherwise specified in writing, this report has been prepared solely for the use by the Client and for use only in connection with the evaluation of the subject property. Any other use by the Client or any use by any other person shall be at the user's sole risk, and HAI shall have neither liability nor responsibility with respect to such use.

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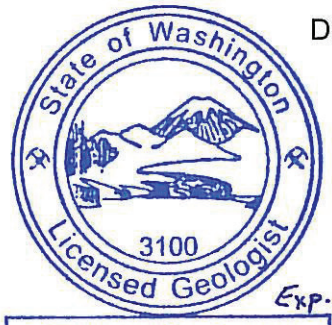

11.0 GLOSSARY OF ABBREVIATIONS

bgs	below ground surface
DO	dissolved oxygen
E & E	Ecology and Environment, Inc.
eV	electron Volt
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
HAI	Hahn and Associates, Inc.
ID	inside diameter
IDW	investigative derived waste
mg/kg	milligrams per kilogram
MDLs	Method Detection Limits
MTCA	Model Toxics Control Act
NGVD	National Geodetic Vertical Datum
NW	Northwest Method
OD	outer diameter
ORP	oxidation reduction potential
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PID	photoionization detector
port	Port of Vancouver, USA
PVC	polyvinyl chloride
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure
TEF	Toxicity Equivalence Factor
TPH	total petroleum hydrocarbons
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
VOCs	volatile organic compounds

TABLES

Table 1 - Summary of Soil Testing Results: Total Petroleum Hydrocarbons and Polychlorinated Biphenyls (PCBs)

					Total Petroleum Hydrocarbons			Polychlorinated Biphenyls							
					NWTPH-Dx		NWTPH-Gx	EPA Method 8082A							
					Diesel-Range Organics	Oil-Range Organics	Gasoline Range Organics	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Sum of total)
Screening Levels		WA Method A Cleanup for Industrial Properties => [1]			2,000	2,000	100								10
		WA Method A Cleanup for Unrestricted Land Use => [1]			2,000	2,000	100								1
		WA Method B Soil Cancer => [2]						14.3					0.5	0.5	0.5
		WA Method B Soil Non Cancer => [2]						5.6					1.6		
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs) [3]**	**Sample Date**	**Analytical Results (mg/kg)**										
Ecology and Environment, Inc. - Soil Samples (November 2008)															
SB001	SB001 (6-8)	6.0 - 8.0	-	25-Nov-08	UJ	UJ	U								
	SB001 (16-18)	16 - 18	-	25-Nov-08	UJ	UJ	U								
SB002	SB002 (6-8)	6.0 - 8.0	-	25-Nov-08	UJ	UJ	U								
	SB002 (13-15)	13 - 15	-	25-Nov-08	UJ	UJ	U								
SB003	SB003 (8-10)	8.0 - 10	-	25-Nov-08	UJ	UJ	U								
	SB003 (24-26)	24 - 26	-	25-Nov-08	UJ	UJ	U	U	U	U	U	U	U	U	U
SB004	SB004 (8-10)	8.0 - 10	-	26-Nov-08	UJ	UJ	U								
	SB004 (26-28)	26 - 28	-	26-Nov-08	UJ	UJ	U								
SB005	SB005 (10-12)	10 - 12	-	26-Nov-08	UJ	UJ	U								
	SB005 (22-24)	22 - 24	-	26-Nov-08	UJ	UJ	U								
SB006	SB006 (6-8)	6.0 - 8.0	-	26-Nov-08	**82.1 J**	**279 J**	U								
	SB006 (26-28)	26 - 28	-	26-Nov-08	UJ	UJ	U								
SB007	SB007 (4-8)	4.0 - 8.0	-	26-Nov-08	UJ	UJ	U								
	SB007 (21-23)	21 - 23	-	26-Nov-08	UJ	UJ	U	U	U	U	U	U	U	U	U
SB008	SB008 (12-14)	12 - 14	-	26-Nov-08	**61.8 J**	**366 J**	U								
	SB008 (24-26)	24 - 26	-	26-Nov-08	**14.6 J**	**90.8 J**	U	U	U	U	U	U	U	U	U
SB009	SB009 (8-10)	8.0 - 10	-	26-Nov-08	**92.9 J**	**618 J**	U								
	SB009 (16-18)	16 - 18	-	26-Nov-08	UJ	UJ	U								
SB010	SB010 (6-8)	6.0 - 8.0	-	26-Nov-08	**171 J**	**655 J**	U								
	SB010 (13-15)	13 - 15	-	26-Nov-08	UJ	UJ	U								

Notes:

bgs = below ground surface
bold = detected concentration
Color = concentrations exceeding one or more cleanup levels
EPA = Environmental Protection Agency
J = Estimated Result
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PCBs = polychlorinated biphenyls
R-02 = The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample
U = Not detected above posted concentration

1 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007
2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007
3 = Discrete-depth soil sample collected for VOCs and Gx by EPA Method 5035 (methanol preservation)

F-11 = The hydrocarbon pattern indicates possible weathered diesel, or a contribution from a related component
F-13 = The chromatographic pattern does not resemble the fuel standard used for quantitation

Table 1 - Summary of Soil Testing Results: Total Petroleum Hydrocarbons and Polychlorinated Biphenyls (PCBs)

					Total Petroleum Hydrocarbons			Polychlorinated Biphenyls							
					NWTPH-Dx		NWTPH-Gx	EPA Method 8082A							
					Diesel-Range Organics	Oil-Range Organics	Gasoline Range Organics	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Sum of total)
Screening Levels	WA Method A Cleanup for Industrial Properties => [1]				2,000	2,000	100								10
	WA Method A Cleanup for Unrestricted Land Use => [1]				2,000	2,000	100								1
	WA Method B Soil Cancer => [2]							14.3					0.5	0.5	0.5
	WA Method B Soil Non Cancer => [2]							5.6					1.6		
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs) [3]**	**Sample Date**	**Analytical Results (mg/kg)**										
Hahn and Associates, Inc. - Soil Samples (May and June 2015)															
SB-006A	8832-150527-007	0.5 - 2.5	1.5	27-May-15	**18.9 J**	**39 J**	3.58 U								
	8832-150527-009	10 - 11.5	10.5	27-May-15	**10.4 J**	**19.4 J**	-								
SB-011	8832-150608-054	1.5 - 3.5	2.0	8-Jun-15	8.96 U	17.9 U	2.85 U								
	8832-150608-055	7.7 - 9.7	8.5	8-Jun-15	10.5 U	20.9 U	-								
SB-012	8832-150609-067	1.5 - 3.5	-	9-Jun-15	**4,080 J**	**4,190 J**	**3,020 F-13**	0.00512 U	0.00512 U	0.00512 U	0.00512 U	0.00512 U	0.00512 U	0.0113 R-02 U	0.0113 U
	8832-150609-068	8.0 - 10	-	9-Jun-15	10.2 U	20.3 U	6.84 U								
	8832-150609-069	11 - 13	-	9-Jun-15	11.4 U	22.7 U	-								
	8832-150609-070	17.5 - 19.5	-	9-Jun-15	11.8 U	**27.7 J**	-								
SB-013	8832-150527-014	1.0 - 2.5	1.5	27-May-15	10.5 U	**213**	3.53 U								
	8832-150527-015	5.5 - 7.5	6.5	27-May-15	176 U	**1,060**	3.29 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U
	8832-150527-016	11 - 13	12.0	27-May-15	8.59 U	17.2 U	3.08 U								
	8832-150527-018	21 - 23	-	27-May-15	**97.4**	**22.2 J**	4.37 U								
SB-014	8832-150527-001	1.0 - 2.5	2.0	27-May-15	42.7 U	**475**	2.97 U	0.00567 U	0.00567 U	0.00567 U	0.00567 U	0.00567 U	0.00567 U	**0.0149**	**0.0149**
	8832-150527-002	5.0 - 7.0	6.0	27-May-15	8.5 U	17 U	3.34 U								
	8832-150527-003	11.5 - 13.5	12.5	27-May-15	9.01 U	18 U	-								
MW-1-37	8832-150528-026	0.5 - 1.5	0.5	28-May-15	106 U	**1,160**	4.02 U	0.00568 U	0.00568 U	0.00568 U	0.00568 U	0.00568 U	0.00568 U	0.00568 U	0.00568 U
	8832-150528-027	5.0 - 7.0	5.0	28-May-15	53.3 U	**634**	4.05 U								
	8832-150528-028	12 - 14	12.5	28-May-15	10.6 U	**23.5 J**	-								

Notes:

bgs = below ground surface
bold = detected concentration
Color = concentrations exceeding one or more cleanup levels
EPA = Environmental Protection Agency
J = Estimated Result
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PCBs = polychlorinated biphenyls
R-02 = The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample
U = Not detected above posted concentration

1 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007
2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007
3 = Discrete-depth soil sample collected for VOCs and Gx by EPA Method 5035 (methanol preservation)

F-11 = The hydrocarbon pattern indicates possible weathered diesel, or a contribution from a related component
F-13 = The chromatographic pattern does not resemble the fuel standard used for quantitation

Table 1 - Summary of Soil Testing Results: Total Petroleum Hydrocarbons and Polychlorinated Biphenyls (PCBs)

					Total Petroleum Hydrocarbons			Polychlorinated Biphenyls							
					NWTPH-Dx		NWTPH-Gx	EPA Method 8082A							
					Diesel-Range Organics	Oil-Range Organics	Gasoline Range Organics	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Sum of total)
Screening Levels		WA Method A Cleanup for Industrial Properties => [1]	2,000	2,000	100										10
		WA Method A Cleanup for Unrestricted Land Use => [1]	2,000	2,000	100										1
		WA Method B Soil Cancer => [2]				14.3							0.5	0.5	0.5
		WA Method B Soil Non Cancer => [2]				5.6							1.6		
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs) [3]**	**Sample Date**	**Analytical Results (mg/kg)**										
Hahn and Associates, Inc. - Soil Samples (May and June 2015) (continued)															
MW-2-40	8832-150605-046	0.2 - 1.2	0.5	5-Jun-15	**16.9 J**	**36.3 J**	3.01 U								
	8832-150605-047	6.3 - 8.3	6.5	5-Jun-15	11.8 U	23.6 U	-								
	8832-150605-048	11.2 - 13.2	12	5-Jun-15	**12.5 J**	**23.6 J**	-								
MW-3-35	8832-150605-040	2.0 - 4.0	2.0	5-Jun-15	9.62 U	19.2 U	3.32 U								
	8832-150605-041	6.0 - 8.0	6.5	5-Jun-15	9.56 U	19.1 U	-								
	8832-150605-042	11 - 13	11.5	5-Jun-15	9.66 U	19.3 U	-								
MW-4-34	8832-150609-060	1.5 - 3.5	2.0	9-Jun-15	8.45 U	**105**	2.43 UJ								
	8832-150609-061	6.0 - 8.0	-	9-Jun-15	9.86 U	19.7 U	3.33 U								
	8832-150609-062	10 - 12	-	9-Jun-15	7.87 U	15.7 U	-								
	8832-150609-065	26 - 28	-	9-Jun-15	**289 J, F-11**	**200 J**	3.86 U								
	8832-150609-066	32.5 - 34.5	-	9-Jun-15	11.5 U	**108 F-13**	-								
MW-5-34	8832-150528-020	4.0 - 5.0	4.0	28-May-15	8.84 U	**43 J**	6.61 U								
	8832-150528-021	6.0 - 8.0	6.5	28-May-15	9.88 U	19.8 U	3.34 U								

Notes:

bgs = below ground surface
bold = detected concentration
Color = concentrations exceeding one or more cleanup levels
EPA = Environmental Protection Agency
J = Estimated Result
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
PCBs = polychlorinated biphenyls
R-02 = The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample
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2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007
3 = Discrete-depth soil sample collected for VOCs and Gx by EPA Method 5035 (methanol preservation)

F-11 = The hydrocarbon pattern indicates possible weathered diesel, or a contribution from a related component
F-13 = The chromatographic pattern does not resemble the fuel standard used for quantitation

Table 2 - Summary of Soil Testing Results: Polynuclear Aromatic Hydrocarbons

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Polyaromatic Hydrocarbons by EPA Method 8270D SIM																		
					1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAH TEF Value [3]
Screening Levels				WA Method A Cleanup for Industrial Properties =>							2										5			2
				WA Method A Cleanup for Unrestricted Land Use =>							0.1										5			0.1
				WA Method B Soil Cancer => [2]	34.5					1.37	0.137	1.37		13.7	137	0.137				1.37				
				WA Method B Soil Non Cancer => [2]	5,600	320	4,800		24,000								80	3,200	3,200		1,600		2,400	
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**																		
Ecology and Environment, Inc. - Soil Samples (November 2008)																							
SB001	SB001 (6-8)	6.0 - 8.0	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB001 (16-18)	16 - 18	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB002	SB002 (6-8)	6.0 - 8.0	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB002 (13-15)	13 - 15	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB003	SB003 (8-10)	8.0 - 10	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB003 (24-26)	24 - 26	-	25-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB004	SB004 (8-10)	8.0 - 10	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB004 (26-28)	26 - 28	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	**0.0373**	U	U	**0.029**	**0.0603**	**0.0343**	U
SB005	SB005 (10-12)	10 - 12	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB005 (22-24)	22 - 24	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB006	SB006 (6-8)	6.0 - 8.0	-	26-Nov-08	-	-	ND	**0.0633**	**0.0404**	**0.0723**	0.103	**0.0842**	**0.166**	**0.087**	**0.0939**	**0.0207**	-	**0.15**	U	**0.0825**	U	**0.101**	**0.159**	0.13
	SB006 (26-28)	26 - 28	-	26-Nov-08	-	-	**1.92**	U	**0.042**	**0.032**	U	U	U	U	**0.0384**	U	-	**0.172**	**0.239**	U	**0.0228**	**1.1**	**0.119**	0.003
SB007	SB007 (4-8)	4.0 - 8.0	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
	SB007 (21-23)	21 - 23	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB008	SB008 (12-14)	12 - 14	-	26-Nov-08	-	-	U	**0.0164**	U	**0.057**	**0.0721**	**0.0621**	**0.0687**	**0.0558**	**0.0747**	U	-	**0.123**	U	**0.049**	U	**0.0583**	**0.125**	0.09
	SB008 (24-26)	24 - 26	-	26-Nov-08	-	-	U	U	U	**0.0279**	**0.0285**	**0.0298**	**0.0253**	**0.0312**	**0.0393**	U	-	**0.0594**	U	**0.0203**	U	**0.0209**	**0.0686**	0.03
SB009	SB009 (8-10)	8.0 - 10	-	26-Nov-08	-	-	UJ	UJ	UJ	**0.186**	0.267	**0.233**	**0.248**	**0.229**	**0.279**	**0.0634**	-	**0.362**	UJ	**0.196**	UJ	**0.128**	**0.416**	0.36
	SB009 (16-18)	16 - 18	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
SB010	SB010 (6-8)	6.0 - 8.0	-	26-Nov-08	-	-	UJ	UJ	UJ	**0.0722**	**0.0824**	**0.0785**	**0.0654**	**0.0742**	**0.0963**	UJ	-	**0.13**	UJ	**0.0498**	**0.0456**	**0.113**	**0.124**	0.11
	SB010 (13-15)	13 - 15	-	26-Nov-08	-	-	U	U	U	U	U	U	U	U	U	U	-	U	U	U	U	U	U	U
Hahn and Associates, Inc. - Soil Samples (May and June 2015)																							
SB-006A	8832-150527-007	0.5 - 2.5	1.5	27-May-15	0.00527 U	**0.00563 J**	0.00527 U	0.00527 U	0.00527 U	**0.0398**	**0.0717**	**0.0937 J**	**0.0865**	**0.0313 J**	**0.0504**	**0.0117**	0.00527 U	**0.0376**	0.00527 U	**0.0838**	0.00527 U	**0.0194**	**0.0453**	0.09
	8832-150527-009	10 - 11.5	10.5	27-May-15	0.00498 U	0.00498 U	0.00498 U	0.00498 U	0.00498 U	**0.0244**	**0.0387**	**0.0489 J**	**0.0313**	**0.0192 J**	**0.0344**	**0.00639 J**	0.00498 U	**0.0402**	0.00498 U	**0.0335**	**0.00724 J**	**0.0222**	**0.0357**	0.05
SB-011	8832-150608-054	1.5 - 3.5	2.0	8-Jun-15	0.00518 U	0.00518 U	0.00518 U	**0.0699**	**0.0265**	**0.218**	0.34	**0.363 J**	**0.208**	**0.127 J**	**0.278**	**0.0472**	0.00518 U	**0.348**	0.0104 U	**0.22**	**0.0076 J**	**0.104**	**0.443**	0.44
	8832-150608-055	7.7 - 9.7	8.5	8-Jun-15	0.00549 U	0.00549 U	0.00549 U	0.00549 U	0.00549 U	**0.00695 J**	0.00549 U	**0.00606 J**	0.00549 U	0.00549 U	**0.00551 J**	0.00549 U	0.00549 U	**0.00783 J**	0.00549 U	0.00549 U	0.00549 U	0.00549 U	**0.00974 J**	0.007
SB-012	8832-150609-067	1.5 - 3.5	-	9-Jun-15	**23**	**23.7**	**3.33**	0.827 UJ	**4.58**	2.7	2.6	2.44	**2.06**	**0.795 M-02**	**4.46**	0.339	**1.04**	**7.13**	**6.23**	1.61	**48.4**	**21.2**	**9.3**	3.43
	8832-150609-068	8.0 - 10	-	9-Jun-15	**0.0843**	**0.00625 J**	**0.0119**	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0052 U	**0.00737 J**	0.0052 U	**0.0316**	**0.00624 J**	0.0052 U	0.007
SB-013	8832-150527-014	1.0 - 2.5	1.5	27-May-15	**0.0785**	**0.0913**	**0.031 J**	0.0277 U	**0.0478 J**	**0.0927**	**0.0778**	**0.0458 J**	**0.0546 J**	0.0277 U	**0.154**	0.0277 U	0.0277 U	**0.047 J**	**0.0419 J**	**0.0297 J**	0.0277 U	**0.182**	**0.21**	0.09
	8832-150527-015	5.5 - 7.5	6.5	27-May-15	0.0267 U	0.0267 U	0.0267 U	0.0267 U	0.0267 U	**0.0352 J**	**0.0314 J**	**0.0307 J**	**0.0345 J**	0.0267 U	**0.0555 J**	0.0267 U	0.0267 U	0.0267 U	0.0267 U	0.0267 U	0.0267 U	0.0267 U	**0.0329 J**	0.04
SB-014	8832-150527-001	1.0 - 2.5	2.0	27-May-15	0.0269 U	0.0269 U	0.0269 U	0.0269 U	0.0269 U	**0.0579**	**0.0768**	**0.0928 J**	**0.159**	**0.0325 J**	**0.0578**	**0.0295 J**	0.0269 U	**0.0621**	0.0269 U	**0.0912**	0.0269 U	**0.0347 J**	**0.0627**	0.11
	8832-150527-003	11.5 - 13.5	12.5	27-May-15	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	**0.0108**	0.00482 U	0.00482 U	0.00482 U	**0.0162**	0.00482 U	0.006
MW-1-37	8832-150528-026	0.5 - 1.5	0.5	28-May-15	0.0281 U	0.0281 U	0.0281 U	0.0281 U	0.0281 U	**0.0328 J**	**0.0346 J**	**0.0385 J**	**0.0608**	0.0281 U	**0.0297 J**	0.0281 U	0.0281 U	0.0281 U	0.0281 U	**0.0309 J**	0.0281 U	0.0281 U	**0.031 J**	0.04
	8832-150528-027	5.0 - 7.0	5.0	28-May-15	0.0306 U	0.0306 U	0.0306 U	0.0306 U	0.0306 U	**0.0838**	0.134	**0.235 J**	**0.167**	**0.0853 J**	**0.154**	**0.0359 J**	0.0306 U	**0.181**	0.0306 U	**0.168**	0.0306 U	**0.0693**	**0.193**	0.19
	8832-150528-028 [4]	12 - 14	12.5	28-May-15	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.00564 UJ	0.004
MW-2-40	8832-150605-046	0.2 - 1.2	0.5	5-Jun-15	**3.3**	**6.77**	0.0729 UJ	0.0626 UJ	0.0717 UJ	**0.0759 J**	**0.0279**	**0.0434 J**	**0.0694**	**0.0127 J**	**0.07 J**	0.00569 U	0.0478 UJ	**0.16**	**0.212**	**0.0156**	**4.11**	**0.435**	**0.297**	0.04
MW-3-35	8832-150605-040	2.0 - 4.0	2.0	5-Jun-15	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.00528 U	0.007
	8832-150605-045 [4]	25.8 - 27.8	-	5-Jun-15	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	0.00502 UJ	**0.0131**	0.00502 UJ	0.00502 UJ	0.003
MW-4-34	8832-150609-060	1.5 - 3.5	2.0	9-Jun-15	0.00477 U	0.00477 U	0.00477 U	0.00477 U	0.00477 U	**0.00744 J**	**0.00795 J**	**0.0116 J**	**0.00727 J**	0.00477 U	**0.0115 J**	0.00477 U	0.00477 U	**0.00834 J**	0.00477 U	**0.00738 J**	0.00477 U	0.00477 U	**0.00969**	0.01
	8832-150609-061	6.0 - 8.0	-	9-Jun-15	0.00461 U	0.00461 U	0.00461 U	0.00461 U	0.00461 U	**0.00725 J**	**0.00691 J**	**0.00717 J**	**0.00633 J**	0.00461 UJ	**0.00781 J**	0.00461 U	0.00461 U	**0.00801 J**	0.00461 U	**0.00662 J**	0.00461 U	0.00461 U	**0.00928**	0.009
	8832-150609-065	26 - 28	-	9-Jun-15	**0.197**	**0.32**	0.0498 UJ	0.0127 UJ	0.0266 UJ	**0.035 J**	**0.0181**	**0.0279 J**	**0.0136**	**0.00672 J**	**0.0938 J**	0.00578 U	0.127 UJ	**0.0843**	**0.0997**	**0.0103 J**	**0.181**	**0.151**	**0.0962**	0.02
MW-5-34	8832-150528-020	4.0 - 5.0	4.0	28-May-15	0.00527 U	0.00527 U	0.00527 U	0.00527 U	0.00527 U	**0.00537 J**	0.00527 U	**0.00546 J**	0.00527 U	0.00527 U	**0.00929 J**	0.00527 U	0.00527 U	**0.00794 J**	0.00527 U	0.00527 U	0.00527 U	0.00527 U	**0.00902 J**	0.007

