



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

December 3, 2012

Mr. Kip Summers
City of Olympia
222 Columbia Ave NE
Olympia, WA 98501

Re: Opinion on Proposed Cleanup of the following Site:

- **Site Name:** Former Unocal Hulco Bulk Plant
- **Site Address:** 301 N Columbia, Olympia
- **Facility/Site No.:** 58484616
- **Cleanup Site ID No.:** 4808
- **VCP Project No.:** SW1146

Dear Mr. Summers:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of the Former Unocal Hulco Bulk Plant facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Upon completion of the proposed cleanup, will further remedial action likely be necessary to clean up contamination at the Site?

NO. Ecology has determined that, upon completion of your proposed cleanup, no further remedial action will likely be necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following release:

- Petroleum hydrocarbons and related constituents into the Soil, Soil Vapor, and Groundwater.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following document:

1. Remedial Investigation and Feasibility Study Report, Former Unocal Bulk Plant 0828 and Hulco Property, dated August 2012 by Anchor QEA, LLC (Anchor).
2. Upland Investigation Data Report, Percival Landing, dated August 2011 by Anchor.
3. Letter to Dr. Mark Brearley (Unocal Corporation) from Mr. Chuck Cline (Ecology), RE: No Further Action, dated October 10, 2003.
4. Final Cleanup Report, Supplemental Remedial Investigation, Former Unocal Bulk Plant 0828 and Hulco Property, 301 North Columbia Street and 206/216 Olympia Avenue West, Olympia, Washington, dated April 5, 2002 by GeoEngineers.
5. Results of Groundwater Sampling and Free Product Recovery, July and August 1998, Former Unocal Bulk Plant 0828 and Adjacent Former Hulco Property, 301/307 North Columbia Street and 206/216 Olympia Avenue Northwest, Olympia, Washington, dated October 7, 1998 by GeoEngineers.
6. Report of Environmental Services, Remedial Excavation Monitoring, Former Unocal Bulk Plant 0828 and Hulco Property, Olympia, Washington, dated December 19, 1995 by GeoEngineers.
7. Cleanup Action Plan, Unocal Olympia Bulk Plant and Hulco Property, Olympia, Washington, dated August 16, 1995 by GeoEngineers.
8. Risk Assessment, Development of Target Cleanup Levels, and Feasibility Study for Former Unocal Olympia Bulk Plant/Hulco Property, dated June 1995 by ICF Kaiser Engineers, Inc.
9. Report of Environmental Services, Subsurface Contamination Assessment and Ground Water Monitoring, Hulco Property and Unocal Bulk Plant 0828, Olympia, Washington, dated May 16, 1995 by GeoEngineers.

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that, upon completion of your proposed cleanup, **no further remedial action** will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action. The Site is described above and in **Enclosure A**.

The Site comprises Thurston County Tax Parcel Nos. 78507100200 (former Unocal property) and 78507100100 (former Hulco property), which are both currently owned by the City of Olympia (City). In addition, a portion of the Site along the shoreline is owned by the State of Washington and managed by the Department of Natural Resources. The Unocal Bulk Plant operated on the Site from about 1910 to 1993. The Hulco property was a bulk fuel storage facility operated by different companies, including Shell Oil Company (Shell) and Atlantic Richfield Company (ARCO). The Shell/ARCO bulk plant operated from about 1924 to about 1980. The Site is currently occupied by a portion of the recently redeveloped Percival Landing Park (park) (see attached Figure 2).

Early characterization activities were conducted at the Site between 1988 and 1995. Contamination above MTCA cleanup levels was identified in both soil and groundwater. Contaminants were predominantly gasoline-, diesel-, and oil-range petroleum hydrocarbons (TPH-G, TPH-D, and TPH-O, respectively), and benzene. Free product was also present in some wells. In addition, halogenated volatile organic compounds (HVOCs) such as vinyl chloride, tetrachloroethylene (PCE), and trichloroethylene (TCE) were reportedly present in groundwater on the southern portion of the Site in 1995.

In 1995, a sizable cleanup was conducted on both parcels when the bulk plants ceased operations. Additional soil was removed in 2001. Please see Section 3 (Selection of cleanup action) for further details on this cleanup action. Following the cleanup, on October 20, 2003, Ecology issued a No Further Action (NFA) letter for the Site. However, the NFA stated that contaminated soils remained in the west wall of the excavated portion of the Site below the boardwalk, and in the northwest section adjacent a retaining wall (see attached

Figure 3). These soils were left in place due to concerns over compromising the structural integrity of the boardwalk and retaining wall. Reportedly, soil contamination was also left in place along the common boundary of the former Unocal and Hulco properties in the center of the Site, and along the southern boundary of the properties. Five monitoring well locations (MW-12 through MW-15, and B-7) located along the western boundary of the Site, adjacent to the boardwalk, were used to demonstrate compliance for groundwater, which was reportedly achieved for all contaminants of concern (COCs) sometime in 2002.