Table 2 - Summary of Soil Testing Results: Polynuclear Aromatic Hydrocarbons

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Polyaromatic Hydrocarbons by EPA Method 8270D SIM																			
					1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a) pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Total Carcinogenic PAH TEF Value [3]
Screening Levels			WA Method A Cleanup for Industrial Properties =>								2										5			2
			WA Method A Cleanup for Unrestricted Land Use =>								0.1										5			0.1
			WA Method B Soil Cancer => [2]		34.5					1.37	0.137	1.37		13.7	137	0.137				1.37				
			WA Method B Soil Non Cancer => [2]		5,600	320	4,800		24,000								80	3,200	3,200		1,600		2,400	
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**																			
Hahn and Associates, Inc. - Soil Samples (February 2016)																								
SB-015	8832-160224-053	0.5 - 2.5	-	24-Feb-16	0.0944 U	0.0944 U	0.0944 U	0.0944 U	0.0944 U	**0.163 J**	0.171	**0.254 J**	**0.184**	**0.095 J**	**0.255 J**	0.0944 U	0.0944 U	**0.439**	0.0944 U	**0.16**	0.0944 U	**0.504**	**0.413**	0.24547
	8832-160224-054	6.0 - 8.0	-	24-Feb-16	**0.0161**	**0.0179**	0.0109 U	0.0109 U	0.0109 U	**0.0187 J**	**0.0168**	**0.0267 J**	**0.0131**	0.0109 U	**0.0207 J**	0.0109 U	0.0109 U	**0.0291**	0.0109 U	**0.0135**	0.0109 U	**0.0179**	**0.0338**	0.023442
SB-016	8832-160224-060	1.0 - 3.0	-	24-Feb-16	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.00958 U	0.0067539
	8832-160224-057	5.0 - 7.0	-	24-Feb-16	0.0107 U	0.0107 U	0.0107 U	0.0107 U	0.0107 U	**0.0132 J**	**0.0128**	**0.0185 J**	0.0107 U	0.0107 U	**0.0284 J**	0.0107 U	0.0107 U	**0.0392**	0.0107 U	0.0107 U	0.0107 U	**0.0303**	**0.0443**	0.017324
SB-017	8832-160223-019	1.0 - 2.3	-	23-Feb-16	0.171 U	0.171 U	0.171 U	0.171 U	**0.202**	**1.09**	1.03	1.56 J	**0.651**	**0.668 J**	**1.54**	0.171 U	0.171 U	**2.68**	0.171 U	**0.751**	0.171 U	**1.62**	**2.65**	1.46085
	8832-160223-020	5.0 - 7.0	-	23-Feb-16	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.00852 U	0.0060066
SB-018	8832-160224-049	1.0 - 3.2	-	24-Feb-16	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0103 U	0.0072615
	8832-160224-050	6.0 - 8.0	-	24-Feb-16	0.122 U	0.122 U	0.122 U	0.122 U	0.122 U	**0.179 J**	0.21	**0.268 J**	**0.231**	0.122 U	**0.269 J**	0.122 U	0.122 U	**0.284**	0.122 U	**0.174**	0.122 U	**0.219**	**0.366**	0.28089
	8832-160224-051	13 - 14	-	24-Feb-16	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0088
SB-019	8832-160224-044	0.0 - 2.0	-	24-Feb-16	0.201 U	0.201 U	0.201 U	0.201 U	0.201 U	**0.203 J**	0.201 U	**0.288 J**	0.201 U	0.201 U	**0.29 J**	0.201 U	0.201 U	**0.536**	0.201 U	0.201 U	0.201 U	**0.368**	**0.515**	0.1726
	8832-160224-047	6.0 - 8.0	-	24-Feb-16	**0.0635**	**0.073**	**0.0308**	**0.0438**	**0.241**	1.53	1.26	1.87 J	**0.526**	**0.634 J**	**1.68**	0.192	**0.0453**	**2.23**	**0.0651**	**0.667**	**0.0624**	**0.974**	**2.36**	1.7661
	8832-160224-045	13 - 14.5	-	24-Feb-16	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0122 U	0.0086
SB-020	8832-160223-023	1.0 - 2.5	-	23-Feb-16	0.467 U	0.467 U	0.467 U	**5.91**	**5.1**	9.04	15.1	15.8 J	**10.3**	**6.22 J**	**8.25**	2.49	**0.747**	**13.6**	**0.804**	12.9	**1.01**	**8**	**11.3**	19.8275
	8832-160223-025	6.0 - 7.0	-	23-Feb-16	0.0475 U	0.0475 U	0.0475 U	**0.0839**	**0.0976**	**0.268 J**	0.285	**0.349 J**	**0.188**	**0.153 J**	**0.263 J**	0.0475 U	0.0475 U	**0.457**	0.0475 U	**0.207**	0.0475 U	**0.291**	**0.361**	0.387705
	8832-160224-059	13 - 15	-	24-Feb-16	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0125 U	0.0088
	8832-160223-026	18 - 19.5	-	23-Feb-16	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0118 U	0.0083
SB-021	8832-160224-039	0.0 - 2.0	-	24-Feb-16	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	**0.104 J**	**0.281**	0.103 U	**0.119 J**	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.103 U	0.07854
	8832-160224-040	2.0 - 3.7	-	24-Feb-16	0.1 U	**0.101**	0.1 U	0.1 U	0.1 U	0.1 U	0.131	**0.161 J**	**0.232**	0.1 U	0.12 U	0.1 U	0.1 U	**0.101**	0.1 U	**0.165**	0.1 U	**0.123**	**0.153**	0.1742
	8832-160224-041	6.0 - 8.0	-	24-Feb-16	0.0108 U	**0.011**	0.0108 U	0.0108 U	0.0108 U	0.0108 U	0.0108 U	**0.0119 J**	0.0108 U	0.0108 U	0.0108 U	0.0108 U	0.0108 U	**0.0147**	0.0108 U	0.0108 U	0.0108 U	0.0108 U	**0.0153**	0.008264
SB-022	8832-160224-033	0.0 - 2.0	-	24-Feb-16	**0.548**	**0.673**	0.203 U	0.203 U	0.203 U	0.203 U	0.203 U	**0.234 J**	0.203 U	0.203 U	0.507 U	0.203 U	0.203 U	0.203 U	0.203 U	0.203 U	0.203 U	**0.437**	**0.224**	0.156365
	8832-160224-034	2.0 - 3.5	-	24-Feb-16	**1.5**	**1.92**	0.209 U	0.209 U	**0.248**	0.209 U	0.209 U	**0.258 J**	0.209 U	0.209 U	0.628 U	0.209 U	0.209 U	**0.227**	**0.491**	0.209 U	**0.412**	**1.06**	**0.366**	0.162695
	8832-160224-035	5.0 - 7.0	-	24-Feb-16	**0.0397**	**0.0459**	0.0109 U	0.0109 U	**0.0222**	**0.0823**	**0.0872**	**0.107 J**	**0.0554**	**0.0378 J**	**0.103**	0.0109 U	**0.0127**	**0.168**	0.0109 U	**0.0564**	**0.034**	**0.113**	**0.201**	0.117125
	8832-160224-036	8.0 - 9.0	-	24-Feb-16	**0.0476**	**0.0536**	0.00996 U	0.00996 U	0.00996 U	**0.0351**	**0.0332**	**0.0401 J**	**0.0206**	**0.0136 J**	**0.0428**	0.00996 U	0.00996 U	**0.0672**	0.00996 U	**0.021**	**0.0175**	**0.0621**	**0.0803**	0.045106
SB-023	8832-160224-027	0.0 - 1.2	-	24-Feb-16	0.054 U	0.054 U	0.054 U	0.054 U	0.054 U	**0.068 J**	**0.0564**	**0.0836 J**	0.054 U	0.054 U	**0.091 J**	0.054 U	0.054 U	**0.126**	0.054 U	0.054 U	0.054 U	**0.109**	**0.124**	0.07814
	8832-160224-028	5.0 - 6.0	-	24-Feb-16	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**0.378**	0.2 U	0.2 U	0.2 U	**0.698**	**0.341**	0.141
	8832-160224-032	8.0 - 10	-	24-Feb-16	**0.347**	**0.266**	0.0159 U	0.0148 U	**0.0395**	**0.143**	0.13	**0.173 J**	**0.0622**	**0.0631 J**	**0.188**	**0.0191**	**0.0586**	**0.207**	**0.0276 J**	**0.0679**	**0.114**	**0.307**	**0.229**	0.17849
	8832-160224-029	10 - 11.7	-	24-Feb-16	0.0541 U	**0.0614**	0.0541 U	0.0541 U	0.0541 U	0.0541 U	0.0541 U	**0.0732 J**	0.0541 U	0.0541 U	**0.132 J**	0.0541 U	**0.068**	**0.112**	0.0541 U	0.0541 U	**0.0883**	**0.205**	**0.113**	0.043805
SB-024	8832-160223-015	1.0 - 3.0	-	23-Feb-16	0.00865 U	0.00865 U	0.00865 U	0.00865 U	0.00865 U	**0.0166 J**	**0.0194**	**0.0296 J**	**0.0197**	**0.00954 J**	**0.0201 J**	0.00865 U	0.00865 U	**0.0253**	0.00865 U	**0.0177**	0.00865 U	**0.0135**	**0.0296**	0.0273775
	8832-160223-016	6.0 - 7.0	-	23-Feb-16	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.00868 U	0.0061194
SB-025	8832-160223-004	1.0 - 3.0	-	23-Feb-16	0.0463 U	0.0463 U	0.0463 U	0.0463 U	0.0463 U	**0.0498 J**	**0.0663**	**0.0963 J**	**0.0868**	0.0463 U	**0.121 J**	0.0463 U	0.0463 U	**0.0606**	0.0463 U	**0.0646**	0.0463 U	**0.053**	**0.102**	0.090895
	8832-160223-006	6.0 - 7.7	-	23-Feb-16	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00909 U	0.00640845
SB-026	8832-160223-008	1.0 - 3.0	-	23-Feb-16	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.0102 U	0.007191
	8832-160223-010	6.0 - 7.5	-	23-Feb-16	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	**0.0223 J**	**0.0255**	**0.0328 J**	**0.0195**	**0.0157 J**	**0.0238 J**	0.0098 U	0.0098 U	**0.0273**	0.0098 U	**0.023**	0.0098 U	**0.0104**	**0.0317**	0.035608
SB-027	8832-160223-001	1.0 - 3.0	-	23-Feb-16	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.00924 U	0.0065142
	8832-160223-002	6.0 - 8.0	-	23-Feb-16	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00999 U	0.00704295
SB-028	8832-160223-012	1.0 - 3.0	-	23-Feb-16	0.0108 U	0.0108 U	0.0108 U	0.0108 U	0.0108 U	**0.0138 J**	**0.0122**	**0.0182 J**	0.0108 U	0.0108 U	**0.0157 J**	0.0108 U	0.0108 U	**0.0241**	0.0108 U	0.0108 U	0.0108 U	**0.0142**	**0.0266**	0.016637
	8832-160223-013	5.0 - 6.0	-	23-Feb-16	0.00952 U	0.00952 U	0.00952 U	0.00952 U	0.00952 U	**0.0111 J**	0.00952 U	**0.0172 J**	**0.0132**	0.00952 U	**0.0145 J**	0.00952 U	0.00952 U	**0.0213**	0.00952 U	**0.0117**	0.00952 U	**0.0173**	**0.0213**	0.009381

Notes:
bgs = below ground surface
bold = detected concentration
Color = concentrations exceeding one or more cleanup levels.
EPA = Environmental Protection Agency

J = Estimated Result
mg/kg = milligrams per kilogram
PAHs = polyaromatic hydrocarbons
U = Not detected above concentration identified

1 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
3 = TEF values calculated as described in WAC 173-340-708(8). When the individual PAH concentration was reported as non-detect, then the TEF was multiplied by half the Reporting Level.
4 = This sample was received, or the analysis requested, outside of the recommended holding time.

Table 3 - Summary of Soil Testing Results: Metals

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Total Metals															
					EPA Method 6020															
					Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent) [4]	Chromium (Trivalent) [5]	Copper	Lead	TCLP Lead (mg/L) [6]	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Screening Levels				WA Background [1] =>	**5**	**7**	**2**	**1**	**42**			**36**	**17**		**0.07**	**38**	**0.78**	**0.61**		**86**
				WA Method A Cleanup for Industrial Properties => [2]		**20**		**2**		**19**	**2,000**		**1,000**		**2**					
				WA Method A Cleanup for Unrestricted Land Use => [2]		**20**		**2**		**19**	**2,000**		**250**		**2**					
				WA Method B Soil Cancer => [3]		**0.667**														
				WA Method B Soil Non Cancer => [3]	**32**	**24**	**160**	**80**		**240**	**120,000**	**3,200**				**1,600**	**400**	**400**	**0.8**	**24,000**
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**															
Ecology and Environment, Inc. - Soil Samples (November 2008)																				
SB001	SB001 (6-8)	6.0 - 8.0	-	25-Nov-08	UJ	1.65 J	U	U	8.1 J	-	-	8.34 J	3.07	-	U	8.22	U	U	U	34.3
	SB001 (16-18)	16 - 18	-	25-Nov-08	UJ	2.01 J	U	U	8.31 J	-	-	8.82 J	**22.2**	-	U	8.26	U	U	U	59.4
SB002	SB002 (6-8)	6.0 - 8.0	-	25-Nov-08	UJ	1.97 J	U	U	8.08 J	-	-	9.37 J	3.09	-	U	7.44	U	U	U	38.3
	SB002 (13-15)	13 - 15	-	25-Nov-08	UJ	2.72 J	U	U	9.59 J	-	-	14.4 J	12.7	-	U	11	U	U	U	71.3
SB003	SB003 (8-10)	8.0 - 10	-	25-Nov-08	UJ	**7.75 J**	U	U	26.5 J	-	-	**42.7 J**	15	-	**0.109**	24	U	U	U	78
	SB003 (24-26)	24 - 26	-	25-Nov-08	UJ	2.02 J	U	U	33.4 J	-	-	25.8 J	6.11	-	U	23.8	U	U	U	53.1
SB004	SB004 (8-10)	8.0 - 10	-	26-Nov-08	UJ	1.41 J	U	U	11.1 J	-	-	9.22 J	2.23	-	U	10.2	U	U	**92.5**	37.1
	SB004 (26-28)	26 - 28	-	26-Nov-08	UJ	**25.6 J**	U	**2.43**	21.9 J	-	-	**40.1 J**	**69.6**	-	U	19.3	U	U	**71.5**	**328**
SB005	SB005 (10-12)	10 - 12	-	26-Nov-08	UJ	5.19 J	0.761	0.774	27.6 J	-	-	31.4 J	10.1	-	U	24.7	U	U	U	**124**
	SB005 (22-24)	22 - 24	-	26-Nov-08	UJ	**7.77 J**	0.96	U	36 J	-	-	33 J	11	-	U	27.5	U	U	U	**88.2**
SB006	SB006 (6-8)	6.0 - 8.0	-	26-Nov-08	**5.29 UJ**	**14.3 J**	U	**1.46**	23.9 J	-	-	**143 J**	**1,100**	-	**0.316**	21.2	U	U	U	**1,140**
	SB006 (26-28)	26 - 28	-	26-Nov-08	UJ	**18 J**	U	0.748	21.9 J	-	-	**39.3 J**	**38.4**	-	U	20.2	U	U	U	**191**
SB007	SB007 (4-8)	4.0 - 8.0	-	26-Nov-08	UJ	1.71 J	U	U	8.27 J	-	-	8.42 J	4.54	-	U	7.65	U	U	U	39
	SB007 (21-23)	21 - 23	-	26-Nov-08	UJ	10.2 J	U	**2.12**	21.1 J	-	-	**36.9 J**	**47.1**	-	U	19.1	U	U	U	**328**
SB008	SB008 (12-14)	12 - 14	-	26-Nov-08	UJ	2.52 J	U	U	13.5 J	-	-	26.6 J	**90.7**	-	U	12.4	U	U	U	**146**
	SB008 (24-26)	24 - 26	-	26-Nov-08	UJ	1.75 J	U	U	8.78 J	-	-	10.7 J	**23.5**	-	**0.0885**	8.49	U	U	U	53.5
SB009	SB009 (8-10)	8.0 - 10	-	26-Nov-08	UJ	4.26 J	U	U	14.2 J	-	-	**46.5 J**	**114**	-	U	13.5	U	U	U	**135**
	SB009 (16-18)	16 - 18	-	26-Nov-08	UJ	5.79 J	0.83	U	28.6 J	-	-	32.3 J	11.7	-	U	24.8	**1.12**	U	U	74.5
SB010	SB010 (6-8)	6.0 - 8.0	-	26-Nov-08	2.94 J	**9.32 J**	U	U	19.6 J	-	-	**111 J**	**181**	-	U	17.3	**0.811**	U	U	**95.7**
	SB010 (13-15)	13 - 15	-	26-Nov-08	UJ	15.7 J	U	U	**46.4 J**	-	-	**53.9 J**	**1,180**	-	**0.226**	24.6	U	U	U	**412**
Hahn and Associates, Inc. - Soil Samples (May and June 2015)																				
SB-006A	8832-150527-007	0.5 - 2.5	1.5	27-May-15	4.82	2.37	0.84	0.535	11.1	-	-	30	**121**	-	**0.092 J**	18.6	0.608 U	0.122 U	0.134 J	80
	8832-150527-008	5.0 - 7.0	5.5	27-May-15	0.595 U	2.25	0.904	0.559	10.2	-	-	21.7	15	-	0.0476 U	12.8	0.595 U	0.119 U	0.155 J	59.5
	8832-150527-009	10 - 11.5	10.5	27-May-15	-	-	-	-	-	-	-	-	**37.2**	-	-	-	-	-	-	-
	8832-150527-010	16 - 18	-	27-May-15	-	-	-	-	-	-	-	-	2.73	-	-	-	-	-	-	-
	8832-150527-011	21 - 23	-	27-May-15	-	-	-	-	-	-	-	-	**41.5**	-	-	-	-	-	-	-
	8832-150527-012	26 - 28	-	27-May-15	-	-	-	-	-	-	-	-	**24.7**	-	-	-	-	-	-	-
	8832-150527-013	31 - 33	-	27-May-15	-	-	-	-	-	-	-	-	15.6	-	-	-	-	-	-	-
SB-011	8832-150608-054	1.5 - 3.5	2.0	8-Jun-15	0.531 U	1.02 J	0.106 U	0.191 J	3.06	-	-	5.15	2.56	-	0.0425 U	4.73	0.531 U	0.106 U	0.106 U	27.1
	8832-150608-055	7.7 - 9.7	8.5	8-Jun-15	-	-	-	-	-	-	-	-	5.67	-	-	-	-	-	-	-
	8832-150608-056	12.4 - 14.4	13	8-Jun-15	0.686 U	4.28	**2.21**	0.467	20.1	-	-	25.5	8.08	-	0.0571 J	20	**1.02 J**	0.137 U	0.151 J	55
	8832-150608-057	18 - 20	-	8-Jun-15	-	-	-	-	-	-	-	-	9.16	-	-	-	-	-	-	-

Table 3 - Summary of Soil Testing Results: Metals

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Total Metals															
					EPA Method 6020															
					Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent) [4]	Chromium (Trivalent) [5]	Copper	Lead	TCLP Lead (mg/L) [6]	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Screening Levels			WA Background [1] =>		**5**	**7**	**2**	**1**	**42**			**36**	**17**		**0.07**	**38**	**0.78**	**0.61**		**86**
			WA Method A Cleanup for Industrial Properties => [2]			20		2		19	2,000		1,000		2					
			WA Method A Cleanup for Unrestricted Land Use => [2]			20		2		19	2,000		250		2					
			WA Method B Soil Cancer => [3]			0.667														
			WA Method B Soil Non Cancer => [3]		32	24	160	80		240	120,000	3,200				1,600	400	400	0.8	24,000
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**															
Hahn and Associates, Inc. - Soil Samples May and June 2015) (continued)																				
SB-012	8832-150609-067	1.5 - 3.5	-	9-Jun-15	1.1 J	2.18	0.298	0.515 J	8.91	-	-	33.2	**119**	0.147	**0.227**	16.7	0.573 U	0.137 J	0.115 U	**88.1**
	8832-150609-068	8.0 - 10	-	9-Jun-15	-	-	-	-	-	-	-	-	9.73	-	-	-	-	-	-	-
	8832-150609-069	11 - 13	-	9-Jun-15	0.654 U	3.64	0.445	0.497 J	10.5	1.45 U	-	21.5	6.64	-	0.0523 U	12	0.654 U	0.131 U	0.131 U	53
	8832-150609-070	17.5 - 19.5	-	9-Jun-15	-	-	-	-	-	-	-	-	16.4	-	-	-	-	-	-	-
	8832-150609-071	23 - 25	-	9-Jun-15	-	-	-	-	-	-	-	-	7.89	-	-	-	-	-	-	-
	8832-150609-072	26.5 - 28.5	-	9-Jun-15	-	-	-	-	-	-	-	-	9.53	-	-	-	-	-	-	-
SB-013	8832-150527-014	1.0 - 2.5	1.5	27-May-15	0.578 U	1.48	0.625	0.474	9.67	-	-	24.5	19.4	-	0.0463 U	10.4	0.578 U	0.116 U	0.116 J	62.3
	8832-150527-015	5.5 - 7.5	6.5	27-May-15	0.571 U	1.7	0.663	0.571	9.2	-	-	27.2	**37.2**	-	0.0457 U	12	0.571 U	0.114 U	0.137 J	72.2
	8832-150527-016	11 - 13	12.0	27-May-15	-	-	-	-	-	-	-	-	2.43	-	-	-	-	-	-	-
	8832-150527-018	21 - 23	-	27-May-15	-	-	-	-	-	-	-	-	**36.1**	-	-	-	-	-	-	-
SB-014	8832-150527-001	1.0 - 2.5	2.0	27-May-15	0.772 J	3.23	0.399	0.897	10.4	-	-	**87.8**	821	4.38	**3.61 / 0.0025 U** [7]	10.8	0.623 U	0.361	0.125 U	**220**
	8832-150527-002	5.0 - 7.0	6.0	27-May-15	-	-	-	-	-	-	-	-	2.34	-	0.0432 U	-	-	-	-	-
	8832-150527-003	11.5 - 13.5	12.5	27-May-15	0.565 U	1.51	0.113 U	0.204 J	3.26	1.18 U	3.26	6.99	4.13	-	0.0452 U	5.56	0.565 U	0.113 U	0.113 U	29.5
	8832-150527-004	16.5 - 18.5	-	27-May-15	-	-	-	-	-	-	-	-	**31.3**	-	-	-	-	-	-	-
	8832-150527-005	21 - 23	-	27-May-15	-	-	-	-	-	-	-	-	**35**	-	-	-	-	-	-	-
	8832-150527-006	25 - 27	-	27-May-15	-	-	-	-	-	-	-	-	**30.8**	-	-	-	-	-	-	-
SB-015	8832-150605-053	8.0 - 10	-	5-Jun-15	-	-	-	-	21	2.02 J	19	-	-	-	-	-	-	-	-	-
MW-1-37	8832-150528-026	0.5 - 1.5	0.5	28-May-15	0.587 U	2.08	0.587	0.517	9.13	-	-	25.1	**56.7**	-	**0.11**	10.9	0.587 U	0.129 J	0.117 J	78.5
	8832-150528-027	5.0 - 7.0	5.0	28-May-15	-	-	-	-	-	-	-	-	772	1.19	-	-	-	-	-	-
	8832-150528-028	12 - 14	12.5	28-May-15	-	-	-	-	-	-	-	-	**27.1**	-	-	-	-	-	-	-
MW-2-40	8832-150605-046	0.2 - 1.2	0.5	5-Jun-15	0.616 U	1.96	0.677	0.628	18.3	-	-	26.5	545	0.118	**0.241**	10.7	0.616 U	0.172 J	0.123 U	**195**
	8832-150605-047	6.3 - 8.3	6.5	5-Jun-15	-	-	-	-	-	-	-	-	9.05	-	-	-	-	-	-	-
	8832-150605-048	11.2 - 13.2	12	5-Jun-15	0.68 U	4.16	0.516	0.598	13.5	1.42 J	-	26.1	**29.4**	-	0.0637 J	14.4	0.68 U	0.136 U	0.136 U	62.9
	8832-150605-049	17.5 - 19.5	-	5-Jun-15	-	-	-	-	-	-	-	-	9.37	-	-	-	-	-	-	-
	8832-150605-050	21.5 - 23.5	-	5-Jun-15	-	-	-	-	-	-	-	-	8.46	-	-	-	-	-	-	-
	8832-150605-051	28 - 30	-	5-Jun-15	-	-	-	-	-	-	-	-	8.63	-	-	-	-	-	-	-
MW-3-35	8832-150605-040	2.0 - 4.0	2.0	5-Jun-15	0.576 U	1.11 J	0.161 J	0.219 J	3.57	-	-	8.15	4.85	-	0.0461 U	6.22	0.576 U	0.127 J	0.115 U	31
	8832-150605-041	6.0 - 8.0	6.5	5-Jun-15	-	-	-	-	-	-	-	-	2.35	-	-	-	-	-	-	-
	8832-150605-042	11 - 13	11.5	5-Jun-15	0.582 U	1.39	0.128 J	0.256	3.83	1.19 U	-	6.09	3.77	-	0.0466 U	6.77	0.582 U	0.116 U	0.116 U	34.7
	8832-150605-043	16 - 18	-	5-Jun-15	-	-	-	-	-	-	-	-	7.15	-	-	-	-	-	-	-

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Terminal 1 Property
Vancouver, WA

					Total Metals															
					EPA Method 6020															
					Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent) [4]	Chromium (Trivalent) [5]	Copper	Lead	TCLP Lead (mg/L) [6]	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Screening Levels				WA Background [1] =>	**5**	**7**	**2**	**1**	**42**			**36**	**17**		**0.07**	**38**	**0.78**	**0.61**		**86**
				WA Method A Cleanup for Industrial Properties => [2]		**20**		**2**		**19**	**2,000**		**1,000**		**2**					
				WA Method A Cleanup for Unrestricted Land Use => [2]		**20**		**2**		**19**	**2,000**		**250**		**2**					
				WA Method B Soil Cancer => [3]		**0.667**														
				WA Method B Soil Non Cancer => [3]	**32**	**24**	**160**	**80**		**240**	**120,000**	**3,200**				**1,600**	**400**	**400**	**0.8**	**24,000**
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**															
Hahn and Associates, Inc. - Soil Samples (May and June 2015) (continued)																				
MW-4-34	8832-150609-060	1.5 - 3.5	2.0	9-Jun-15	0.549 U	1.27	0.56	0.725	7.02	-	-	28.1	**24.2**	-	0.0439 U	10.3	0.703 J	0.11 U	0.11 J	61.6
	8832-150609-061	6.0 - 8.0	-	9-Jun-15	-	-	-	-	-	-	-	-	**20.8**	-	-	-	-	-	-	-
	8832-150609-062	10 - 12	-	9-Jun-15	-	-	-	-	-	-	-	-	2.6	-	-	-	-	-	-	-
	8832-150609-063	15 - 17	-	9-Jun-15	-	-	-	-	-	-	-	-	3.12	-	-	-	-	-	-	-
	8832-150609-064	21 - 23	-	9-Jun-15	-	-	-	-	-	-	-	-	13.4	-	-	-	-	-	-	-
	8832-150609-065	26 - 28	-	9-Jun-15	0.744 U	5.25	0.402	0.64 J	14.7	-	-	29.2	**20.8**	-	**0.435**	14.6	0.744 U	0.149 U	0.149 U	**89.8**
	8832-150609-066	32.5 - 34.5	-	9-Jun-15	-	-	-	-	-	-	-	-	16.8	-	-	-	-	-	-	-
MW-5-34	8832-150528-020	4.0 - 5.0	4.0	28-May-15	0.526 U	1.7	0.105 J	0.189 J	3.62	-	-	7.57	3.57	-	0.0421 U	5.04	0.526 U	0.105 U	0.105 U	22.7
	8832-150528-021	6.0 - 8.0	6.5	28-May-15	0.559 U	1.31	0.134 J	0.235	4.6	-	-	6.46	2.59	-	0.0447 U	6.06	0.559 U	0.112 U	0.112 U	30.4
	8832-150528-023	16 - 18	-	28-May-15	-	1.12	-	0.112 U	2.28	-	-	-	2.83	-	-	-	-	-	0.112 U	-
	8832-150528-024	20 - 22	-	28-May-15	-	1.08 J	-	0.137 J	2.78	-	-	-	3.45	-	-	-	-	-	0.114 U	-
	8832-150528-025	26 - 28	-	28-May-15	-	**13.2**	-	**1.36**	11.1	2.18 J	-	-	**45.5**	-	-	-	-	-	0.128 U	-
Hahn and Associates, Inc. - Soil Samples (February 2016)																				
SB-015	8832-160224-053	0.5 - 2.5	-	24-Feb-16	-	-	-	-	-	-	-	-	287	-	-	-	-	-	-	-
	8832-160224-054	6.0 - 8.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**139**	-	-	-	-	-	-	-
	8832-160224-055	13 - 14	-	24-Feb-16	-	-	-	-	-	-	-	-	10.3	-	-	-	-	-	-	-
SB-016	8832-160224-056	0.0 - 1.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**32.4**	-	-	-	-	-	-	-
	8832-160224-060	1.0 - 3.0	-	24-Feb-16	-	-	-	-	-	-	-	-	2.66	-	-	-	-	-	-	-
	8832-160224-057	5.0 - 7.0	-	24-Feb-16	-	-	-	-	-	-	-	-	7.21	-	-	-	-	-	-	-
	8832-160224-058	10 - 12	-	24-Feb-16	-	-	-	-	-	-	-	-	3.91	-	-	-	-	-	-	-
SB-017	8832-160223-019	1.0 - 2.3	-	23-Feb-16	-	-	-	-	-	-	-	-	**30.4**	-	-	-	-	-	-	-
	8832-160223-020	5.0 - 7.0	-	23-Feb-16	-	-	-	-	-	-	-	-	2.56	-	-	-	-	-	-	-
	8832-160223-021	10 - 12	-	23-Feb-16	-	-	-	-	-	-	-	-	5.11	-	-	-	-	-	-	-
SB-018	8832-160224-048	0.0 - 1.0	-	24-Feb-16	-	-	-	-	-	-	-	-	8.13	-	-	-	-	-	-	-
	8832-160224-049	1.0 - 3.2	-	24-Feb-16	-	-	-	-	-	-	-	-	11.2	-	-	-	-	-	-	-
	8832-160224-050	6.0 - 8.0	-	24-Feb-16	-	-	-	-	-	-	-	-	467	-	-	-	-	-	-	-
	8832-160224-051	13 - 14	-	24-Feb-16	-	-	-	-	-	-	-	-	10.6	-	-	-	-	-	-	-
	8832-160224-052	15.5 - 17.5	-	24-Feb-16	-	-	-	-	-	-	-	-	11.3	-	-	-	-	-	-	-
SB-019	8832-160224-044	0.0 - 2.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**22**	-	-	-	-	-	-	-
	8832-160224-047	6.0 - 8.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**61.6**	-	-	-	-	-	-	-
	8832-160224-045	13 - 14.5	-	24-Feb-16	-	-	-	-	-	-	-	-	9.59	-	-	-	-	-	-	-
	8832-160224-046	18 - 19.5	-	24-Feb-16	-	-	-	-	-	-	-	-	7.89	-	-	-	-	-	-	-

Table 3 - Summary of Soil Testing Results: Metals

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Total Metals																
					EPA Method 6020																
					Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent) [4]	Chromium (Trivalent) [5]	Copper	Lead	TCLP Lead (mg/L) [6]	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Screening Levels				WA Background [1] =>	**5**	**7**	**2**	**1**	**42**			**36**	**17**		**0.07**	**38**	**0.78**	**0.61**		**86**
				WA Method A Cleanup for Industrial Properties => [2]		**20**		**2**		**19**	**2,000**		**1,000**		**2**					
				WA Method A Cleanup for Unrestricted Land Use => [2]		**20**		**2**		**19**	**2,000**		**250**		**2**					
				WA Method B Soil Cancer => [3]		**0.667**														
				WA Method B Soil Non Cancer => [3]	**32**	**24**	**160**	**80**		**240**	**120,000**	**3,200**				**1,600**	**400**	**400**	**0.8**	**24,000**
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**															
Hahn and Associates, Inc. - Soil Samples (February 2016) (continued)																				
SB-020	8832-160223-022	0.0 - 1.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**98.3**	-	-	-	-	-	-	-
	8832-160223-023	1.0 - 2.5	-	23-Feb-16	-	-	-	-	-	-	-	-	**71.1**	-	-	-	-	-	-	-
	8832-160223-024	5.0 - 6.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**56.5**	-	-	-	-	-	-	-
	8832-160223-025	6.0 - 7.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**50.7**	-	-	-	-	-	-	-
	8832-160224-059	13 - 15		24-Feb-16	-	-	-	-	-	-	-	-	13.3	-	-	-	-	-	-	-
	8832-160223-026	18 - 19.5		23-Feb-16	-	-	-	-	-	-	-	-	8.3	-	-	-	-	-	-	-
SB-021	8832-160224-039	0.0 - 2.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**22.4**	-	-	-	-	-	-	-
	8832-160224-040	2.0 - 3.7	-	24-Feb-16	-	-	-	-	-	-	-	-	**54.4**	-	-	-	-	-	-	-
	8832-160224-041	6.0 - 8.0	-	24-Feb-16	-	-	-	-	-	-	-	-	8.63	-	-	-	-	-	-	-
	8832-160224-042	13 - 14	-	24-Feb-16	-	-	-	-	-	-	-	-	9.74	-	-	-	-	-	-	-
	8832-160224-043	18 - 20	-	24-Feb-16	-	-	-	-	-	-	-	-	**48.8**	-	-	-	-	-	-	-
SB-022	8832-160224-033	0.0 - 2.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**35.7**	-	-	-	-	-	-	-
	8832-160224-034	2.0 - 3.5	-	24-Feb-16	-	-	-	-	-	-	-	-	308	-	-	-	-	-	-	-
	8832-160224-035	5.0 - 7.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**227**	-	-	-	-	-	-	-
	8832-160224-036	8.0 - 9.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**35.2**	-	-	-	-	-	-	-
	8832-160224-037	13 - 14.5	-	24-Feb-16	-	-	-	-	-	-	-	-	11.9	-	-	-	-	-	-	-
	8832-160224-038	18 - 19	-	24-Feb-16	-	-	-	-	-	-	-	-	8.2	-	-	-	-	-	-	-
SB-023	8832-160224-027	0.0 - 1.2	-	24-Feb-16	-	-	-	-	-	-	-	-	**129**	-	-	-	-	-	-	-
	8832-160224-028	5.0 - 6.0	-	24-Feb-16	-	-	-	-	-	-	-	-	**41.9**	-	-	-	-	-	-	-
	8832-160224-032	8.0 - 10	-	24-Feb-16	-	-	-	-	-	-	-	-	**59.9**	-	-	-	-	-	-	-
	8832-160224-029	10 - 11.7	-	24-Feb-16	-	-	-	-	-	-	-	-	**90.2**	-	-	-	-	-	-	-
	8832-160224-030	13 - 15	-	24-Feb-16	-	-	-	-	-	-	-	-	10.9	-	-	-	-	-	-	-
	8832-160224-031	18 - 20	-	24-Feb-16	-	-	-	-	-	-	-	-	8.46	-	-	-	-	-	-	-
SB-024	8832-160223-015	1.0 - 3.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**240**	0.392	-	-	-	-	-	-
	8832-160223-018	3.0 - 4.0		23-Feb-16	-	-	-	-	-	-	-	-	14.2	-	-	-	-	-	-	-
	8832-160223-016	6.0 - 7.0	-	23-Feb-16	-	-	-	-	-	-	-	-	6.22	-	-	-	-	-	-	-
	8832-160223-017	10 - 12	-	23-Feb-16	-	-	-	-	-	-	-	-	**17.9**	-	-	-	-	-	-	-
SB-025	8832-160223-004	1.0 - 3.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**28.5**	-	-	-	-	-	-	-
	8832-160223-005	3.0 - 3.7	-	23-Feb-16	-	-	-	-	-	-	-	-	2.35	-	-	-	-	-	-	-
	8832-160223-006	6.0 - 7.7	-	23-Feb-16	-	-	-	-	-	-	-	-	3.69	-	-	-	-	-	-	-
	8832-160223-007	10 - 12	-	23-Feb-16	-	-	-	-	-	-	-	-	4.19	-	-	-	-	-	-	-

Table 3 - Summary of Soil Testing Results: Metals

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

					Total Metals															
					EPA Method 6020															
					Antimony	Arsenic	Beryllium	Cadmium	Chromium (III+VI)	Chromium (hexavalent) [4]	Chromium (Trivalent) [5]	Copper	Lead	TCLP Lead (mg/L) [6]	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Screening Levels			WA Background [1] =>	**5**	**7**	**2**	**1**	**42**			**36**	**17**		**0.07**	**38**	**0.78**	**0.61**		**86**
			WA Method A Cleanup for Industrial Properties => [2]		**20**		**2**		**19**	**2,000**		**1,000**		**2**					
			WA Method A Cleanup for Unrestricted Land Use => [2]		**20**		**2**		**19**	**2,000**		**250**		**2**					
			WA Method B Soil Cancer => [3]		**0.667**														
			WA Method B Soil Non Cancer => [3]	**32**	**24**	**160**	**80**		**240**	**120,000**	**3,200**				**1,600**	**400**	**400**	**0.8**	**24,000**
Boring Location	**Sample Number**	**Sample Depth (feet bgs)**	**Grab Sample Depth (feet bgs)**	**Sample Date**	**Analytical Results (mg/kg)**															
Hahn and Associates, Inc. - Soil Samples (February 2016) (continued)																				
SB-026	8832-160223-008	1.0 - 3.0	-	23-Feb-16	-	-	-	-	-	-	-	-	14.1	-	-	-	-	-	-	-
	8832-160223-009	3.0 - 4.6		23-Feb-16	-	-	-	-	-	-	-	-	9.66	-	-	-	-	-	-	-
	8832-160223-010	6.0 - 7.5	-	23-Feb-16	-	-	-	-	-	-	-	-	980	0.05 U	-	-	-	-	-	-
	8832-160223-011	10 - 13	-	23-Feb-16	-	-	-	-	-	-	-	-	**23**	-	-	-	-	-	-	-
SB-027	8832-160223-001	1.0 - 3.0	-	23-Feb-16	-	-	-	-	-	-	-	-	2.63	-	-	-	-	-	-	-
	8832-160223-002	6.0 - 8.0	-	23-Feb-16	-	-	-	-	-	-	-	-	3.62	-	-	-	-	-	-	-
	8832-160223-003	10 - 12	-	23-Feb-16	-	-	-	-	-	-	-	-	4.72	-	-	-	-	-	-	-
SB-028	8832-160223-012	1.0 - 3.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**142**	-	-	-	-	-	-	-
	8832-160223-013	5.0 - 6.0	-	23-Feb-16	-	-	-	-	-	-	-	-	**136**	-	-	-	-	-	-	-
	8832-160223-014	10 - 11	-	23-Feb-16	-	-	-	-	-	-	-	-	471	1.21	-	-	-	-	-	-

Notes:
bgs = below ground surface
bold = detected at a concentration higher than default Washington State background levels
Color = denotes concentrations exceeding background and Method A MTCA Cleanup Value for Unrestricted Land Use
EPA = Environmental Protection Agency

J = estimated concentration
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
TCLP = Toxicity Characteristic Leaching Procedure (EPA 1311)
U = not detected above posted concentration

1 = Natural Background Soil Metals Concentrations in Washington State, October 1994
2 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
3 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
4 = Hexavalent chromium testing by EPA Method 7196A
5 = Trivalent chromium concentration based on calculation between total and hexavalent chromium
6 = TCLP lead screening level value is 5.0 mg/L
7 = Values posted are total (3.61) and TCLP (0.0025 U). TCLP units are mg/L. TCLP mercury hazardous waste screening level value is 0.2 mg/L.