In September 2010, during shoreline excavation as part of park redevelopment, petroleum contamination was identified that resulted in a visible sheen on the waterway. This release occurred when the contractor encountered and removed a timber cribwall that was buried in the shoreline embankment. The release was reported to Ecology and was assigned Environmental Report Tracking System (ERTS) #622261. The Ecology Spills Team responded and contained the release to the waterway.

Following the incident, the City initiated an upland investigation to determine the source of the petroleum contamination. Between September and December 2010, numerous soil samples were collected by Anchor at multiple depths from 30 soil borings and nine test pits in the upland area (see attached Figure 4). Analytical results identified concentrations of TPH-G, TPH-D, TPH-O, benzene, and ethyl benzene in soil above MTCA Method A cleanup levels (see attached Tables 2a and 2b). The contamination was primarily located on the properties adjacent to the shoreline. One of the areas identified included the former Unocal and Hulco properties. Another area of contamination was identified south of Olympia Avenue. However, based on data collected to date, this source area appears to be different and separate from the Unocal/Hulco area, and is being addressed as a separate site (Olympia City Sewer Pump Station – F/S ID No. 31651436).

As a follow up to this investigation, Anchor advanced an additional seven soil borings (BH-33 through BH-39) and excavated two test pits (TP-10 and TP-11) on the Site in June 2011. Soil samples were collected from each location at multiple depths, and groundwater samples were collected from four of the borings (BH-33, BH-34, BH-37, and BH-38) from a temporary wellpoint screen interval of about 6 to 11 feet below ground surface (bgs). Two soil vapor samples were also collected from borings BH-36 and BH-39 (sample locations and analyses are shown in Figure 4 and Table 1, respectively).

Analytical results indicated the presence of TPH-G in one soil sample, TPH-D/TPH-O in one groundwater sample, and benzene in one soil vapor sample above MTCA cleanup levels or screening criteria (see attached Tables 2a, 2b, 3b, and 4). No structures that could potentially be impacted by vapor intrusion are located within 100 feet of the benzene exceedance in soil vapor. This includes the Harbor House that was constructed as part of park redevelopment. Regardless, as a precaution, the Harbor House was constructed with a vapor barrier.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

A Method B soil cleanup level for TPH for protection of the direct contact pathway was calculated by Anchor for the Site. A soil sample collected from boring BH-36 was analyzed for volatile and extractable petroleum hydrocarbons (VPH/EPH) and the results run through Ecology's MTCATPH11.1 Worksheets. The calculation resulted in a direct contact cleanup level of 2,724 milligrams per kilogram (mg/kg). The calculation also indicated that 100% non-aqueous phase liquid in the soil would not cause an exceedance in groundwater. Additional soil cleanup levels were derived by Anchor for protection of surface water due to the Site's proximity to Budd Inlet. However, no comparison of these levels was made with cleanup levels that would be appropriate for protection of the direct contact pathway to determine which would be more stringent. Regardless, Method A cleanup levels would be considered the most stringent, and none of the COCs detected in soil at the Site, aside from TPH-G (which meets the Method B cleanup level), exceed Method A cleanup levels.

Also due to the location of the Site adjacent to surface water, groundwater beneath the Site is not considered suitable as a potable source of drinking water. Therefore, groundwater to surface water migration would be considered the primary exposure pathway, and groundwater cleanup levels protective of surface water were established. Since no surface water criteria exists for TPH, Method A cleanup levels were used for comparison.

Soil vapor data was compared against Method B Soil Gas Screening Levels as defined in Ecology's draft Guidance for Evaluating Soil Vapor Intrusion.

Standard points of compliance are being used for the Site. The point of compliance for protection of groundwater shall be established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs. In addition, the point of compliance for the groundwater shall be established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site. Lastly, the point of compliance for the soil-to-vapor pathway shall be established in the ambient air throughout the Site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you proposed for the Site meets the substantive requirements of MTCA.