Table 4 - Summary of Soil Testing Results: Volatile Organic Compounds (VOCs)

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

			Boring Location =>	SB-006A	SB-011	SB-012	SB-013	SB-014	MW-1-37	MW-2-40	MW-3-35	MW-4-34	MW-5-34
			Sample Date =>	27-May-15	8-Jun-15	9-Jun-15	27-May-15	27-May-15	28-May-15	5-Jun-15	5-Jun-15	9-Jun-15	28-May-15
			Sample Depth (feet bgs) =>	0.5 - 2.5	1.5 - 3.5	1.5 - 3.5	2.0 - 2.5	1.0 - 2.0	0.5 - 1.5	0.2 - 1.2	2.0 - 4.0	1.5 - 3.5	4.0 - 5.0
			Grab Sample Depth (feet bgs) =>	1.5	2.0	2.0	1.5	2.0	0.5	0.5	2.0	2.0	4.0
			Sample Number =>	8832-150527-007	8832-150608-054	8832-150609-067	8832-150527-014	8832-150527-001	8832-150528-026	8832-150605-046	8832-150605-040	8832-150609-060	8832-150528-020
	WA Method A Cleanup for Industrial Properties [1]	WA Method A Cleanup for Unrestricted Land Use [1]	WA Method B Soil Cancer [2]	WA Method B Soil Non Cancer [2]	Analytical Testing Results (mg/kg)									
Volatile Organic Compounds (VOCs) by EPA 8260B														
1,1,1,2-tetrachloroethane			38.5	2,400	0.0358 U	0.0143 U	0.163 U	0.0353 U	0.0297 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1,1-trichloroethane	2	2		160,000	0.0358 U	0.0143 U	0.163 U	0.0353 U	0.0297 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1,2,2-tetrachloroethane			5	1,600	0.0179 U	0.0143 U	0.783 UJ	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1,2-trichloroethane			17.5	320	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1-dichloroethane			175	16,000	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1-dichloroethene				4,000	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,1-dichloropropene					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
1,2,3-trichlorobenzene					0.179 U	0.143 U	1.63 U	0.177 U	0.148 U	0.201 U	0.151 U	0.166 U	0.121 UJ	0.165 U
1,2,3-trichloropropane			0.0333	320	0.0358 U	0.0285 U	0.653 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
1,2,4-trichlorobenzene			34.5	800	0.179 U	0.143 U	1.63 U	0.177 U	0.148 U	0.201 U	0.151 U	0.166 U	0.121 UJ	0.165 U
1,2,4-trimethylbenzene					0.0358 U	0.0285 U	**67.2**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
1,2-dibromo-3-chloropropane			1.25	16	0.179 U	0.143 U	1.63 U	0.177 U	0.148 U	0.201 U	0.151 U	0.166 U	0.121 UJ	0.165 U
1,2-dibromoethane	0.005	0.005	0.5	720	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,2-dichlorobenzene				7,200	0.0179 U	0.0143 U	0.653 UJ	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,2-dichloroethane			11	480	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,2-dichloropropane			27.8	7,200	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,3,5-trimethylbenzene				800	0.0358 U	0.0285 U	**9.99**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
1,3-dichlorobenzene					0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
1,3-dichloropropane					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
1,4-dichlorobenzene			185	5,600	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
2,2-dichloropropane					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Methyl Ethyl Ketone				48,000	0.358 U	0.285 U	3.26 U	0.353 U	0.297 U	0.402 U	0.301 U	0.332 U	0.0121 UJ	0.331 U
2-chlorotoluene				1,600	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
2-hexanone (MBK)					0.358 U	0.285 U	3.26 U	0.353 U	0.297 U	0.402 U	0.301 U	0.332 U	0.0121 UJ	0.331 U
4-chlorotoluene					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Acetone				72,000	0.716 U	0.57 U	6.53 U	0.706 U	0.594 U	0.804 U	0.602 U	0.664 U	0.0121 UJ	0.661 U
Benzene	0.03	0.03	18.2	320	0.00895 U	0.00713 U	0.0816 U	0.00883 U	0.00742 U	0.0101 U	0.00753 U	0.0083 U	0.0121 UJ	0.00827 U
Bromobenzene					0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Bromochloromethane					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Bromodichloromethane			16.1	1,600	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Bromoform			127	1,600	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Bromomethane				112	0.716 U	0.57 U	6.53 U	0.706 U	0.594 U	0.804 U	0.602 U	0.664 U	0.0121 UJ	0.661 U
Carbon tetrachloride			14.3	320	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Chlorobenzene				1,600	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Chlorodibromomethane			11.9	1,600	0.0716 U	0.057 U	0.653 U	0.0706 U	0.0594 U	0.0804 U	0.0602 U	0.0664 U	0.0121 UJ	0.0661 U
Chloroethane					0.358 U	0.285 U	3.26 U	0.353 U	0.297 U	0.402 U	0.301 U	0.332 U	0.0121 UJ	0.331 U
Chloroform			32.3	800	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Chloromethane					0.179 U	0.143 U	1.63 U	0.177 U	0.148 U	0.201 U	0.151 U	0.166 U	0.0121 UJ	0.165 U
cis-1,2-dichloroethene				160	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
cis-1,3-dichloropropene					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Dibromomethane				800	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Dichlorodifluoromethane				16,000	0.0716 U	0.057 U	0.653 U	0.0706 U	0.0594 U	0.0804 U	0.0602 U	0.0664 U	0.0121 UJ	0.0661 U
Dichloromethane	0.02	0.02	500	480	0.179 U	0.143 U	1.63 U	0.177 U	0.148 U	0.201 U	0.151 U	0.166 U	0.0121 UJ	0.165 U
Ethylbenzene	6	6		8,000	0.0179 U	0.0143 U	**2.78**	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Hexachlorobutadiene			12.8	80	0.0716 U	0.057 U	0.653 U	0.0706 U	0.0594 U	0.0804 U	0.0602 U	0.0664 U	0.0121 UJ	0.0661 U
Isopropylbenzene				8,000	0.0358 U	0.0285 U	**3.41**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
MTBE	0.1	0.1	556		0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
4-Methyl-2-pentanol					0.358 U	0.285 U	3.26 U	0.353 U	0.297 U	0.402 U	0.301 U	0.332 U	0.0121 UJ	0.331 U
Naphthalene	5	5		1,600	0.0716 U	0.057 U	200	0.0706 U	0.0594 U	0.0804 U	0.0602 U	0.0664 U	0.0121 UJ	0.0661 U
n-butylbenzene				4,000	0.0358 U	0.0285 U	**3.49 J**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U

Notes:

bgs = below ground surface
bold = detected concentration
Color = concentrations exceeding one or more cleanup levels
EPA = Environmental Protection Agency

J = estimated concentration
mg/kg = milligrams per kilogram
U = not detected above posted concentration
VOCs = volatile organic compounds

1 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

Table 4 - Summary of Soil Testing Results: Volatile Organic Compounds (VOCs)

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

				Boring Location =>	SB-006A	SB-011	SB-012	SB-013	SB-014	MW-1-37	MW-2-40	MW-3-35	MW-4-34	MW-5-34
				Sample Date =>	27-May-15	8-Jun-15	9-Jun-15	27-May-15	27-May-15	28-May-15	5-Jun-15	5-Jun-15	9-Jun-15	28-May-15
				Sample Depth (feet bgs) =>	0.5 - 2.5	1.5 - 3.5	1.5 - 3.5	2.0 - 2.5	1.0 - 2.0	0.5 - 1.5	0.2 - 1.2	2.0 - 4.0	1.5 - 3.5	4.0 - 5.0
				Grab Sample Depth (feet bgs) =>	1.5	2.0	2.0	1.5	2.0	0.5	0.5	2.0	2.0	4.0
				Sample Number =>	8832-150527-007	8832-150608-054	8832-150609-067	8832-150527-014	8832-150527-001	8832-150528-026	8832-150605-046	8832-150605-040	8832-150609-060	8832-150528-020
	WA Method A Cleanup for Industrial Properties [1]	WA Method A Cleanup for Unrestricted Land Use [1]	WA Method B Soil Cancer [2]	WA Method B Soil Non Cancer [2]	Analytical Testing Results (mg/kg)									
Volatile Organic Compounds (VOCs) by EPA 8260B (continued)														
n-propylbenzene				8,000	0.0179 U	0.0143 U	**2.47**	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
p-isopropyltoluene					0.0358 U	0.0285 U	**6.37 J**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
sec-butylbenzene				8,000	0.0358 U	0.0285 U	**1.36**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Styrene				16,000	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0121 UJ	0.0331 U
Trichloroethene	0.03	0.03	12	40	0.0179 U	0.0143 U	**0.163 U**	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
tert-butylbenzene				8,000	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
Tetrachloroethene	0.05	0.05	476	480	0.0179 U	0.0143 U	**0.163 U**	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Toluene	7	7		6,400	0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
trans-1,2-dichloroethene				1,600	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
trans-1,3-dichloropropene					0.0358 U	0.0285 U	0.326 U	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
Trichlorofluoromethane (Freon 11)				24,000	0.0716 U	0.057 U	0.653 U	0.0706 U	0.0594 U	0.0804 U	0.0602 U	0.0664 U	0.0485 UJ	0.0661 U
Vinyl chloride				240	0.0179 U	0.0143 U	0.163 U	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Xylene (m & p)					0.0358 U	0.0285 U	**0.973**	0.0353 U	0.0297 U	0.0402 U	0.0301 U	0.0332 U	0.0243 UJ	0.0331 U
Xylene (o)				16,000	0.0179 U	0.0143 U	**7.37**	0.0177 U	0.0148 U	0.0201 U	0.0151 U	0.0166 U	0.0121 UJ	0.0165 U
Xylene Total	9	9		16,000	0.0537 U	0.31166 U	**8.343**	0.053 U	0.0445 U	0.0603 U	0.20276 U	0.1089 U	0.0364 U	0.0496 U

Notes:

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Table 5 - Summary of Groundwater Testing Results: Metals, Polynuclear Aromatic Hydrocarbons, Total Petroleum Hydrocarbons, and Volatile Organic Compounds

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

								E & E (2008 Sample)	HAI (2015 and 2016 Samples)							
							Well Location =>	SB03 [4]	MW-1-37			MW-2-40		MW-3-35		
							Screen Interval (feet bgs) =>	24 - 29	27 - 37			30 - 40		25 - 35		
							Sample Number =>	GW003 (24 - 29)	8832-150616-102	8832-150616-103 (DUP)	8832-160210-105	8832-150617-107	8832-160210-104	8832-150616-100	8832-160209-102	8832-160209-103 (DUP)
							Sample Date =>	25-Nov-08	16-Jun-15	16-Jun-15	10-Feb-16	17-Jun-15	10-Feb-16	16-Jun-15	9-Feb-16	9-Feb-16
	WA Method A Cleanup for Groundwater [1]	Benzene (Non Detect) [1]	WA Method B Ground Water Cancer [2]	WA Method B Ground Water Non Cancer [2]	WDOE Vapor Intrusion Screening Level Cancer [3]	WDOE Vapor Intrusion Screening Level Non Cancer [3]	Units	Analytical Results								
Total and Dissolved Metals by EPA Method 6020																
Antimony				6.4			µg/L	U	0.5 U	-	1 U	**0.989 J**	1 U	0.5 U	1 U	1 U
Arsenic	5		0.0583	4.8			µg/L	3.6	3.48	-	3.76	14	2.19	4.53	6.56	6.44
Arsenic (filtered)	5		0.0583	4.8			µg/L	-	-	-	-	1.22	-	-	-	4.07
Beryllium				32			µg/L	U	0.1 U	-	0.2 U	**1.01**	0.2 U	0.1 U	0.2 U	0.2 U
Cadmium	5			8			µg/L	U	0.04 U	-	0.2 U	**0.689**	0.2 U	**0.1 J**	0.2 U	0.2 U
Chromium (VI)				48			µg/L	-	5 H UJ	-	5 U	**7**	5 U	5 H UJ	5 U	**0.0061**
Chromium (III+VI)	50						µg/L	**20.5**	0.5 U	-	1 U	319	1 U	0.5 U	1 U	1 U
Chromium (III+VI) (filtered)	50						µg/L	-	-	-	-	0.5 U	-	-	-	-
Copper				320			µg/L	**32.2**	**0.589 J**	-	1 U	**140**	**4.26**	**1.71 J**	**1.49**	**1.89**
Lead	15						µg/L	**7.36**	**0.1 J**	-	0.2 U	34.4	**0.211**	**0.267**	**0.211**	**0.211**
Lead (filtered)	15						µg/L	-	-	-	-	0.1 U	-	-	-	-
Mercury	2					0.89	µg/L	U	0.04 U	-	0.08 U	**0.0831**	0.08 U	0.04 U	0.08 U	0.08 U
Nickel				320			µg/L	13	**0.778 J**	-	1 U	**52**	**3.21**	**8.91**	**7.51**	**7.84**
Selenium				80			µg/L	U	**0.667 J**	-	1 U	**2.01**	1 U	**0.978 J**	1 U	1 U
Silver				80			µg/L	U	0.1 U	-	0.2 U	**0.233**	0.2 U	0.1 U	0.2 U	0.2 U
Thallium				0.16			µg/L	U	0.1 U	-	0.2 U	0.233	0.2 U	0.1 U	**0.2 U**	**0.2 U**
Zinc				4,800			µg/L	**76.1**	2 U	-	4 U	**103**	4 U	**12.7**	**33.5**	**33.5**
Polyaromatic Hydrocarbons (PAHs) by EPA Method 8270D																
1-Methylnaphthalene			1.51	560			µg/L	U	0.0415 U	-	0.0860 U	0.0392 U	0.182 U	26.1	68.9	70.7
2-Methylnaphthalene				32			µg/L	U	0.0415 U	-	0.0860 U	0.0392 U	0.182 U	49.9 J	94.5	94.3
Acenaphthene				960			µg/L	U	0.0166 U	-	0.0430 U	0.0313 U	0.0909 U	**85.8**	**223**	**226**
Acenaphthylene							µg/L	U	0.0166 U	-	0.0430 U	0.0157 U	0.0909 U	**5.15**	**3.60**	**3.79**
Anthracene				4,800			µg/L	U	0.0166 U	-	0.0430 U	0.0157 U	0.0909 U	**0.866**	**2.46**	**2.24**
Benz(a)anthracene			0.12				µg/L	U	0.0166 U	-	0.0430 U	**0.0192 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Benzo(a) pyrene	0.1		0.012				µg/L	U	0.0166 U	-	0.0430 U	**0.0282 J**	0.0909 U	0.333 U	1.63 U	1.34 U
Benzo(b)fluoranthene			0.12				µg/L	U	0.0166 U	-	0.0430 U	**0.0305 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Benzo(g,h,i)perylene							µg/L	U	0.0166 U	-	0.0430 U	**0.0219 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Benzo(k)fluoranthene			1.2				µg/L	U	0.0166 U	-	0.0430 U	**0.0168 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Chrysene			12				µg/L	U	0.0166 U	-	0.0430 U	**0.0258 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Dibenz(a,h)anthracene			0.012				µg/L	U	0.0166 U	-	0.0430 U	0.0157 U	0.0909 U	0.333 U	1.63 U	1.34 U
Dibenzofuran				16			µg/L	U	0.0166 U	-	0.0430 U	0.0157 U	0.0909 U	34.8 J	75.1	75.5
Fluoranthene				640			µg/L	U	0.0166 U	-	0.0430 U	**0.036**	**0.0995**	**2.71**	**10.5**	**10.8**
Fluorene				640			µg/L	U	0.0166 U	-	0.0430 U	**0.0313**	**0.0909 U**	**30.4**	**58.5**	**59.3**
Indeno(1,2,3-c,d)pyrene			0.12				µg/L	U	0.0166 U	-	0.0430 U	**0.0192 J**	**0.0909 U**	0.333 U	1.63 U	1.34 U
Naphthalene	160			160	8.93	167	µg/L	U	**0.0627 J**	-	0.0860 U	**0.286**	**0.182 U**	149	464	426
Phenanthrene							µg/L	U	0.0415 U	-	0.0430 U	**0.0431 J**	**0.0909 U**	**33.2**	**79.2**	**80.0**
Pyrene				480			µg/L	U	0.0166 U	-	0.0430 U	**0.0392**	**0.0988**	**1.28**	**5.62**	**5.88**
Total Carcinogenic PAH TEF Value [6]	0.1						µg/L	U	**0.00001**	-	**0.000030315**	**0.00002**	**6.40845E-05**	**0.0002**	**0.00114915**	**0.0009447**
Total Petroleum Hydrocarbons by NWTPH-Dx and NWTPH-Gx																
Diesel Range Organics	500						µg/L	U	105 U	102 U	196 U	**140 J**	196 U	795 F-13	858 F-17	693 F-17
Oil Range Organics	500						µg/L	U	211 U	204 U	392 U	194 U	392 U	213 U	435 U	430 U
Gasoline Range Organics		1,000					µg/L	U	50 U	-	100 U	50 U	100 U	1,360 F-13	1,300 F-13	1,340 F-13
Volatile Organic Compounds (VOCs) by EPA Method 8260B																
1,1,1,2-tetrachloroethane			1.68	240	7.4		µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1,1-trichloroethane	200			16,000		5,240	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1,2,2-tetrachloroethane			0.219	160	6.2		µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1,2-trichloroethane			0.768	32	7.71	4.51	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1-dichloroethane			7.68	1,600	11.2		µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1-dichloroethene				400		130	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,1-dichloropropene							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U
1,2,3-trichlorobenzene							µg/L	U	1 U	-	2 U	1 U	2 U	1 U	2 U	2 U
1,2,3-trichloropropane			0.00146	32			µg/L	U	0.5 U	-	1 U	0.5 U	2 U	0.5 U	1 U	1 U
1,2,4-trichlorobenzene			1.51	80		39.2	µg/L	U	1 U	-	2 U	1 U	2 U	1 U	2 U	2 U
1,2,4-trimethylbenzene						28.4	µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U
1,2-dibromo-3-chloropropane			0.0547	1.6			µg/L	U	2.5 U	-	5 U	2.5 U	5 U	2.5 U	5 U	5 U
1,2-dibromoethane	0.01		0.0219	72			µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,2-dichlorobenzene				720		2,570	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,2-dichloroethane	5		0.481	48	4.2	140	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,2-dichloropropane			1.22	720	3.89	28.4	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,3,5-trimethylbenzene				80			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U
1,3-dichlorobenzene							µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
1,3-dichloropropane							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U
1,4-dichlorobenzene			8.1	560	4.85	7,810	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U
2,2-dichloropropane							µg/L	U	0.5 U	-	1 U	0.5 U	-	0.5 U	1 U	1 U
Methyl Ethyl Ketone				4,800		1,740,000	µg/L	U	5 U	-	-	5 U	-	5 U	-	-

Table 5 - Summary of Groundwater Testing Results: Metals, Polynuclear Aromatic Hydrocarbons, Total Petroleum Hydrocarbons, and Volatile Organic Compounds

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

								E & E (2008 Sample)	HAI (2015 and 2016 Samples)								
							Well Location =>	SB03 [4]	MW-1-37			MW-2-40			MW-3-35		
							Screen Interval (feet bgs) =>	24 - 29	27 - 37			30 - 40			25 - 35		
							Sample Number =>	GW003 (24 - 29)	8832-150616-102	8832-150616-103 (DUP)	8832-160210-105	8832-150617-107	8832-160210-104	8832-150616-100	8832-160209-102	8832-160209-103 (DUP)
							Sample Date =>	25-Nov-08	16-Jun-15	16-Jun-15	10-Feb-16	17-Jun-15	10-Feb-16	16-Jun-15	9-Feb-16	9-Feb-16
	WA Method A Cleanup for Groundwater [1]	Benzene (Non Detect) [1]	WA Method B Ground Water Cancer [2]	WA Method B Ground Water Non Cancer [2]	WDOE Vapor Intrusion Screening Level Cancer [3]	WDOE Vapor Intrusion Screening Level Non Cancer [3]	Units	Analytical Results									
Volatile Organic Compounds (VOCs) by EPA Method 8260B																	
2-chlorotoluene				160			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
2-hexanone (MBK)							µg/L	U	5 U	-	10 U	5 U	10 U	5 U	10 U	10 U	
4-chlorotoluene							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Acetone				7,200			µg/L	U	10 U	-	20 U	**21**	**48.4**	10 U	20 U	20 U	
Benzene	5		0.795	32	2.4	103	µg/L	U	0.125 U	-	0.2 U	0.125 U	0.2 U	0.125 U	0.2 U	0.2 U	
Bromobenzene							µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Bromochloromethane							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Bromodichloromethane			0.706	160	1.84		µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Bromoform			5.54	160	200		µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Bromomethane				11.2		13	µg/L	U	5 UJ	-	5 U	5 UJ	5 U	5 UJ	5 U	5 U	
Carbon tetrachloride			0.625	32	0.539	59.2	µg/L	U	0.25 U	-	1 U	0.25 U	1 U	0.25 U	1 U	1 U	
Chlorobenzene				160		286	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Chlorodibromomethane			0.521	160	1.84		µg/L	U	0.5 U	-	-	0.5 U	-	0.5 U	-	-	
Chloroethane							µg/L	U	5 UJ	-	5 U	5 UJ	5 U	5 UJ	5 U	5 U	
Chloroform			1.41	80	1.2	495	µg/L	U	0.5 U	-	1 U	**0.88 J**	**1 U**	0.5 U	1 U	1 U	
Chloromethane						153	µg/L	U	2.5 U	-	5 U	2.5 U	5 U	2.5 U	5 U	5 U	
cis-1,2-dichloroethene				16			µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
cis-1,3-dichloropropene							µg/L	U	0.5 U	-	1 U	0.5 U	2 U	0.5 U	1 U	1 U	
Dibromomethane				80			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Dichlorodifluoromethane				1,600		5.66	µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Dichloromethane	5		21.9	48			µg/L	U	2.5 U	-	-	2.5 U	-	2.5 U	-	-	
Ethylbenzene	700			800		2,780	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Hexachlorobutadiene			0.561	8	0.81		µg/L	U	2.5 U	-	5 U	2.5 U	5 U	2.5 U	5 U	5 U	
Isopropylbenzene				800			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
MTBE	20		24.3		610	87,000	µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
4-Methyl-2-pentanol							µg/L	U	5 U	-	10 U	5 U	10 U	5 U	10 U	10 U	
Naphthalene	160			160	8.93	167	µg/L	U	1 U	-	2 U	1 U	2 U	**227**	**385**	**271**	
n-butylbenzene				400			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
n-propylbenzene				800			µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
p-isopropyltoluene							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
sec-butylbenzene				800			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Styrene				1,600		8,100	µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Trichloroethene	5		0.54	4	1.55	3.84	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
tert-butylbenzene				800			µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Tetrachloroethene	5		20.8	48	22.9	43.5	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Toluene	1,000			640		15,600	µg/L	1.44	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
trans-1,2-dichloroethene				160			µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
trans-1,3-dichloropropene							µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Trichlorofluoromethane				2,400		120	µg/L	U	1 U	-	2 U	1 U	2 U	1 U	2 U	2 U	
Vinyl chloride	0.2			24	0.347	56.7	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Xylene (m & p)						310	µg/L	U	0.5 U	-	1 U	0.5 U	1 U	0.5 U	1 U	1 U	
Xylene (o)				1,600		440	µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	
Xylene Total	1,000			1,600			µg/L	U	0.25 U	-	0.5 U	0.25 U	0.5 U	0.25 U	0.5 U	0.5 U	