Cleanup actions conducted to date have included the following:

- In 1995, a substantial cleanup was conducted at the Site. An estimated 9,438 tons of petroleum-contaminated soil were excavated and disposed of at the Kitsap County Sanitary Landfill. About 55% of this soil originated from the Hulco property and 45% from the Unocal property. Also, about 60,000 gallons of treated wastewater was discharged to nearby catchbasins per Ecology guidance. Confirmation soil samples collected from the base and sidewalls of the excavation indicated the presence of residual contamination in some areas (see attached Figure 3).
- In 2001, an additional 890 tons of petroleum-contaminated soil was excavated from the Site and disposed of at Olympic View Landfill. Also, about 63,000 gallons of water from dewatering activities was discharged to the sanitary sewer per LOTT approval. Confirmation soil samples collected from the limits of the excavation identified residual contamination adjacent to the boardwalk and a retaining wall (see attached Figure 3).
- Between September 2010 and July 2011, during park redevelopment activities, about 11,000 tons of contaminated soil was removed from the shoreline, cove, and playground areas and disposal off Site at the Weyerhaeuser landfill in Castle Rock, Washington. A total of 16 confirmation samples (CS-11 through CS-15, and CS-20 through CS-30) were collected throughout the excavated areas and analyzed for the Site COCs (see attached Figure 4). Only two of the confirmation samples (CS-28 and CS-29) contained concentrations of COCs above MTCA cleanup levels; however, these areas were overexcavated and resampled (CS-30). Analytical results are presented in Tables 2a and 2b.
- The City had originally proposed to install sheet piling along a portion of the shoreline following the completion of in-water activities. However, since contamination was identified, the City altered their plans and installed sheet piling along the entire shoreline following the excavation of contaminated material (the sheet pile wall is illustrated on Figure 8). This was done to provide a more substantial barrier to prevent upland contamination from further migrating to the waterway. Deep sheet pile walls (60 feet in length) were installed along the entire length of the Site (except the cove area) to about -43 feet mean lower low water (MLLW), and short sheet pile walls (15 to 20 feet in length) were installed in the cove area to approximately 0 feet MLLW for bank stabilization. Analytical results of confirmation samples collected from in-water areas indicated that contamination was successfully removed from areas adjacent to the Site. However, according to Anchor, soil upland of the sheet pile wall in the vicinity of boring BH-11 may contain some residual petroleum contamination. A confirmation sample was not collected from the land side of the sheet pile wall when BH-11 was excavated. This area is currently capped by the concrete boardwalk.

In summary, residual contamination remaining at the Site includes a presumed small volume of petroleum contamination on the land side of the sheet pile wall in the vicinity of boring BH-11; a combined TPH-D/TPH-O concentration of 811 micrograms per liter ($\mu\text{g/L}$) in a grab groundwater sample collected from boring BH-38, which exceeds the MTCA Method A cleanup level of 500 $\mu\text{g/L}$; and a benzene concentration of 93 micrograms per cubic meter ($\mu\text{g/m}^3$) in soil vapor collected from boring BH-36, which exceeds the soil gas screening level of 32 $\mu\text{g/m}^3$.

As previously stated, the area of potential residual soil contamination is behind the sheet pile wall and is capped by the concrete boardwalk, and the soil vapor exceedance is not within 100 feet of any structure that could be impacted by vapor intrusion. The groundwater exceedance is less than twice the cleanup level and, based on existing data, appears to be localized. Due to the presence of the sheet pile wall, there is little to no movement of shallow groundwater beneath the Site. As such, it is not likely this localized exceedance would result in a release to surface water prior to natural attenuation to below cleanup levels occurring. Further, groundwater beneath the Site is not considered a potable source of drinking water. Presuming Institutional Controls are implemented at the Site (see discussion below), Ecology does not consider the localized exceedance in groundwater to be a threat to human health or the environment.

As part of their August 2012 Remedial Investigation/Feasibility Study, Anchor evaluated five potential cleanup alternatives for the Site:

1. No Action.
2. Institutional Controls.
3. Monitored Natural Recovery.
4. In Situ or Ex Situ Treatment of Soil.
5. Soil Removal.

Upon evaluating the costs and benefits of the alternatives using a disproportionate cost analysis, Anchor selected Institutional Controls as their preferred alternative. This alternative includes placing a deed restriction on the Site (in the form of an Environmental Covenant [EC]) that restricts certain uses of the Site (such as excavation of capped areas, groundwater usage, and building of certain structures without proper precautions for vapor intrusion).