Table 5 - Summary of Groundwater Testing Results: Metals, Polynuclear Aromatic Hydrocarbons, Total Petroleum Hydrocarbons, and Volatile Organic Compounds

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

								HAI (2015 and 2016 Samples)					
							Well Location =>	MW-4-34		MW-5-34		Equipment Blank [5]	Trip Blank
							Screen Interval (feet bgs) =>	24 - 34		24 - 34		-	-
							Sample Number =>	8832-150616-101	8832-160209-101	8832-150617-104	8832-160209-100	8832-150617-105	8832-160209-
							Sample Date =>	16-Jun-15	9-Feb-16	17-Jun-15	9-Feb-16	17-Jun-15	9-Feb-16
	WA Method A Cleanup for Groundwater [1]	Benzene (Non Detect) [1]	WA Method B Ground Water Cancer [2]	WA Method B Ground Water Non Cancer [2]	WDOE Vapor Intrusion Screening Level Cancer [3]	WDOE Vapor Intrusion Screening Level Non Cancer [3]	Units	Analytical Results					
Total and Dissolved Metals by EPA Method 6020													
Antimony				6.4			µg/L	0.5 U	1 U	0.5 U	1 U	-	-
Arsenic	5		0.0583	4.8			µg/L	**5.38**	**10.8**	**5.5**	**6.14**	-	-
Arsenic (filtered)	5		0.0583	4.8			µg/L	4.88	**9.87**	4.59	**5.89**	-	-
Beryllium				32			µg/L	0.1 U	0.2 U	0.1 U	0.2 U	-	-
Cadmium	5			8			µg/L	0.04 U	0.2 U	**0.189 J**	0.2 U	-	-
Chromium (VI)				48			µg/L	5 H UJ	5 U	5 U	5 U	-	-
Chromium (III+VI)	50						µg/L	**0.856 J**	1 U	**2.31**	**1.49**	-	-
Chromium (III+VI) (filtered)	50						µg/L	-	-	-	-	-	-
Copper				320			µg/L	**2.03**	1 U	**4.98**	**2.37**	-	-
Lead	15						µg/L	**1.52**	**0.211**	**4.92**	**0.644**	-	-
Lead (filtered)	15						µg/L	-	-	-	-	-	-
Mercury	2					0.89	µg/L	0.04 U	0.08 U	0.04 U	0.08 U	-	-
Nickel				320			µg/L	**3.91**	**2.08**	**10.9**	**1.8**	-	-
Selenium				80			µg/L	**0.678 J**	1 U	0.5 U	1 U	-	-
Silver				80			µg/L	0.1 U	0.2 U	0.1 U	0.2 U	-	-
Thallium				0.16			µg/L	0.1 U	0.2 U	0.1 U	0.2 U	-	-
Zinc				4,800			µg/L	**8.31**	4 U	**25.5**	**9.19**	-	-
Polyaromatic Hydrocarbons (PAHs) by EPA Method 8270D													
1-Methylnaphthalene			1.51	560			µg/L	0.0433 U	0.0850 U	0.04 U	0.0851 U	0.0395 U	0.0395 U
2-Methylnaphthalene				32			µg/L	0.0433 U	0.0850 U	0.04 U	0.0851 U	0.0395 U	0.0395 U
Acenaphthene				960			µg/L	**0.0242 J**	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Acenaphthylene							µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Anthracene				4,800			µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Benz(a)anthracene			0.12				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Benzo(a) pyrene	0.1		0.012				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Benzo(b)fluoranthene			0.12				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Benzo(g,h,i)perylene							µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Benzo(k)fluoranthene			1.2				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Chrysene			12				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Dibenz(a,h)anthracene			0.012				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Dibenzofuran				16			µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Fluoranthene				640			µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Fluorene				640			µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Indeno(1,2,3-c,d)pyrene			0.12				µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Naphthalene	160			160	8.93	167	µg/L	**0.152**	**0.133**	**0.169**	**0.283**	0.0395 U	0.0395 U
Phenanthrene							µg/L	0.0433 U	0.0850 U	0.04 U	0.0851 U	0.0395 U	0.0395 U
Pyrene				480			µg/L	0.0173 U	0.0340 U	0.016 U	0.0340 U	0.0158 U	0.0158 U
Total Carcinogenic PAH TEF Value [6]	0.1						µg/L	**2.08465E-05**	**0.00002115**	**0.00001**	**0.00002115**	**0.00001**	**0.00001**
Total Petroleum Hydrocarbons by NWTPH-Dx and NWTPH-Gx													
Diesel Range Organics	500						µg/L	**120 J**	211 U, F-13	110 U	213 U	100 U	100 U
Oil Range Organics	500						µg/L	211 U	421 U	220 U	426 U	200 U	200 U
Gasoline Range Organics		1,000					µg/L	50 U	100 U, F-13	50 U	100 U	-	-
Volatile Organic Compounds (VOCs) by EPA Method 8260B													
1,1,1,2-tetrachloroethane			1.68	240	7.4		µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,1,1-trichloroethane	200			16,000		5,240	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,1,2,2-tetrachloroethane			0.219	160	6.2		µg/L	0.25 U	0.5 U	0.25 U	1 U	-	0.5 U
1,1,2-trichloroethane			0.768	32	7.71	4.51	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,1-dichloroethane			7.68	1,600	11.2		µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,1-dichloroethene				400		130	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,1-dichloropropene							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
1,2,3-trichlorobenzene							µg/L	1 U	2 U	1 U	2 U	-	2 U
1,2,3-trichloropropane			0.00146	32			µg/L	0.5 U	1 U	0.5 U	2 U	-	1 U
1,2,4-trichlorobenzene			1.51	80		39.2	µg/L	1 U	2 U	1 U	2 U	-	2 U
1,2,4-trimethylbenzene						28.4	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
1,2-dibromo-3-chloropropane			0.0547	1.6			µg/L	2.5 U	5 U	2.5 U	5 U	-	5 U
1,2-dibromoethane	0.01		0.0219	72			µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,2-dichlorobenzene				720		2,570	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,2-dichloroethane	5		0.481	48	4.2	140	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,2-dichloropropane			1.22	720	3.89	28.4	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,3,5-trimethylbenzene				80			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
1,3-dichlorobenzene							µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
1,3-dichloropropane							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
1,4-dichlorobenzene			8.1	560	4.85	7,810	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
2,2-dichloropropane							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Methyl Ethyl Ketone				4,800		1,740,000	µg/L	5 U	-	5 U	-	-	-

Table 5 - Summary of Groundwater Testing Results: Metals, Polynuclear Aromatic Hydrocarbons, Total Petroleum Hydrocarbons, and Volatile Organic Compounds

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

								HAI (2015 and 2016 Samples)					
							Well Location =>	MW-4-34		MW-5-34		Equipment Blank [5]	Trip Blank
							Screen Interval (feet bgs) =>	24 - 34		24 - 34		-	-
							Sample Number =>	8832-150616-101	8832-160209-101	8832-150617-104	8832-160209-100	8832-150617-105	8832-160209-
							Sample Date =>	16-Jun-15	9-Feb-16	17-Jun-15	9-Feb-16	17-Jun-15	9-Feb-16
	WA Method A Cleanup for Groundwater [1]	Benzene (Non Detect) [1]	WA Method B Ground Water Cancer [2]	WA Method B Ground Water Non Cancer [2]	WDOE Vapor Intrusion Screening Level Cancer [3]	WDOE Vapor Intrusion Screening Level Non Cancer [3]	Units	Analytical Results					
Volatile Organic Compounds (VOCs) by EPA Method 8260B													
2-chlorotoluene				160			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
2-hexanone (MBK)							µg/L	5 U	10 U	5 U	10 U	-	10 U
4-chlorotoluene							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Acetone				7,200			µg/L	10 U	20 U	10 U	20 U	-	20 U
Benzene	5		0.795	32	2.4	103	µg/L	0.125 U	0.2 U	0.125 U	0.2 U	-	0.2 U
Bromobenzene							µg/L	0.25 U	0.5 U	0.25 U	0.5	-	0.5 U
Bromochloromethane							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Bromodichloromethane			0.706	160	1.84		µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Bromoform			5.54	160	200		µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Bromomethane				11.2		13	µg/L	5 UJ	5 U	5 UJ	5 U	-	5 U
Carbon tetrachloride			0.625	32	0.539	59.2	µg/L	0.25 U	1 U	0.25 U	1 U	-	1 U
Chlorobenzene				160		286	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
Chlorodibromomethane			0.521	160	1.84		µg/L	0.5 U	-	0.5 U	-	-	-
Chloroethane							µg/L	5 UJ	5 U	5 UJ	0.5 U	-	5 U
Chloroform			1.41	80	1.2	495	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Chloromethane						153	µg/L	2.5 U	5 U	2.5 U	5 U	-	5 U
cis-1,2-dichloroethene				16			µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
cis-1,3-dichloropropene							µg/L	0.5 U	1 U	0.5 U	2 U	-	1 U
Dibromomethane				80			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Dichlorodifluoromethane				1,600		5.66	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Dichloromethane	5		21.9	48			µg/L	2.5 U	-	2.5 U	1 U	-	-
Ethylbenzene	700			800		2,780	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
Hexachlorobutadiene			0.561	8	0.81		µg/L	2.5 U	5 U	2.5 U	5 U	-	5 U
Isopropylbenzene				800			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
MTBE	20		24.3		610	87,000	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
4-Methyl-2-pentanol							µg/L	5 U	10 U	5 U	10 U	-	10 U
Naphthalene	160			160	8.93	167	µg/L	1 U	2 U	1 U	2 U	-	2 U
n-butylbenzene				400			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
n-propylbenzene				800			µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
p-isopropyltoluene							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
sec-butylbenzene				800			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Styrene				1,600		8,100	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Trichloroethene	5		0.54	4	1.55	3.84	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
tert-butylbenzene				800			µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Tetrachloroethene	5		20.8	48	22.9	43.5	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
Toluene	1,000			640		15,600	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
trans-1,2-dichloroethene				160			µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
trans-1,3-dichloropropene							µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Trichlorofluoromethane				2,400		120	µg/L	1 U	2 U	1 U	2 U	-	2 U
Vinyl chloride	0.2			24	0.347	56.7	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
Xylene (m & p)						310	µg/L	0.5 U	1 U	0.5 U	1 U	-	1 U
Xylene (o)				1,600		440	µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U
Xylene Total	1,000			1,600			µg/L	0.25 U	0.5 U	0.25 U	0.5 U	-	0.5 U

Notes:

bgs = below ground surface
bold - detected concentration
Color = concentrations exceeding one or more cleanup levels.
EPA = Environmental Protection Agency
J - Estimated value
PAHs = polyaromatic hydrocarbons
TEF = Toxicity Equivalency Factor
U = Not detected
µg/L = micrograms per liter
VOCs = volatile organic compounds

1 = MTCA Cleanup Regulation, Method A Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
2 = MTCA Cleanup Regulation, Method B Cleanup Levels, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.
3 = Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Review Draft October 2009, updated April 6, 2015.
4 = Ecology and Environment, Inc. November 2008 temporary well point location.
5 = Equipment blank collected upon groundwater sample collection at the MW-5-34 well location, prior to sampling MW-4-34.
6 = TEF values calculated as described in WAC 173-340-708(8); When the individual PAH concentration was reported as non-detected, then the TEF was multiplied by half the Reporting Level.
F-13 = The chromatographic pattern does not resemble the fuel standard used for quantitation.
F-17 = No fuel pattern detected. The Diesel result represents carbon range C12 to C24, and the Oil result represents >C24 to C40.
H = Sample was analyzed outside of the recommended hold time.

Table 6 - Summary of Soil Gas Testing Results: Volatile Organic Compounds (VOCs)

Port of Vancouver, USA
Terminal 1 Property
Vancouver, WA

Boring Location =>	SG-1	SG-2
Sample Date =>	3-Mar-16	3-Mar-16
Sample Depth (feet bgs) =>	18.5 - 19.0	18.5 - 19.0
Sample Number =>	8832-160303-SG-1	8832-160303-SG-2
Deep Soil Gas Screening Level (ug/m^3) [1]	Analytical Testing Results (ug/m^3)	
Volatile Organic Compounds (VOCs) by EPA Method TO-15		
1,1-Dichloroethane	156	0.69 U	0.90 U
1,1-Dichloroethene	9,143	0.67 U	0.88 U
1,1,1-Trichloroethane	228,571	**1.6**	1.2 U
1,1,2-Trichloroethane	9	0.93 U	1.2 U
1,1,2,2-Tetrachloroethane	4	1.2 U	1.5 U
1,2-Dibromoethane (EDB)	NE	1.3 U	1.7 U
1,2-Dichlorobenzene	9,143	1.0 U	1.3 U
1,2-Dichloroethane	10	0.69 U	0.90 U
1,2-Dichloropropane	25	0.78 U	1.0 U
1,2,4-Trichlorobenzene	91	6.3 U	8.3 U
1,2,4-Trimethylbenzene	320	0.84 U	1.1 U
1,3-Butadiene	8	**2.3**	**7.2**
1,3-Dichlorobenzene	NE	1.0 U	1.3 U
1,3,5-Trimethylbenzene	NE	0.84 U	1.1 U
1,4-Dichlorobenzene	23	1.0 U	1.3 U
1,4-Dioxane	NE	0.61 U	0.80 U
2-Butanone (Methyl Ethyl Ketone)	228,571	**12**	**13**
2-Hexanone	NE	3.5 U	4.6 U
2-Propanol	NE	**4.4**	2.7 U
2,2,4-Trimethylpentane	NE	4.0 U	5.2 U
3-Chloropropene	NE	2.7 U	3.5 U
4-Ethyltoluene	NE	0.84 U	1.1 U
4-Methyl-2-pentanone	NE	0.70 U	0.91 U
Acetone	NE	**57**	**62**
alpha-Chlorotoluene	NE	0.88 U	1.2 U
Benzene	32	**1.2**	**2.8**
Bromodichloromethane	7	1.1 U	1.5 U
Bromoform	227	1.8 U	2.3 U
Bromomethane	229	3.3 U	4.3 U
Carbon Disulfide	32,000	**2.7**	**18**
Carbon Tetrachloride	42	1.1 U	1.4 U
Chlorobenzene	2,286	0.78 U	1.0 U
Chloroethane	NE	2.2 U	2.9 U
Chloroform	11	**2.8**	1.1 U
Chloromethane	4,114	1.8 U	2.3 U
cis-1,2-Dichloroethene	NE	**1.3**	0.88 U
cis-1,3-Dichloropropene	NE	0.77 U	1.0 U
Cumene	18,286	0.84 U	1.1 U
Cyclohexane	NE	0.58 U	0.77 U
Dibromochloromethane	9	1.4 U	1.9 U
Ethanol	NE	**41**	**5.8**
Ethyl Benzene	45,714	0.74 U	0.97 U
Freon 11	NE	**1.2**	**1.4**
Freon 113	NE	1.3 U	1.7 U
Freon 114	NE	1.2 U	1.6 U
Freon 12	NE	**2.9**	**2.7**
Heptane	NE	**1.3**	0.91 U
Hexachlorobutadiene	11	9.1 U	12 U
Hexane	32,000	**1.7**	**1.6**
m,p-Xylene	4,571	0.74 U	0.97 U
Methyl tert-butyl ether	962	0.61 U	0.80 U
Methylene Chloride	25,000	1.2 U	1.5 U
Naphthalene	7	4.4 U	5.8 U
o-Xylene	4,571	0.74 U	0.97 U
Propylbenzene	NE	0.84 U	1.1 U
Styrene	45,714	0.72 U	0.95 U
Tetrachloroethene	962	**17**	**15**
Tetrahydrofuran	NE	2.5 U	3.3 U
Toluene	228,571	**3.5**	**3.4**
trans-1,2-Dichloroethene	NE	0.67 U	0.88 U
trans-1,3-Dichloropropene	NE	0.77 U	1.0 U
Trichloroethene	37	**1.1**	1.2 U
Vinyl Chloride	28	0.43 U	0.57 U
VPH Fractions by Modified EPA Method TO-15		
C5-C8 Aliphatic Hydrocarbons	270,000	55 U	72 U
>C8-C12 Aliphatic Hydrocarbons	14,000	99 U	130 U
>C8-C10 Aromatic Hydrocarbons	18,000	84 U	110 U
>C10-C12 Aromatic Hydrocarbons	NE	93 U	120 U

Leak Check Tracer	Leak Threshold	% Helium Detected	
Helium	5%	0.94%	1.90%

Boring Location =>	SG-3	SG-4
Sample Date =>	3-Mar-16	3-Mar-16
Sample Depth (feet bgs) =>	5.5 - 6.0	2.5 - 3.0
Sample Number =>	8832-160303-SG-3	8832-160303-SG-4
Sub-Slab Soil Gas Screening Level (ug/m^3) [1]	Analytical Testing Results (ug/m^3)	
Volatile Organic Compounds (VOCs) by EPA Method TO-15		
1,1-Dichloroethane	52	2.3 U	2.1 U
1,1-Dichloroethene	3,048	2.2 U	2.1 U
1,1,1-Trichloroethane	76,190	3.1 U	2.8 U
1,1,2-Trichloroethane	3	3.1 U	2.8 U
1,1,2,2-Tetrachloroethane	1	3.9 U	3.6 U
1,2-Dibromoethane (EDB)	NE	4.3 U	4.0 U
1,2-Dichlorobenzene	3,048	**7.9**	3.1 U
1,2-Dichloroethane	3	2.3 U	2.1 U
1,2-Dichloropropane	8	2.6 U	2.4 U
1,2,4-Trichlorobenzene	30	21 U	19 U
1,2,4-Trimethylbenzene	107	**28**	**10**
1,3-Butadiene	3	1.2 U	**6.9**
1,3-Dichlorobenzene	NE	3.4 U	3.1 U
1,3,5-Trimethylbenzene	NE	**8.9**	**6.1**
1,4-Dichlorobenzene	8	3.4 U	3.1 U
1,4-Dioxane	NE	2.0 U	1.9 U
2-Butanone (Methyl Ethyl Ketone)	76,190	**15**	7.7 U
2-Hexanone	NE	12 U	11 U
2-Propanol	NE	6.9 U	6.4 U
2,2,4-Trimethylpentane	NE	13 U	12 U
3-Chloropropene	NE	8.8 U	8.2 U
4-Ethyltoluene	NE	**66**	**10**
4-Methyl-2-pentanone	NE	2.3 U	2.1 U
Acetone	NE	**64**	**28**
alpha-Chlorotoluene	NE	2.9 U	2.7 U
Benzene	11	**12**	**6**
Bromodichloromethane	2	3.8 U	3.5 U
Bromoform	76	5.8 U	5.4 U
Bromomethane	76	11 U	10 U
Carbon Disulfide	10,667	8.8 U	8.1 U
Carbon Tetrachloride	14	3.6 U	3.3 U
Chlorobenzene	762	2.6 U	2.4 U
Chloroethane	NE	7.4 U	6.9 U
Chloroform	4	2.8 U	2.5 U
Chloromethane	1,371	5.8 U	5.4 U
cis-1,2-Dichloroethene	NE	2.2 U	2.1 U
cis-1,3-Dichloropropene	NE	2.6 U	2.4 U
Cumene	6,095	**100**	**14**
Cyclohexane	NE	1.9 U	**11**
Dibromochloromethane	3	4.8 U	4.4 U
Ethanol	NE	**8.5**	4.9 U
Ethyl Benzene	15,238	**28**	**7.6**
Freon 11	NE	3.2 U	2.9 U
Freon 113	NE	4.3 U	4.0 U
Freon 114	NE	3.9 U	3.6 U
Freon 12	NE	2.8 U	2.6 U
Heptane	NE	**3.3**	**22**
Hexachlorobutadiene	4	30 U	28 U
Hexane	10,667	**3.6**	**23**
m,p-Xylene	1,524	**19**	**22**
Methyl tert-butyl ether	321	2.0 U	1.9 U
Methylene Chloride	8,333	3.9 U	**3.8**
Naphthalene	2	**27**	14 U
o-Xylene	1,524	**64**	**10**
Propylbenzene	NE	**40**	**6.4**
Styrene	15,238	**8.5**	2.2 U
Tetrachloroethene	321	**7**	**6.6**
Tetrahydrofuran	NE	8.3 U	7.7 U
Toluene	76,190	**32**	**7.9**
trans-1,2-Dichloroethene	NE	2.2 U	2.1 U
trans-1,3-Dichloropropene	NE	2.6 U	2.4 U
Trichloroethene	12	3.0 U	2.8 U
Vinyl Chloride	9	1.4 U	1.3 U
VPH Fractions by Modified EPA Method TO-15		
C5-C8 Aliphatic Hydrocarbons	90,000	**1,060**	**4,080**
>C8-C12 Aliphatic Hydrocarbons	4,700	**39,000**	**22,200**
>C8-C10 Aromatic Hydrocarbons	6,000	**1,100**	130 U
>C10-C12 Aromatic Hydrocarbons	NE	**840**	140 U