Ecology has reviewed the evaluation of cleanup alternatives and concurs with the selection of Institutional Controls. Next steps include the need to draft an EC for Ecology review. **In addition to identifying areas of the Site where residual soil, groundwater, and soil vapor are present, the EC should summarize the Institutional Controls to be placed on the Site, including restrictions on intrusive activities, groundwater usage, and building of structures without proper vapor protection.** The process for drafting and filing the EC is as follows:

1. Conduct a title search to identify all persons holding an interest in the real property subject to the covenant. To save time later, you should conduct the search as early in the process as possible. Generally, Ecology will not sign the covenant unless all interest holders are willing to sign on as grantors or subordinate their interests. See step 5 below.
2. Draft the covenant using the boilerplate document available on the VCP web site: www.ecy.wa.gov/programs/tcp/vcp/vcp2008/vcpRequirements.html. Please note that any changes to the boilerplate language in the covenant must be approved by the Attorney General's Office.
3. Submit the draft covenant for review and comment to the appropriate land use planning authority in your jurisdiction. When requesting such review, please do the following:
 - Send me a copy of your written request.
 - Provide the authority with my contact information.
 - Request that the authority send me a copy of any written response.

Ecology will not approve the covenant unless the authority has been adequately consulted.

4. Upon completing your consultations with the local land use planning authority, submit the draft covenant to Ecology for review and approval. Unless already submitted, also submit to Ecology any comments provided by the planning authority or, if none were provided, documentation of your consultation.
5. Upon Ecology approval, obtain the signatures of all grantors of the covenant and obtain subordination agreements with any persons holding an interest in the real property subject to the covenant who are not signing the covenant as a grantor.
6. Upon obtaining the signatures of the grantors and any necessary subordination agreements, submit the covenant to Ecology for its signature as the grantee.
7. Upon obtaining Ecology's signature, record the covenant in every county where the real property subject to the covenant is located. For detailed recording instructions, please refer to Chapter 65.04 RCW.

8. Upon recording, return the original signed and recorded covenant to Ecology and provide a copy of the recorded covenant to the following persons:
- Each person that signed the covenant.
 - Each person holding a recorded interest in the real property subject to the covenant.
 - Each person in possession of the real property subject to the covenant at the time the covenant is executed.
 - Each municipality or other unit of local government in which real property subject to the covenant is located.
 - Any other persons Ecology requires.

The copy must be legible and the recording number must be evident.

For more information on how to create an environmental covenant, please refer to the Uniform Environmental Covenants Act (UECA), Chapter 64.70 RCW, and WAC 173-340-440 of the MTCA Cleanup Regulation.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

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3. Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the VCP.

4. State is immune from liability.

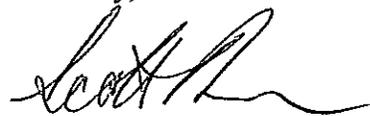
The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. See RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up the Site under the Voluntary Cleanup Program (VCP). As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-6347 or by e-mail at scott.rose@ecy.wa.gov.

Sincerely,



Scott Rose, L.G.
VCP Unit Manager
SWRO Toxics Cleanup Program

SIR/ksc:SW1146 Unocal-Hulco Proposed Site Cleanup Likely NFA 12032012

Enclosures: A – Description and Diagrams of the Site

By certified mail: (7010 2780 0000 2503 6212)

cc: Tom Morrill – City of Olympia
Mike Riley – Anchor QEA
Shannon Soto – WADNR
Gerald Tousley – Thurston County Health Department
Carol Johnston – Ecology
Dolores Mitchell – Ecology

Enclosure A

Description and Diagrams of the Site



Site Description

The former Unocal/Hulco Bulk Plant Site is located at 301 N Columbia Street in Olympia, Washington. The Site is bounded to the west by Budd Inlet, to the south by Olympia Avenue NW, to the east by N Columbia Street, and to the north by paved parking. The Site comprises Thurston County Tax Parcel Nos. 78507100200 (former Unocal property) and 78507100100 (former Hulco property), which are both currently owned by the City of Olympia (City). In addition, a portion of the Site along the shoreline is owned by the State of Washington and managed by the Department of Natural Resources. The Unocal Bulk Plant operated on the Site from about 1910 to 1993. The Hulco property was a bulk fuel storage facility operated by different companies, including Shell Oil Company (Shell) and Atlantic Richfield Company (ARCO). The Shell/ARCO bulk plant operated from about 1924 to about 1980. The Site is currently occupied by a portion of Percival Landing Park (park).

Soils encountered beneath the Site included well-graded fill, with occasional brick and concrete rubble, to about 6 feet below ground surface (bgs). Below the fill, soils were poorly graded fine sand with some shells. Depth to groundwater beneath the Site ranges from about 6 to 9 feet bgs and fluctuates seasonally and with the tides. Groundwater generally flows west towards Budd Inlet; however, some short-term reversal of gradient caused by tidal action has been historically observed in close proximity to Budd Inlet. Under current Site conditions, the sheet pile wall has caused a fairly flat gradient and lateral groundwater flow is minimal.

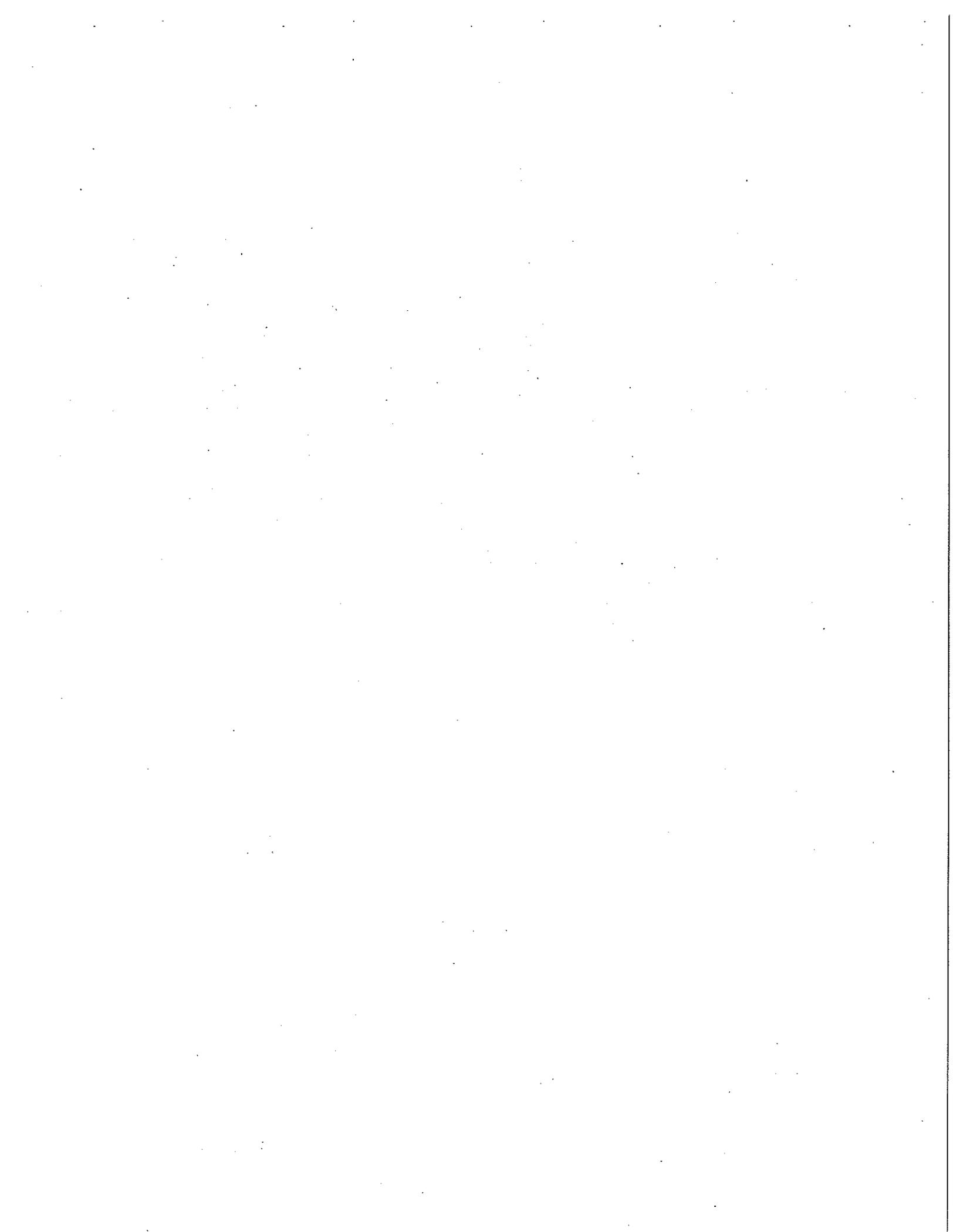


Table 1
Summary of RI Sample Collection and Testing

Station ID	Sample ID	Sample Date	Start Depth (ft) bgs	End Depth (ft) bgs	Tier 1 Testing	Tier 2 Testing	Excavated Post-Sampling ³
BH-11	BH-11-0-5	9/27/2010	0	5	TPH-HCID	—	Yes
	BH-11-5-10	9/27/2010	5	10	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Metals, PAHs	Partially
	BH-11-10-15	9/27/2010	10	15	TPH-HCID	—	No
	BH-11-15-20	9/27/2010	15	20	TPH-HCID	—	No
BH-12	BH-12-0-5	9/28/2010	0	5	TPH-HCID	—	Yes
	BH-12-5-10	9/28/2010	5	10	TPH-HCID	—	Partially
	BH-12-10-15	9/28/2010	10	15	TPH-HCID	—	No
	BH-12-15-20	9/28/2010	15	20	TPH-HCID	—	No
BH-13	BH-13-0-5	9/28/2010	0	5	TPH-HCID	TPH-G, TPH-Dx	Yes
	BH-13-5-10	9/28/2010	5	10	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	Partially
	BH-13-10-15	9/28/2010	10	15	TPH-HCID	—	No
	BH-13-15-20	9/28/2010	15	20	TPH-HCID	—	No
BH-14	BH-14-0-5	9/28/2010	0	5	TPH-HCID	—	Yes
	BH-14-5-10	9/28/2010	5	10	TPH-HCID	—	Partially
	BH-14-10-15	9/28/2010	10	15	TPH-HCID	—	No
	BH-14-15-20	9/28/2010	15	20	TPH-HCID	—	No
BH-15	BH-15-0-5	9/28/2010	0	5	TPH-HCID	—	Yes
	BH-15-5-10	9/28/2010	5	10	TPH-HCID	—	Partially
	BH-15-10-15	9/28/2010	10	15	TPH-HCID	—	No
	BH-15-15-20	9/28/2010	15	20	TPH-HCID	—	No
BH-22	BH-22-0-5	11/8/2010	0	5	TPH-HCID	TPH-Dx	No
	BH-22-5-10	11/8/2010	5	10	TPH-HCID	TPH-Dx	No
	BH-22-10-15	11/8/2010	10	15	TPH-HCID	—	No
	BH-22-15-20	11/8/2010	15	20	TPH-HCID	—	No