Leak Check Tracer	Leak Threshold	% Helium Detected	
Helium	5%	0.93%	0.79%

Notes:

bgs = below ground surface
bold = detected concentration
EPA = Environmental Protection Agency
NE = screening level not established

U = not detected above posted concentration
ug/m^3 = micrograms per cubic meter
VOCs = volatile organic compounds
WDOE = Washington Department of Ecology

1 = Lowest WDOE Method B Soil Gas Screening Level for Vapor Intrusion, April 2015
Bold and Yellow = Concentration Exceeds Lowest Method B Soil Gas Screening Level

Table 7 - Groundwater Elevations: Site Monitoring Well Network

Port of Vancouver, USA - Terminal 1 Property

100 Columbia Street

Vancouver, WA

Elevation of Top of Casing Elevation (NGVD 29 (City of Vancouver)

Date	MW-1-37	MW-2-40	MW-3-35	MW-4-34	MW-5-34
24-Jun-15	29.06	31.53	30.50	31.34	32.10

Measured Water Level (feet btc)

Date	MW-1-37	MW-2-40	MW-3-35	MW-4-34	MW-5-34
16-Jun-15	23.20	26.14	24.20	25.40	26.00
9-Feb-16	21.85	24.87	23.71	23.90	24.50

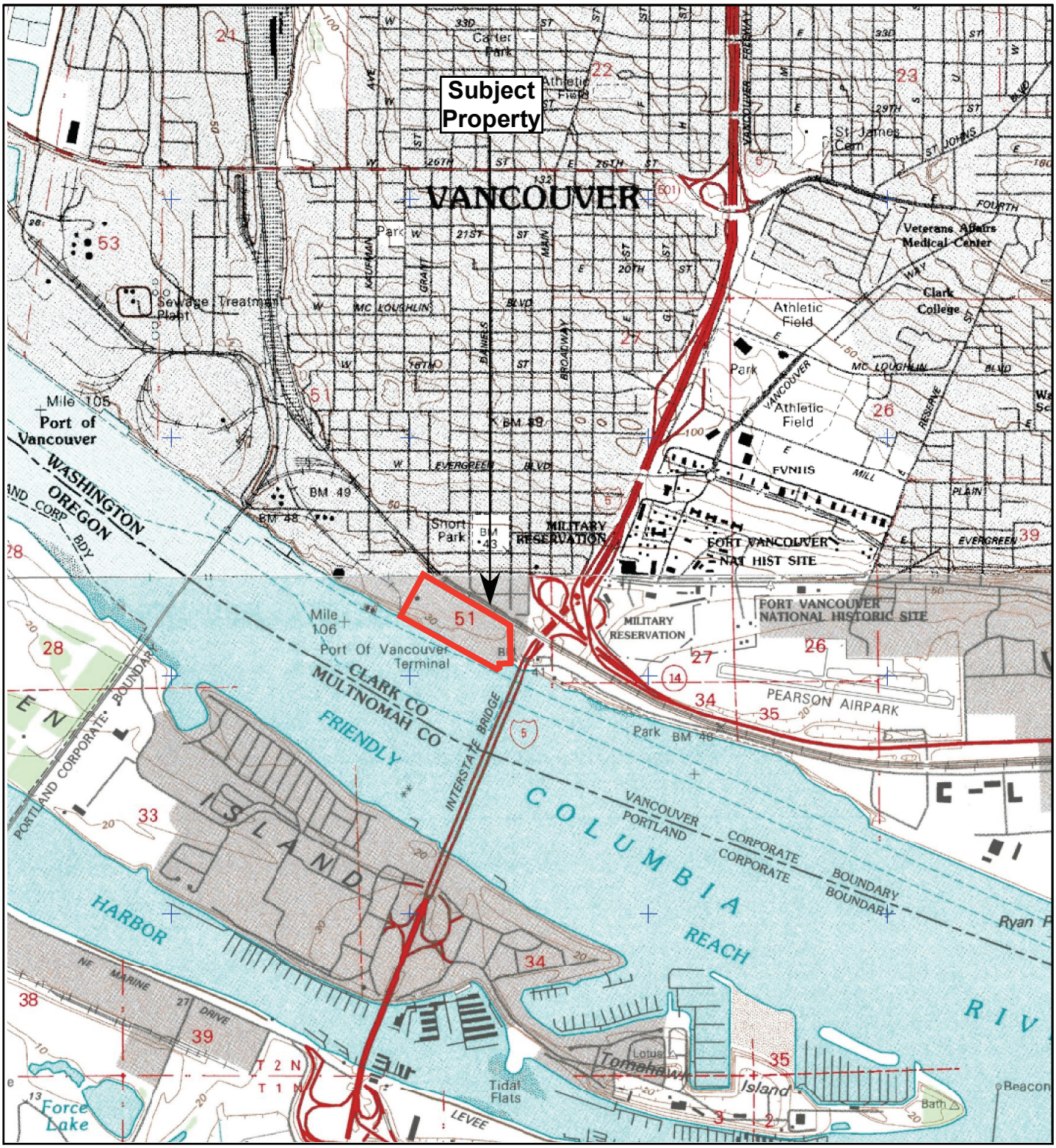
Groundwater Elevation (NGVD 29 (City of Vancouver)

Date	MW-1-37	MW-2-40	MW-3-35	MW-4-34	MW-5-34
16-Jun-15	5.86	5.39	6.30	5.94	6.10
9-Feb-16	7.21	6.66	6.79	7.44	7.60

Notes:

btc = below top of casing
NGVD 29 = National Geodetic Vertical Datum of 1929

FIGURES



Note:
Base Map from the Portland, Oregon (1995)
USGS 7.5-Minute Quadrangle
Contour Intervals: 10 Feet

Investigation Area (approximate)

NORTH

1"=2000'

0 1000 2000 4000

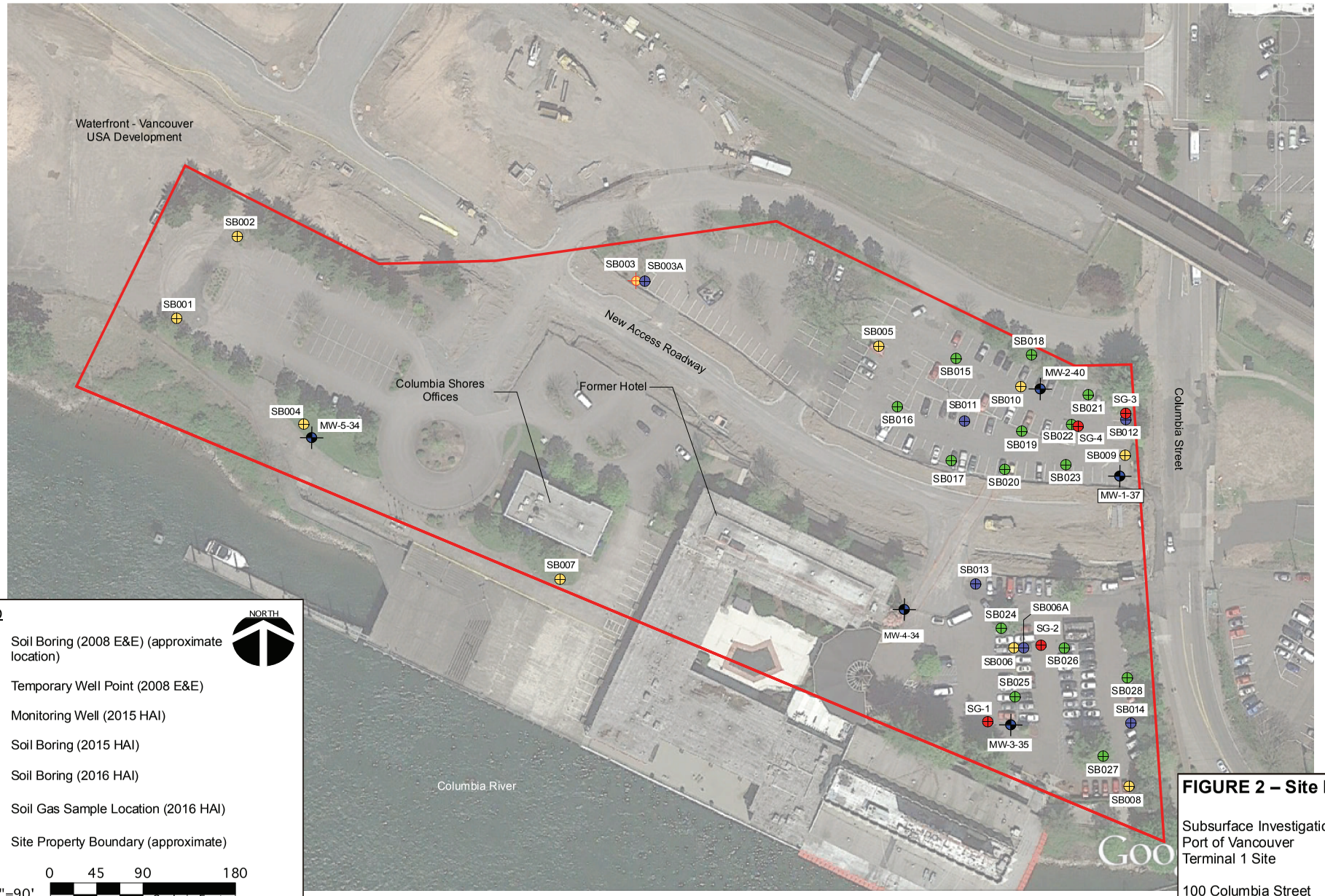
Scale in Feet

FIGURE 1
Location Map

Subsurface Investigation
Port of Vancouver - Terminal 1 Site
100 Columbia Street
Vancouver, WA

HAHN AND ASSOCIATES, INC.
Project No. 8832

April 2016



LEGEND

NORTH

SB001 Soil Boring (2008 E&E) (approximate location)

Temporary Well Point (2008 E&E)

Monitoring Well (2015 HAI)

Soil Boring (2015 HAI)

Soil Boring (2016 HAI)

Soil Gas Sample Location (2016 HAI)

Site Property Boundary (approximate)

0 45 90 180

1"=90' Scale in Feet

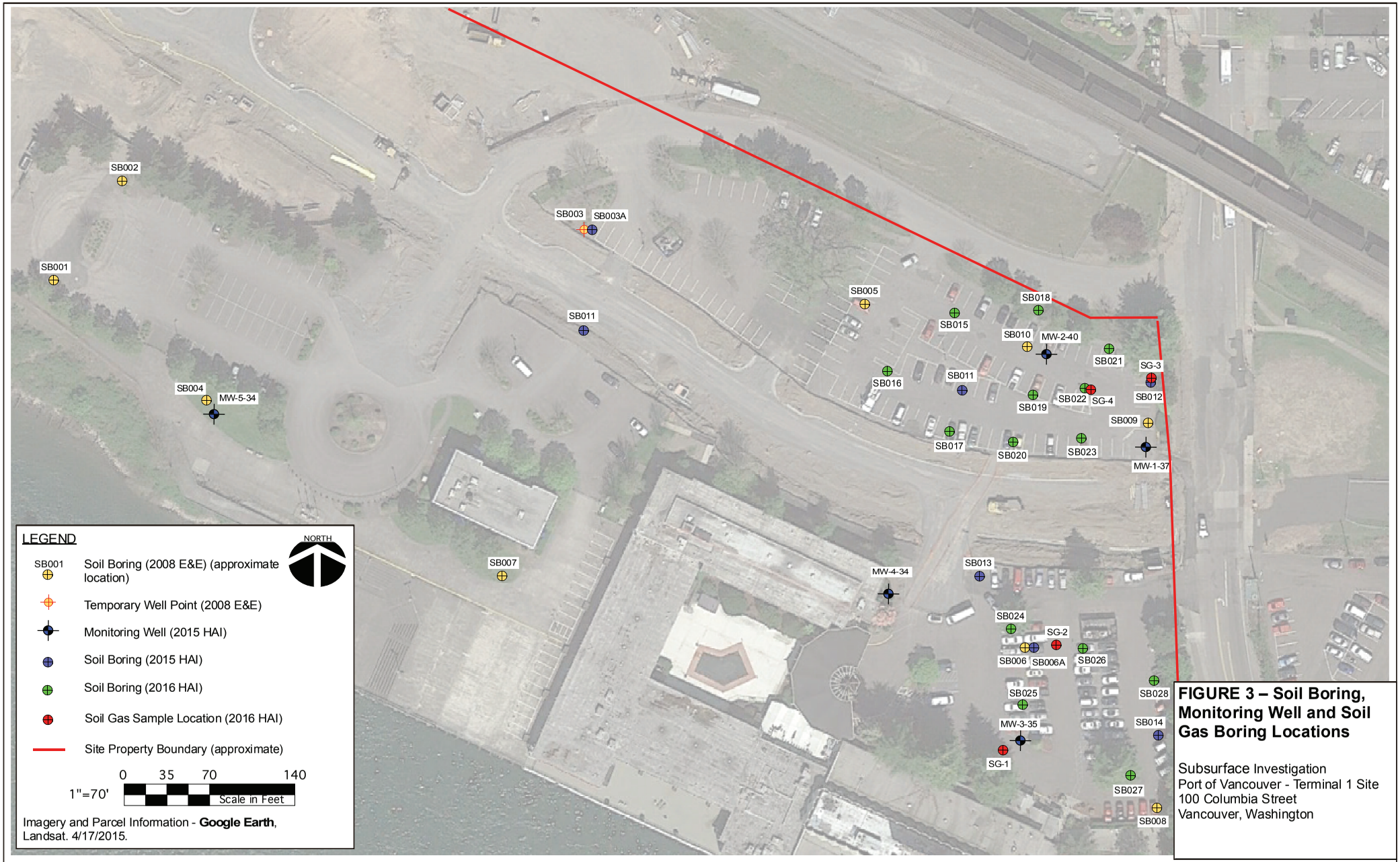
Imagery and Parcel Information - **Google Earth**, Landsat. 4/17/2015.

FIGURE 2 – Site Map

Subsurface Investigation
Port of Vancouver
Terminal 1 Site

100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832 April 2016



Imagery - **Google Earth**, Landsat. 4/17/2015.

FIGURE 3 – Soil Boring, Monitoring Well and Soil Gas Boring Locations

Subsurface Investigation
Port of Vancouver - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832 April 2016

Path: G:\Project\1004-Hahn\8832\Maps\Fig4a_Groundwater Elevations.mxd

Rev. Date: 4/13/2016

Hahn Project # :8832

HAHN AND ASSOCIATES, INC.

Environmental Consultants
434 NW 6th Avenue, Suite 203
Portland, Oregon 97209
503-796-0717

Produced By:

Haz Gis Services, LLC
503.314.0251 | www.kazgis.com

Source: Aerial Photograph obtained from ESRI, ArcGIS Online.

Note: Groundwater contours created using ArcGIS 10.3, Spatial Analyst, Natural Neighbor interpolation tool.

Legend

Monitoring Well
MW-1-37 5.86 With Groundwater Elevation in Feet (City of Vancouver Datum)

6' Isocontour Line - Groundwater Elevation

0 100 200
Feet
1" = 100'

FIGURE 4a
Groundwater Elevation Map
June 16, 2015

Subsurface Investigation
Port of Vancouver - Terminal 1 Site
Vancouver, Washington

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Rev. Date: 4/13/2016

Hahn Project #: 8832

HAHN AND ASSOCIATES, INC.

Environmental Consultants
434 NW 6th Avenue, Suite 203
Portland, Oregon 97209
503-796-0717

Produced By:

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Source: Aerial Photograph obtained from ESRI, ArcGIS Online.

Note: Groundwater contours created using ArcGIS 10.4, Spatial Analyst, Natural Neighbor interpolation tool.

Legend

Monitoring Well
MW-1-37
5.86
With Groundwater Elevation in Feet
(City of Vancouver Datum)

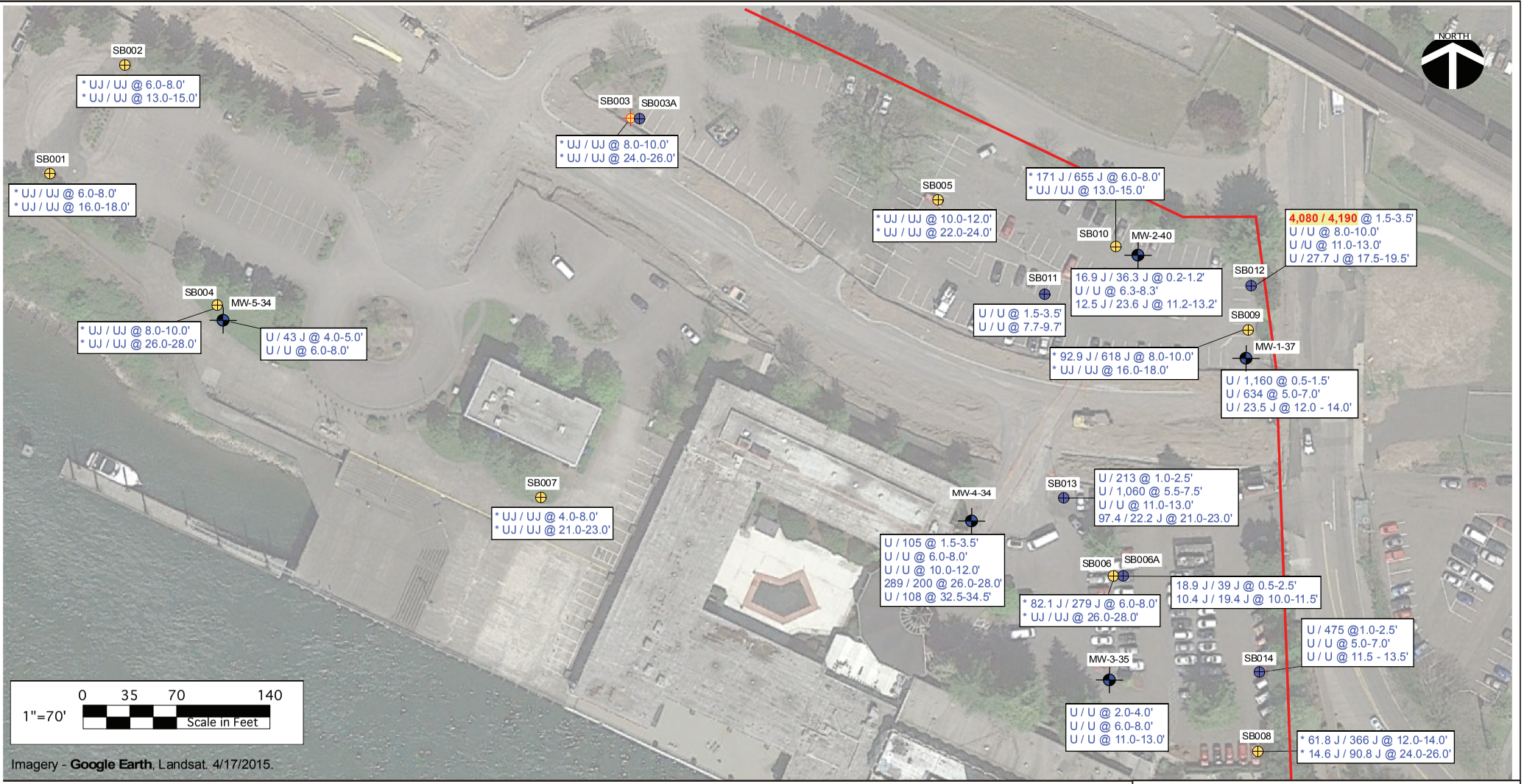
6' Isocontour Line - Groundwater Elevation

0 100 200
Feet
1" = 100'

N

FIGURE 4b
Groundwater Elevation Map
February 9, 2016

Subsurface Investigation
Port of Vancouver - Terminal 1 Site
Vancouver, Washington



LEGEND

SB001 — Soil Boring (2008 E&E) (approximate location)

Temporary Well Point (2008 E&E)

Monitoring Well (2015 HAI)

Soil Boring (2015 HAI)

mg/kg — milligrams per kilograms

U / 43 J @ 4.0-5.0'
U / U @ 6.0-8.0'

Diesel- / oil-range petroleum hydrocarbon concentration in soil in mg/kg @ depth below ground surface (bgs)

Red and Bold — Diesel- or oil-range petroleum hydrocarbon concentration exceeds MTCA Method A Soil Cleanup Level for Unrestricted Land Use (2,000 mg/kg)

Red and Bold — Diesel- or oil-range petroleum hydrocarbon concentration exceeds MTCA Method A Soil Cleanup Level for Industrial Land Use (2,000 mg/kg)

* Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

J Estimated Concentration

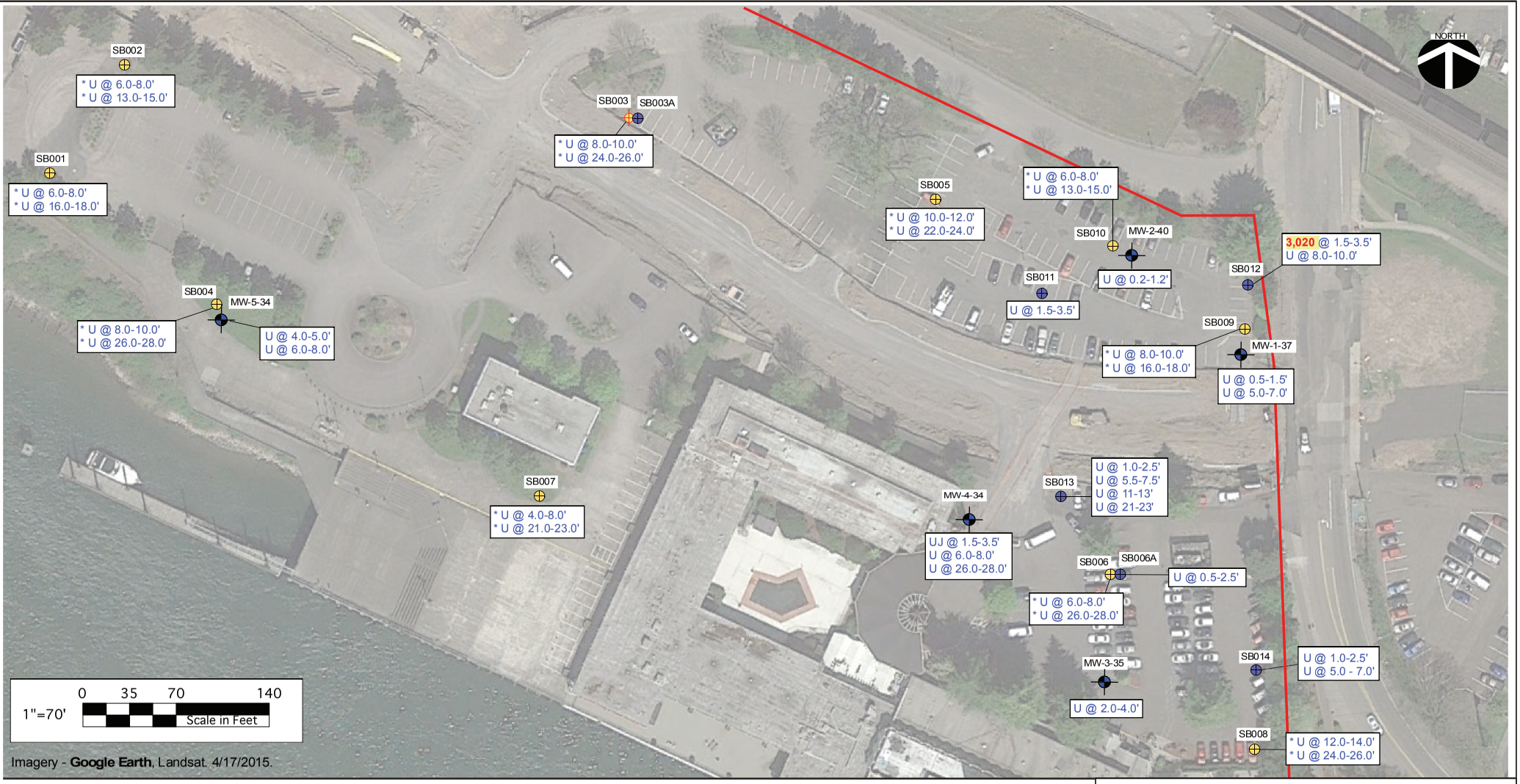
U Not Detected

Subject Property (approximate)

FIGURE 5
Total Diesel- and Oil-Range Petroleum Hydrocarbon Concentrations in Soil

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832 April 2016



LEGEND

- SB001 — Soil Boring (2008 E&E) (approximate location)
- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- Soil Boring (2015 HAI)
- mg/kg — milligrams per kilograms

3,020 @ 1.5-3.5' / U @ 8.0-10.0' — Gasoline-range petroleum hydrocarbon concentration in soil in mg/kg @ depth in feet below ground surface (bgs)

Red and Bold — Gasoline-range petroleum hydrocarbon concentration exceeds MTCA Method A Soil Cleanup Level for Unrestricted Land Use (100 mg/kg)

Red and Bold — Gasoline-range petroleum hydrocarbon concentration exceeds MTCA Method A Soil Cleanup Level for Industrial Land Use (100 mg/kg)

* Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

J Estimated Concentration

U Not Detected

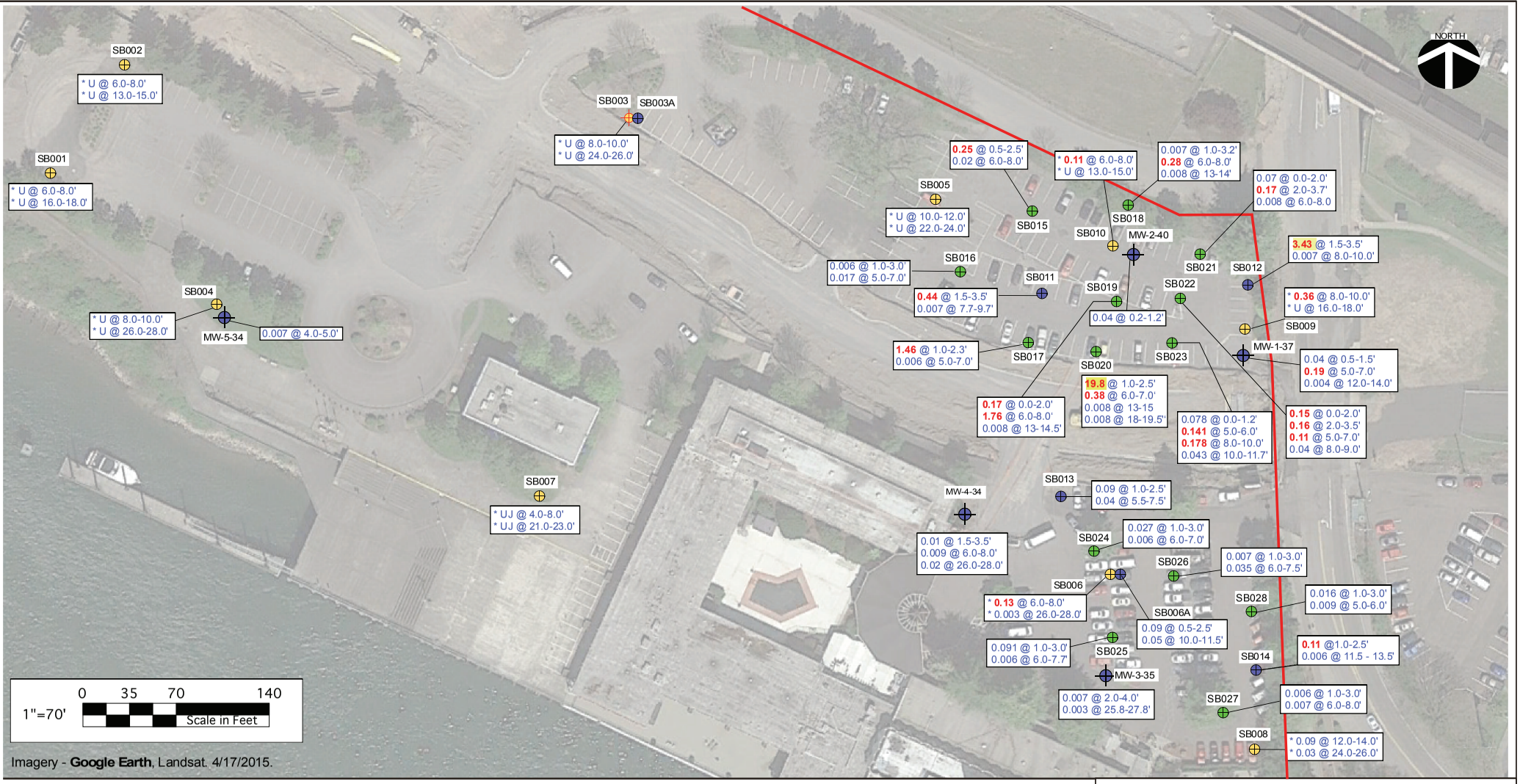
Subject Property (approximate)

FIGURE 6
Gasoline-Range Petroleum Hydrocarbon Concentrations in Soil

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832

April 2016



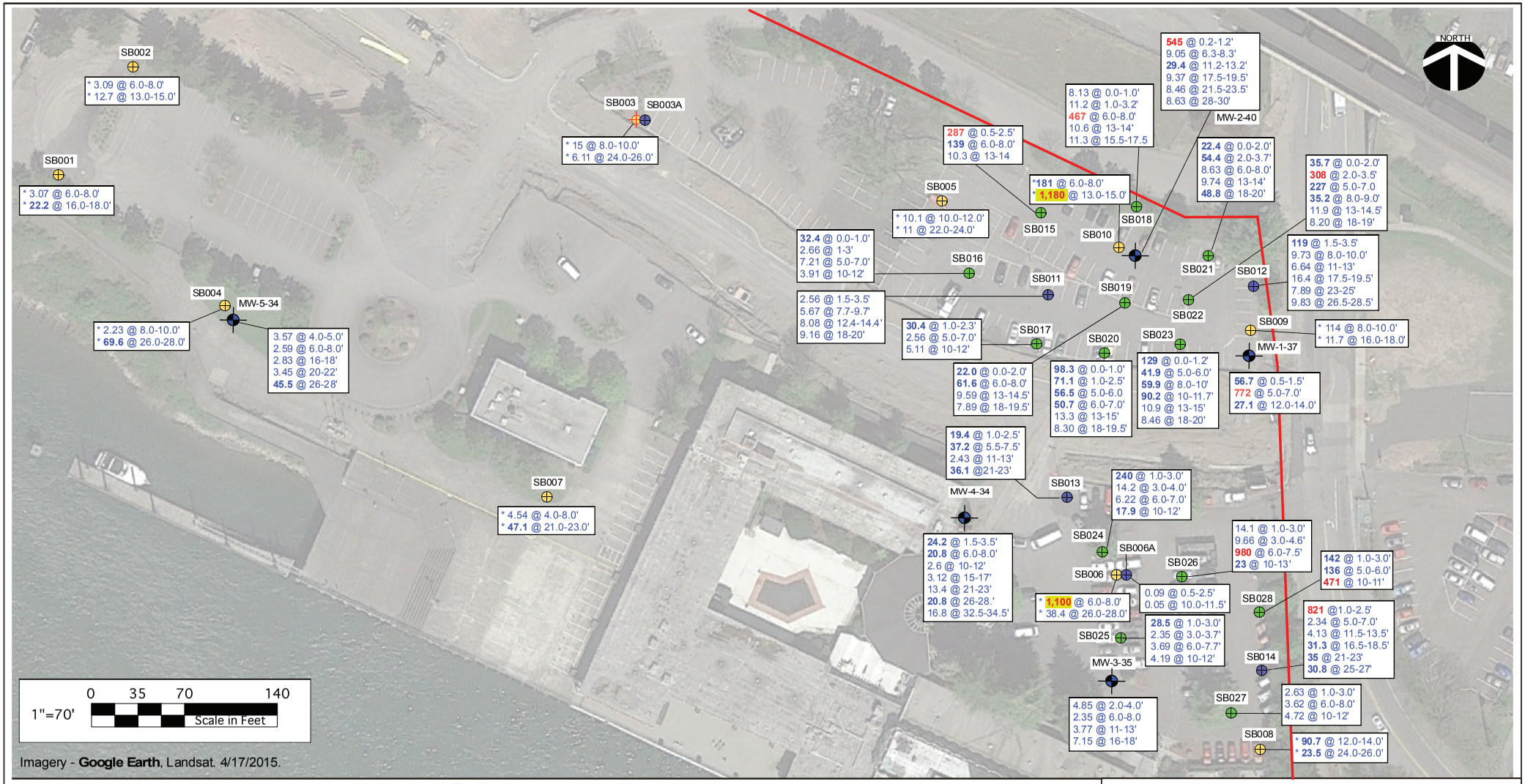
LEGEND

SB001	Soil Boring (2008 E&E) (approximate location)
	Temporary Well Point (2008 E&E)
	Monitoring Well (2015 HAI)
	Soil Boring (2015 HAI)
	Soil Boring (2016 HAI)
0.09 @ 0.5-2.5' 0.05 @ 10.0-11.5'	TEF PAH concentration in soil in mg/kg @ depth in feet below ground surface (bgs)
Red and Bold	TEF PAH result exceeds MTCA Method A Soil Cleanup Level for Unrestricted Land Use (0.1 mg/kg)
Red and Bold	TEF PAH result exceeds MTCA Method A Soil Cleanup Level for Industrial Land Use (2 mg/kg)
*	Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)
	Subject Property (approximate)
TEF	Toxicity Equivalency Factor
U	Not Detected
J	Estimated Concentration
mg/kg	milligrams per kilograms

FIGURE 7
TEF PAH Concentrations in Soil

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832
April 2016



LEGEND

- SB001 — Soil Boring (2008 E&E) (approximate location)
- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- Soil Boring (2015 HAI)
- Soil Boring (2016 HAI)

57.9 @ 0.5-2.5'
29.8 @ 10.0-11.5'

Total lead concentration in soil in mg/kg @ depth in feet below ground surface (bgs)

bold — Total Lead Concentration Exceeds Background Value (17 mg/kg)

Red and Bold — Total Lead Concentration Exceeds Method A Cleanup Level for Unrestricted Land Use (250 mg/kg)

Red and Bold — Total Lead Concentration Exceeds Method A Cleanup Level for Industrial Land Use (1,000 mg/kg)

* Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

Subject Property (approximate)

J — Estimated Concentration

mg/kg — milligrams per kilograms

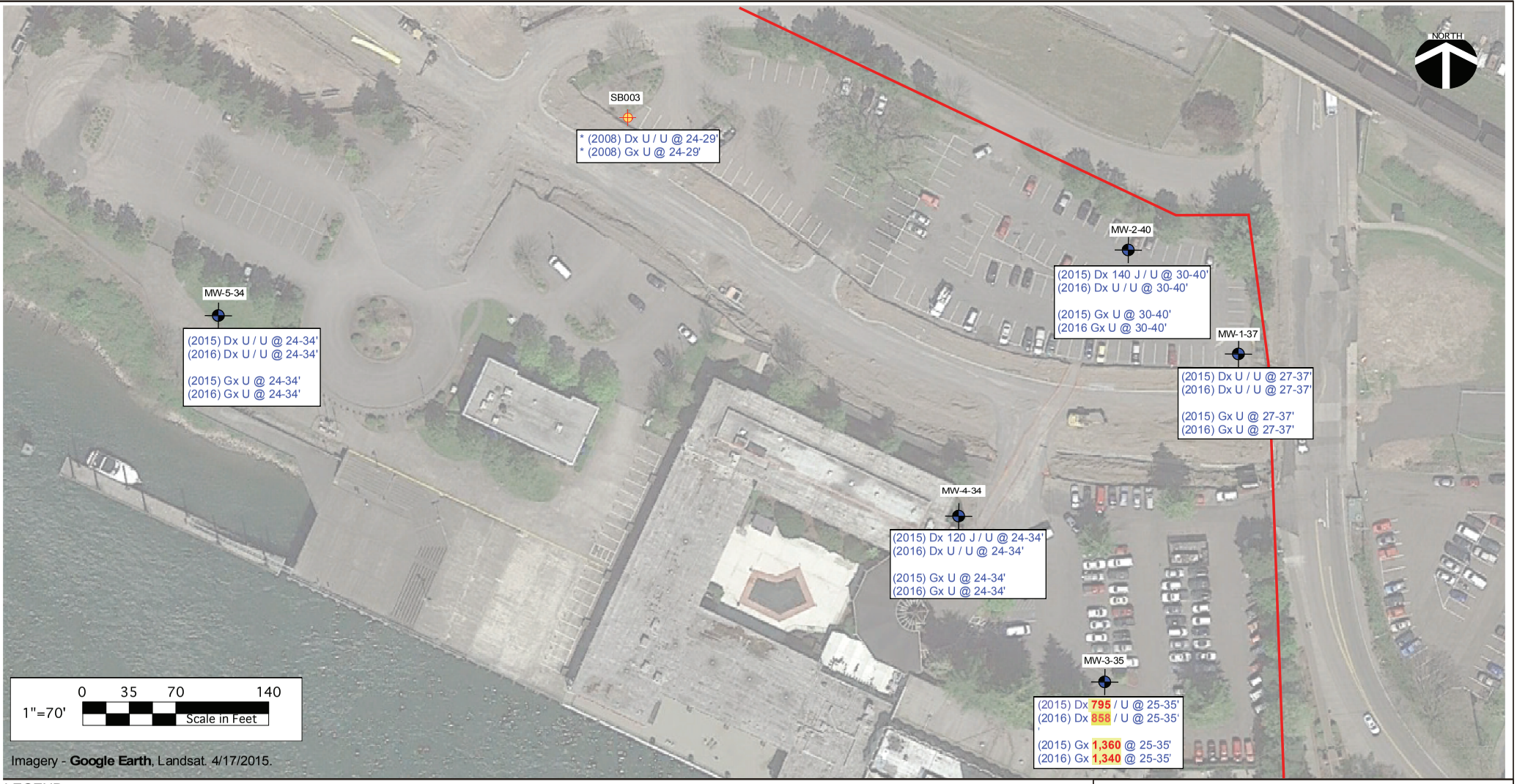
U — Not Detected

FIGURE 8
Total Lead Concentrations in Soil

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832

April 2016



LEGEND

- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- ug/L — micrograms per liter
- Subject Property (approximate)

(2015) Dx 120 J / U @ 24-34'
(2016) Gx U @ 24-34'

Sample year, total diesel- / oil-range (Dx) and gasoline-range (Gx) petroleum hydrocarbon concentration in groundwater in ug/L @ screen interval depth in feet below ground surface (bgs)

Red and Bold — Concentration exceeds MTCA Method A Cleanup Value for Groundwater for diesel-range (500 ug/L) or oil-range (500 ug/L) petroleum hydrocarbons

- U — Not Detected
- * — Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)
- J — Estimated Concentration

FIGURE 9
Total Gasoline-, Diesel-, and Oil-Range Petroleum Hydrocarbon Concentrations in Groundwater
Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832 April 2016

LEGEND

- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- ug/L — micrograms per liter
- Subject Property (approximate)

(2015) 0.169 @ 24-34'
(2016) 0.283 @ 24-34' — Sample year, naphthalene concentration in groundwater in ug/L @ screen interval depth in feet below ground surface (bgs)

Red and Bold — Concentration exceeds MTCA Method A Cleanup Value for Groundwater (160 ug/L)

J — Estimated Concentration

U — Not Detected

* — Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

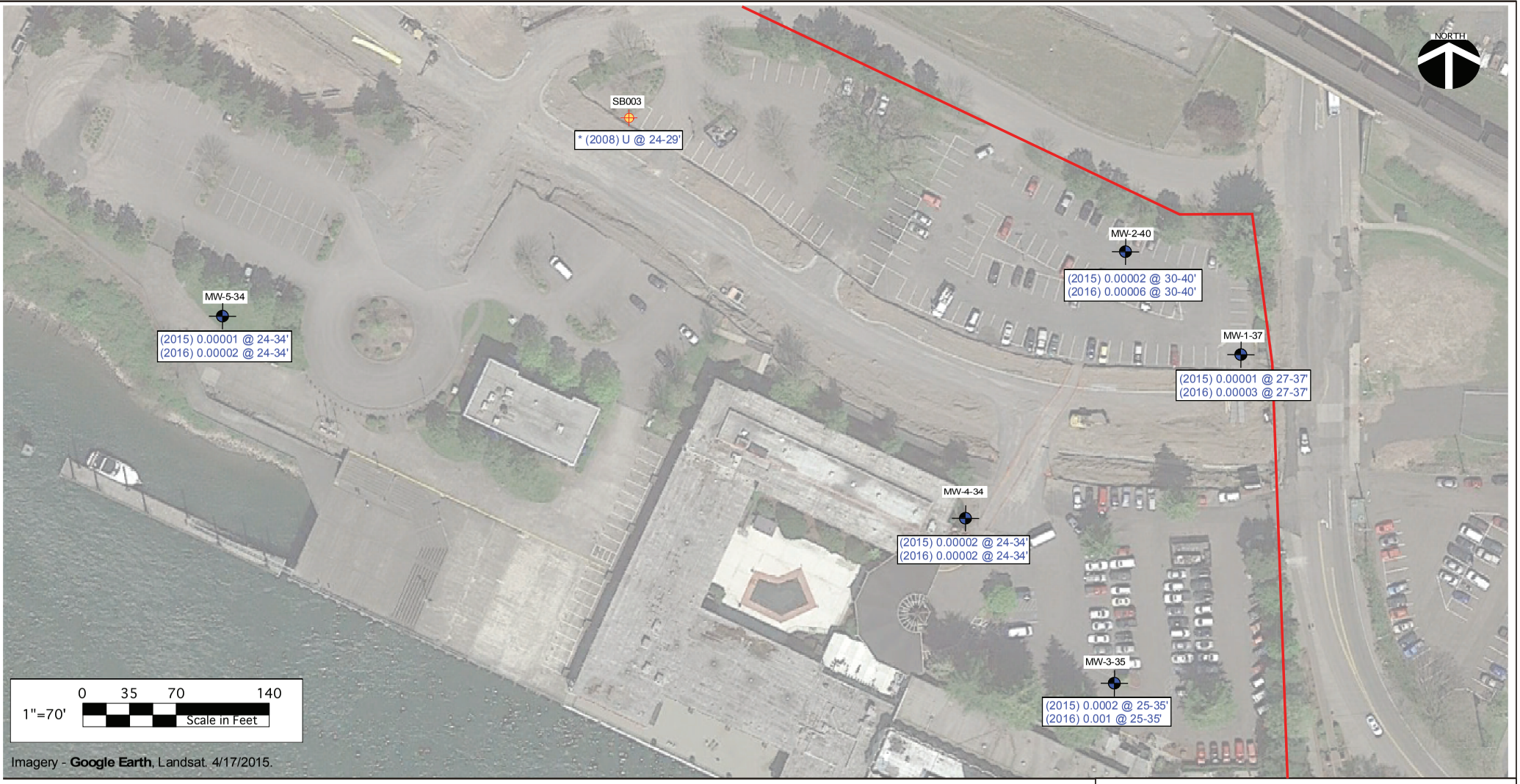
Note: Results posted are the higher of the naphthalene concentrations as reported by either EPA Method 8260 or 8270.