BH-23	BH-23-0-5	11/8/2010	0	5	TPH-HCID	—	No
	BH-23-5-10	11/8/2010	5	10	TPH-HCID	—	No
	BH-23-10-15	11/8/2010	10	15	TPH-HCID	—	No
	BH-23-15-20	11/8/2010	15	20	TPH-HCID	—	No
BH-24	BH-24-0-5	11/9/2010	0	5	TPH-HCID	—	No
	BH-24-5-10	11/9/2010	5	10	TPH-HCID	—	No
	BH-24-10-15	11/9/2010	10	15	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	No
	BH-24-15-20	11/9/2010	15	20	TPH-HCID	—	No
BH-25	BH-25-0-5	11/9/2010	0	5	TPH-HCID	—	No
	BH-25-5-10	11/9/2010	5	10	TPH-HCID	—	No
	BH-25-10-15	11/9/2010	10	15	TPH-HCID	—	No
	BH-25-15-20	11/9/2010	15	20	TPH-HCID	—	No
BH-26	BH-26-0-5	11/9/2010	0	5	TPH-HCID	—	No
	BH-26-5-10	11/9/2010	5	10	TPH-HCID	—	No
	BH-26-10-15	11/9/2010	10	15	TPH-HCID	—	No
	BH-26-15-20	11/9/2010	15	20	TPH-HCID	—	No
BH-27	BH-27-0-5	11/9/2010	0	5	TPH-HCID	—	No
	BH-27-5-10	11/9/2010	5	10	TPH-HCID	—	No
	BH-27-10-15	11/9/2010	10	15	TPH-HCID	—	No
	BH-27-15-20	11/9/2010	15	20	TPH-HCID	—	No
BH-28	BH-28-0-5	11/9/2010	0	5	TPH-HCID	—	Yes
	BH-28-5-10	11/9/2010	5	10	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	Yes
	BH-28-10-15	11/9/2010	10	15	TPH-HCID	—	Yes
	BH-28-15-20	11/9/2010	15	20	TPH-HCID	—	No
BH-33	BH-33-GW	6/17/2011	6	11	GW Tests ¹	—	No
	BH-33-SO-0-5	6/17/2011	0	5	TPH-HCID	—	No
	BH-33-SO-5-10	6/17/2011	5	10	TPH-HCID	—	No
	BH-33-SO-10-15	6/17/2011	10	15	TPH-HCID	—	No
BH-34	BH-33-SO-15-20	6/17/2011	15	20	TPH-HCID	—	No
	BH-34-GW	6/17/2011	5	10	GW Tests ¹	—	No
	BH-34-SO-0-5	6/17/2011	0	5	TPH-HCID	—	No
	BH-34-SO-5-10	6/17/2011	5	10	TPH-HCID	—	No
BH-35	BH-34-SO-10-15	6/17/2011	10	15	TPH-HCID	—	No
	BH-34-SO-15-20	6/17/2011	15	20	TPH-HCID	—	No
	BH-35-SO-0-5	6/17/2011	0	5	TPH-HCID	—	No
	BH-35-SO-5-10	6/17/2011	5	10	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead, VPH, EPH	No
BH-36	BH-35-SO-10-15	6/17/2011	10	15	TPH-HCID	—	No
	BH-35-SO-15-20	6/17/2011	15	20	TPH-HCID	—	No
	BH-36-SO-0-5	6/16/2011	0	5	TPH-HCID	—	No
	BH-36-SO-5-10	6/16/2011	5	10	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead, VPH, EPH	No
BH-36	BH-36-SO-10-15	6/16/2011	10	15	TPH-HCID	—	No
	BH-36-SO-15-20	6/16/2011	15	20	TPH-HCID	—	No
	BH-36-SV	6/16/2011	4.5	4.5	Air Tests ²	—	No

Table 1
Summary of RI Sample Collection and Testing

Station ID	Sample ID	Sample Date	Start Depth (ft) bgs	End Depth (ft) bgs	Tier 1 Testing	Tier 2 Testing	Excavated Post-Sampling ³
BH-37	BH-37-GW	6/16/2011	6	11	GW Tests ¹	--	No
	BH-37-SO-0-5	6/16/2011	0	5	TPH-HCID	--	No
	BH-37-SO-5-10	6/16/2011	5	10	TPH-HCID	--	No
	BH-37-SO-10-15	6/16/2011	10	15	TPH-HCID	--	No
	BH-37-SO-15-20	6/16/2011	15	20	TPH-HCID	--	No
BH-38	BH-38-GW	6/16/2011	6	11	GW Tests ¹	--	No
	BH-38-SO-0-5	6/16/2011	0	5	TPH-HCID	--	No
	BH-38-SO-5-10	6/16/2011	5	10	TPH-HCID	--	No
	BH-38-SO-10-15	6/16/2011	10	15	TPH-HCID	--	No
	BH-38-SO-15-20	6/16/2011	15	20	TPH-HCID	--	No
BH-39	BH-39-SO-0-5	6/16/2011	0	5	TPH-HCID	--	No
	BH-39-SO-5-10	6/16/2011	5	10	TPH-HCID	--	No
	BH-39-SO-10-15	6/16/2011	10	15	TPH-HCID	--	No
	BH-39-SO-15-20	6/16/2011	15	20	TPH-HCID	--	No
	BH-39-SV	6/16/2011	5	5	Alr Tests ²	--	No
TP-2	TP-2-4-6E	9/28/2010	4	6	TPH-HCID	--	Yes
	TP-2-4-6W	9/28/2010	4	6	TPH-HCID	--	Yes
	TP-2-6-8W	9/28/2010	6	8	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	Yes
	TP-2-8-9E	9/28/2010	8	9	TPH-HCID	--	Yes
TP-5	TP-5-4-5	2/16/2011	4	5	--	TPH-G, TPH-Dx, VOCs, total Lead	No
TP-6	TP-6-1-4	10/29/2010	1	4	TPH-HCID	--	No
	TP-6-4-10	10/29/2010	4	10	TPH-HCID	--	No
TP-7	TP-7-1-5	10/28/2010	1	5	TPH-HCID	--	No
	TP-7-6-10	10/28/2010	6	10	TPH-HCID	--	No
TP-8	TP-8-1-6	10/29/2010	1	6	TPH-HCID	--	No
	TP-8-6-9	10/29/2010	6	9	TPH-HCID	--	No
TP-9	TP-9-1-5	10/28/2010	1	5	TPH-HCID	--	No
	TP-9-8-10	10/28/2010	8	10	TPH-HCID	--	No
TP-10	TP-10	6/15/2011	4.5	5	TPH-HCID	--	No
TP-11	TP-11	6/15/2011	6	6.5	TPH-HCID	TPH-Dx, EPH	No
CS-11	CS-11	11/5/2010	0 cm	10 cm	TPH-HCID	TPH-Dx	No
CS-12	CS-12	11/4/2010	0 cm	10 cm	TPH-HCID	--	No
CS-13	CS-13	11/4/2010	0 cm	10 cm	TPH-HCID	--	No
CS-14	CS-14	11/2/2010	0 cm	10 cm	TPH-HCID	TPH-G, TPH-Dx, VOCs	No
CS-15	CS-15	11/2/2010	0 cm	10 cm	TPH-HCID	TPH-Dx	No
CS-20	CS-20	1/26/2011	0 cm	10 cm	--	TPH-G, TPH-Dx, VOCs, total Lead	No
CS-21	CS-21	1/28/2011	0 cm	10 cm	--	TPH-G, TPH-Dx, VOCs, total Lead	No
CS-22	CS-22	4/18/2011	10	12	TPH-HCID	--	No
CS-23	CS-23	4/19/2011	10	12	TPH-HCID	--	No
CS-24	CS-24	4/19/2011	10	12	TPH-HCID	--	No
CS-25	CS-25	4/19/2011	10	12	TPH-HCID	--	No
CS-26	CS-26	4/19/2011	10	12	TPH-HCID	--	No
CS-27	CS-27	4/26/2011	10	12	TPH-HCID	TPH-G, TPH-Dx, VOCs	No
CS-28	CS-28	4/26/2011	10	12	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	Yes
CS-29	CS-29	7/13/2011	10	12	TPH-HCID	TPH-G, TPH-Dx, VOCs, total Lead	Yes
CS-30	CS-30	7/20/2011	10	12	TPH-HCID	--	No