FIGURE 10
Naphthalene Concentrations in Groundwater

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832

April 2016



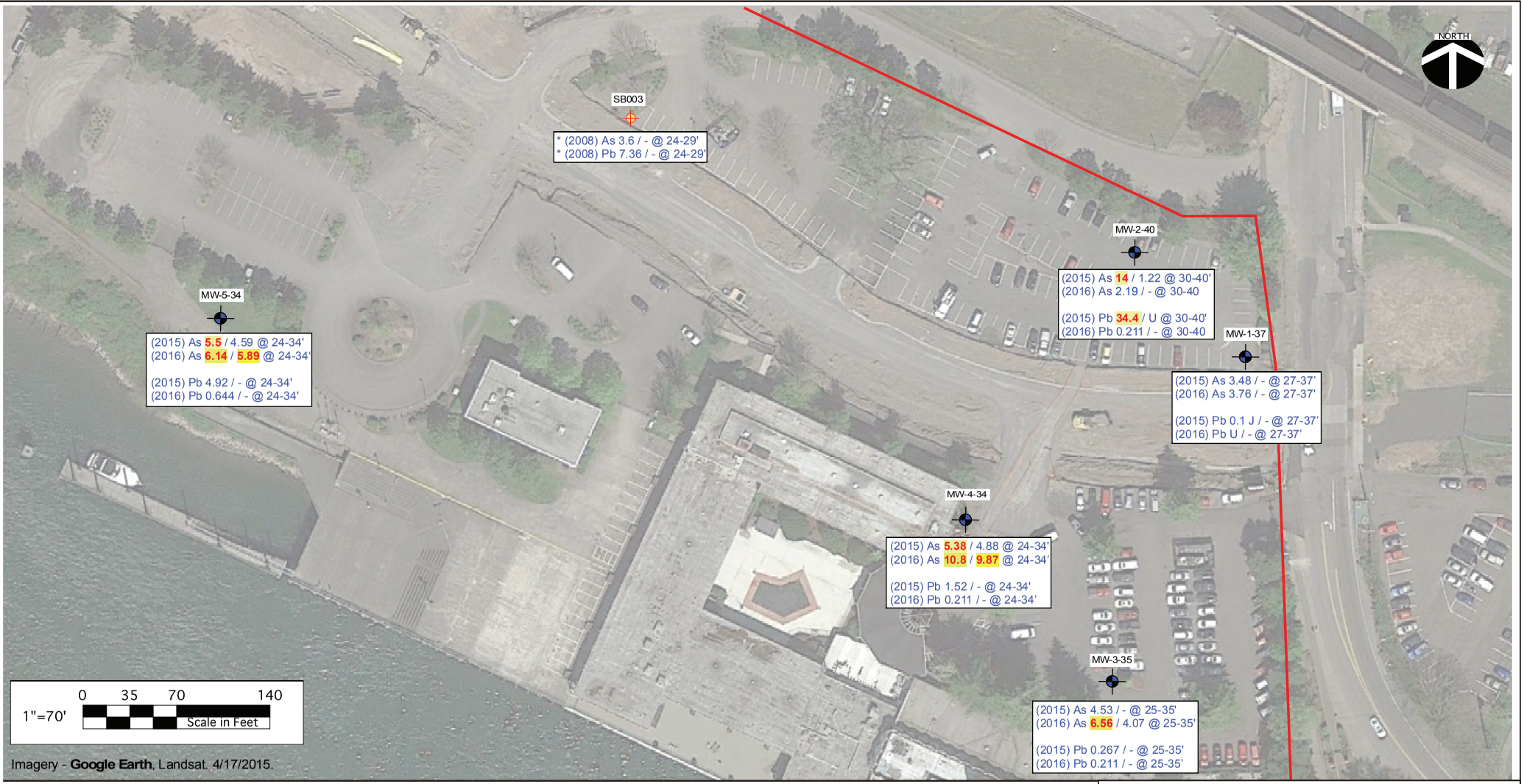
LEGEND

- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- ug/L — micrograms per liter
- Subject Property (approximate)
- (2015) 0.00002 @ 24-34' (2016) 0.00002 @ 24-34' — Sample year, TEF PAH concentration in groundwater in ug/L @ screen interval depth in feet below ground surface (bgs)
- **Red and Bold** — Concentration exceeds MTCA TEF value for Unrestricted Land Use (0.1 ug/L)
- TEF — Toxicity Equivalent Factor
- * — Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)
- U — Not Detected

FIGURE 11
Total Carcinogenic Polyaromatic Hydrocarbon (PAH) TEF Concentrations in Groundwater

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832
April 2016



LEGEND

- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- ug/L micrograms per liter
- Subject Property (approximate)

(2015) As 14 / 1.22 @ 30-40'
(2016) As 2.19 / - @ 30-40

(2015) Pb 34.4 / U @ 30-40'
(2016) Pb 0.211 / - @ 30-40

Sample year, total / dissolved arsenic and total / dissolved lead concentrations groundwater in ug/L @ screen interval depth in feet below ground surface (bgs)

Red and Bold — Concentration exceeds MTCA Method A Cleanup Value for Groundwater for arsenic (5 ug/L) or lead (15 ug/L)

U Not Detected

* Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

J Estimated Concentration

FIGURE 12
Total and Dissolved Arsenic and Lead Concentrations in Groundwater

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832
April 2016

LEGEND

- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- ug/L micrograms per liter
- Subject Property (approximate)

(2015) 2.31 / U @ 24-34'
(2016) 1.49 / U @ 24-34'

Sample year, total / hexavalent chromium concentrations in groundwater in ug/L @ screen interval depth in feet below ground surface (bgs). (Unfiltered sample unless otherwise noted)

Red and Bold Concentration exceeds MTCA Method A Cleanup Value for Groundwater for chromium (50 ug/L)

Dis Dissolved (Field Filtered) Result

* Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

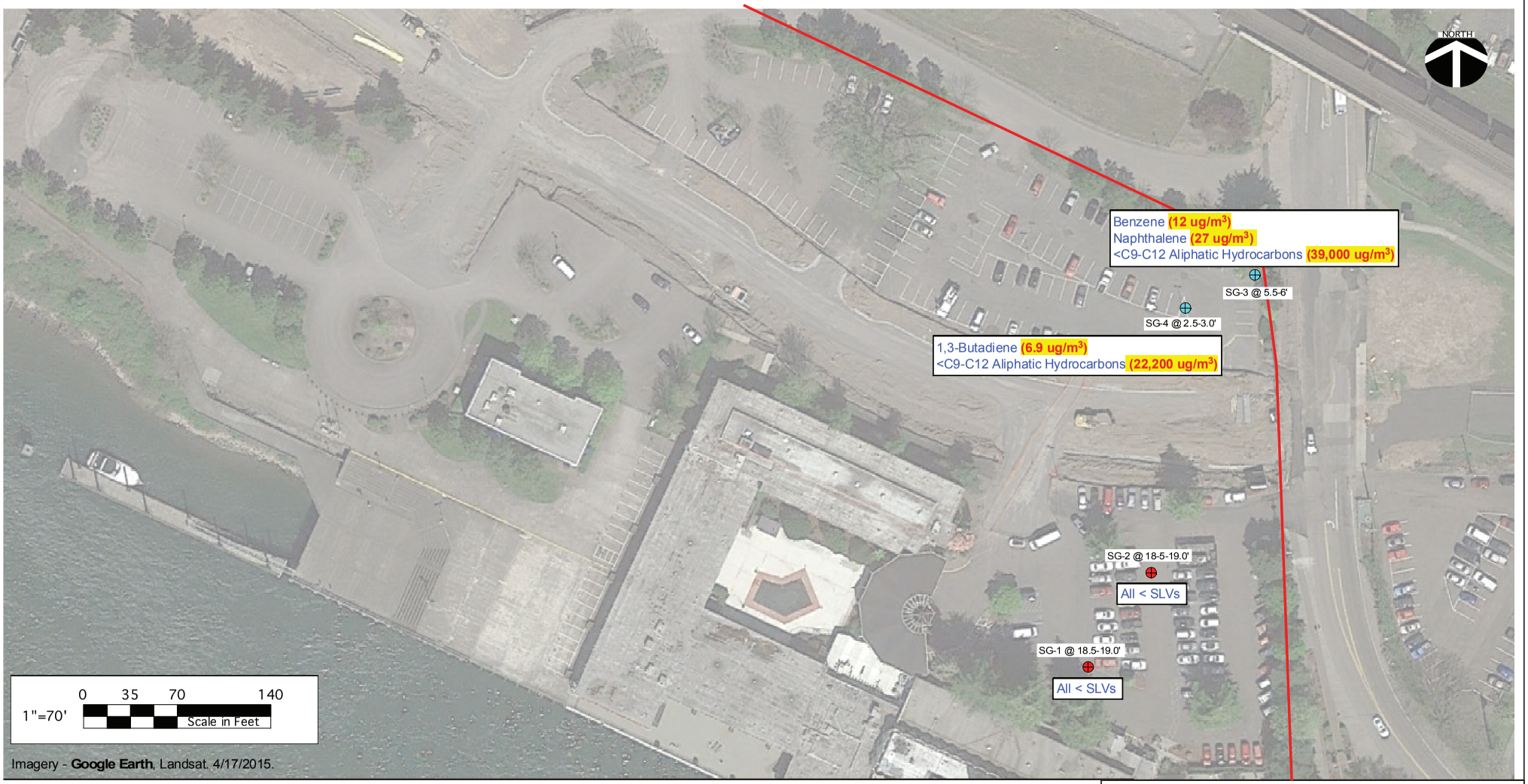
J Estimated Concentration

U Not Detected

FIGURE 13
Total and Hexavalent Chromium Concentrations in Groundwater

Soil and Groundwater Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832
March 2016



LEGEND

SG-1 @ 18.5-19.0'
Soil gas sample location at depth in feet below ground surface

Shallow Soil Gas Sample Location (2016 HAI)

APH Air Phase Hydrocarbons

Ecology Washington Department of Ecology

J Estimated Concentration

SLV Screening Level Value

U Not Detected

VOCs Volatile Organic Compounds

Red and Bold Concentration exceeds lowest Ecology Soil Gas SLV for Vapor Intrusion (April 2015)

Note: Soil gas samples results at SG-1 and SG-2 were compared to "deep" Ecology SLVs (> 15 feet below ground surface), while soil gas sample results from SG-3 and SG-4 were compared to "sub-slab" Ecology SLVs (< 15 feet below ground surface)

FIGURE 14
VOCs and APH in Soil Gas at Concentrations Higher than Ecology SLVs

Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

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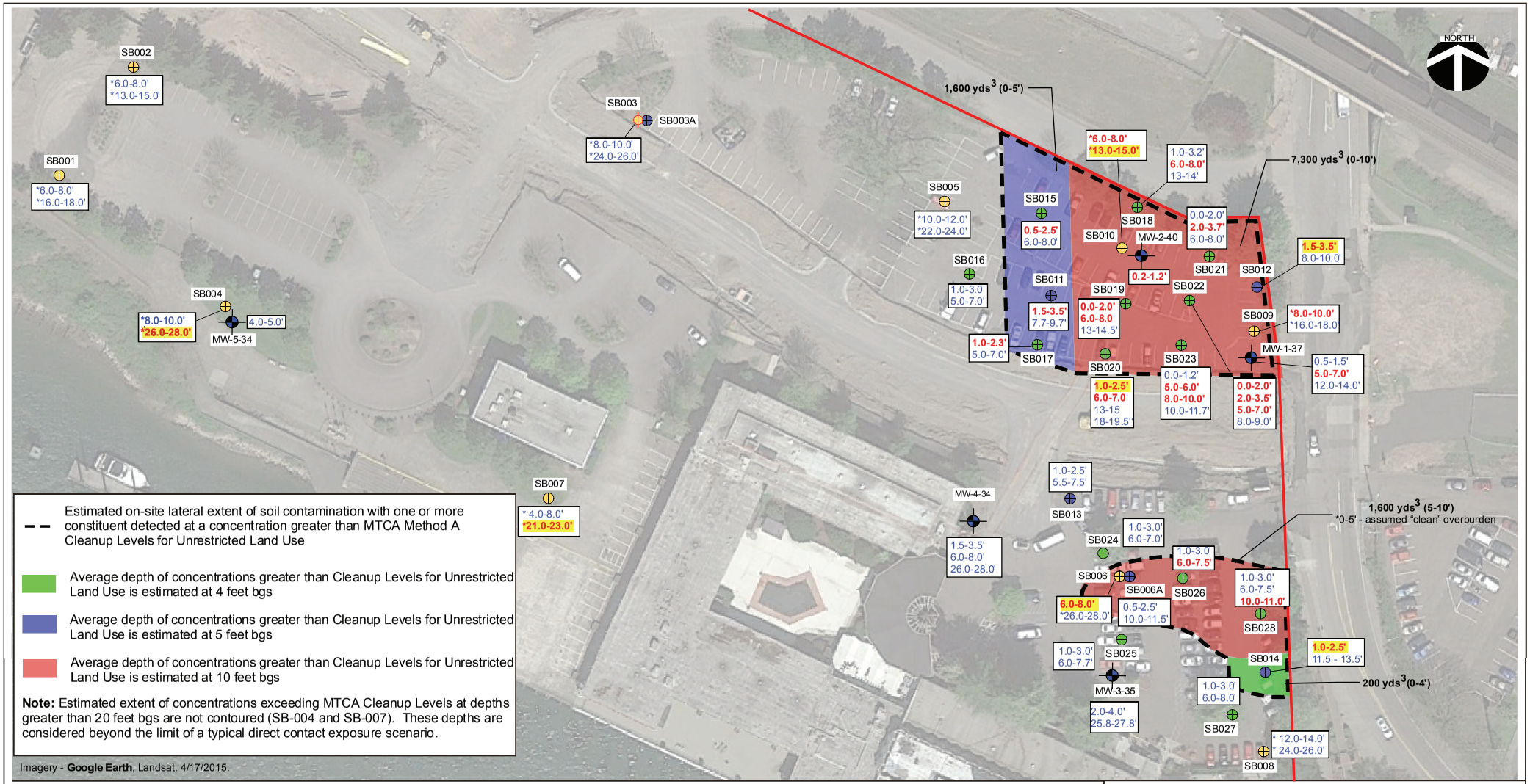


LEGEND

- SB001 — Soil Boring (2008 E&E) (approximate location)
- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- Soil Boring (2015 HAI)
- Soil Boring (2016 HAI)

1.0-3.0' / 6.0-7.5' — Depth in feet below ground surface (bgs) exceeding MTCA Method A for Unrestricted Land Use

Red and Bold — Result exceeds MTCA Method A Soil Cleanup Level for Unrestricted Land Use

Red and Bold — Result esult exceeds MTCA Method A Soil Cleanup Level for Industrial Land Use

* — Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)

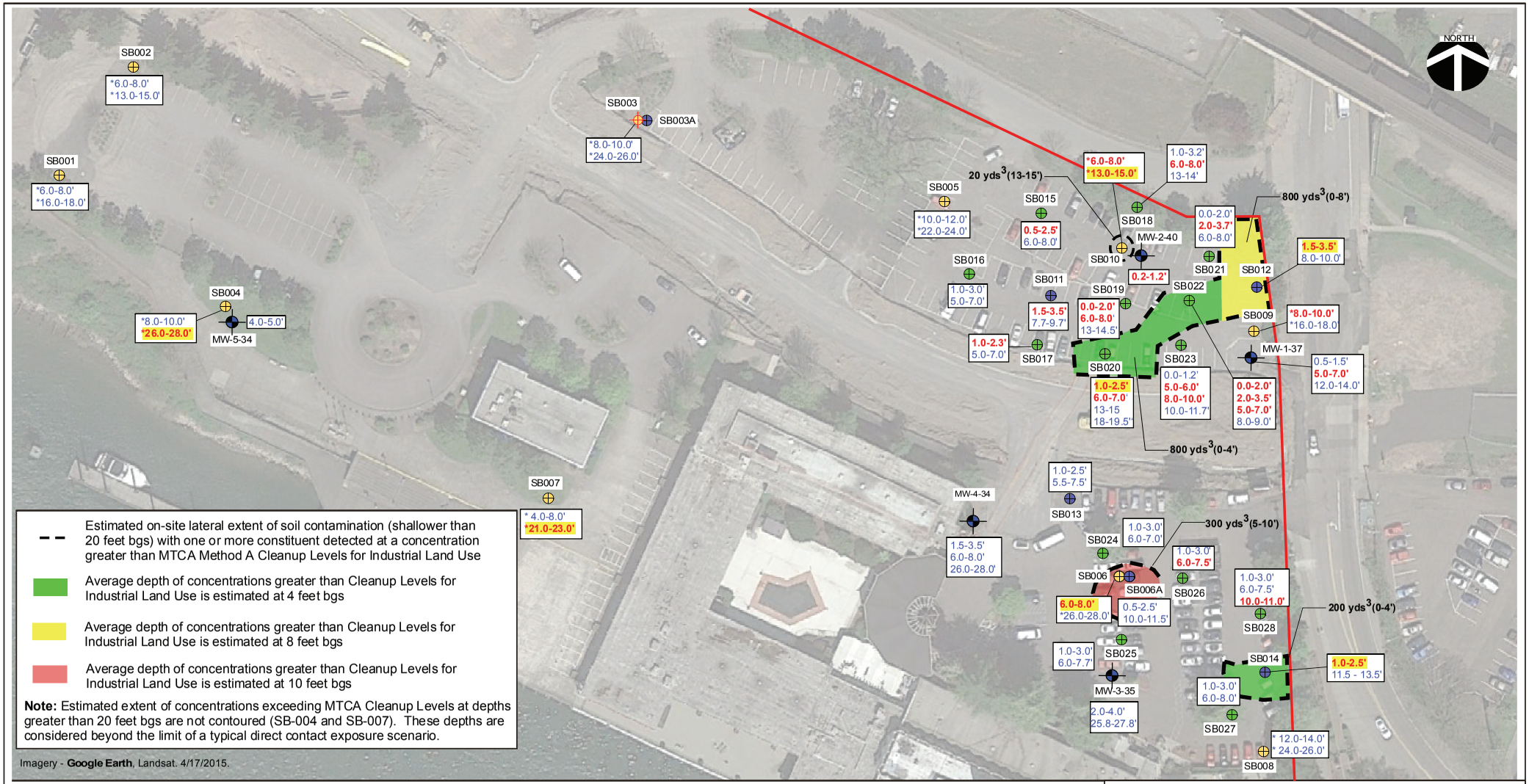
Subject Property (approximate)

bgs — below ground surface

1"=70' 0 35 70 140 Scale in Feet

FIGURE 15
Estimated Extent of Concentrations in Soil Exceeding MTCA Method A Cleanup Levels for Unrestricted Land Use
Subsurface Investigation
Port of Vancouver, USA - Terminal 1 Site
100 Columbia Street
Vancouver, Washington

HAHN AND ASSOCIATES, INC.
Project No. 8832
April 2016



LEGEND

- SB001 — Soil Boring (2008 E&E) (approximate location)
- Temporary Well Point (2008 E&E)
- Monitoring Well (2015 HAI)
- Soil Boring (2015 HAI)
- Soil Boring (2016 HAI)
- 1.0-3.0' / 6.0-7.5' — Depth in feet below ground surface (bgs) exceeding MTCA Method A for Unrestricted Land Use
- Red and Bold — Result exceeds MTCA Method A Soil Cleanup Level for Unrestricted Land Use
- Red and Bold — Result exceeds MTCA Method A Soil Cleanup Level for Industrial Land Use
- Subject Property (approximate)
- * Ecology and Environment, Inc. - Sample Result (November 2008 Environmental Site Assessment)
- bgs — below ground surface

1"=70' (0, 35, 70, 140 Scale in Feet)

FIGURE 16
Estimated Extent of Concentrations in Soil Exceeding MTCA Method A Cleanup Levels for Industrial Land Use
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Port of Vancouver, USA - Terminal 1 Site
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Vancouver, Washington

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