Notes:

- 1 Groundwater (GW) tests included TPH-G, TPH-DX, VOCs, and total and dissolved lead
- 2 Alr tests included VOCs and VPH/APH
- 3 Soil in this sample location was excavated after sample collection and no longer represents current site conditions
- bgs below ground surface
- TPH-HCID Total Petroleum Hydrocarbon Identification for Gasoline, Diesel, and Oil
- TPH-G Total Petroleum Hydrocarbons- Gasoline Range
- TPH-Dx Total Petroleum Hydrocarbons- Diesel and Oil Range
- VOCs Volatile Organic Compounds
- PAHs Polycyclic Aromatic Hydrocarbons
- Total Metals Arsenic, Barium, Cadmium Chromium, Lead, Mercury, Selenium, and Silver
- VPH Volatile Petroleum Hydrocarbons
- APH Aliphatic/Aromatic Petroleum Hydrocarbons
- EPH Extractable Petroleum Hydrocarbons
- Not available or applicable

Table 2a
RI Soil Sampling Results - Petroleum Hydrocarbons

Station ID	Sample ID	Sample Date	Sample Depth	HCID			NW-TPH			Sum of DRO/ORO
				GRO mg/kg	DRO mg/kg	ORO mg/kg	GRO mg/kg	DRO mg/kg	ORO mg/kg	
			Cleanup Level ¹	100 ^a	2,000	2,000	100 ^a	2,000	2,000	2000 ^b
BH-11	BH-11-0-5	9/27/2010	0 - 5 ft	13.8 U	34.4 U	68.9 U	—	—	—	68.9 U
	BH-11-5-10		5 - 10 ft	DETECT	DETECT	DETECT	6.51 U	5.32 U	543 J	5,863 J
	BH-11-10-15		10 - 15 ft	17.8 U	44.5 U	89 U	—	—	—	89 U
	BH-11-15-20		15 - 20 ft	18 U	44.9 U	89.8 U	—	—	—	89.8 U
BH-12	BH-12-0-5	9/28/2010	0 - 5 ft	14.2 U	35.5 U	71.1 U	—	—	—	71.1 U
	BH-12-5-10		5 - 10 ft	17.9 U	44.7 U	89.5 U	—	—	—	89.5 U
	BH-12-10-15		10 - 15 ft	18.4 U	46.1 U	92.2 U	—	—	—	92.2 U
	BH-12-15-20		15 - 20 ft	15 U	37.5 U	75 U	—	—	—	75 U
BH-13	BH-13-0-5	9/28/2010	0 - 5 ft	14.1 U	35.3 U	DETECT	5.27 U	38.4	230	268 J
	BH-13-5-10		5 - 10 ft	DETECT	DETECT	DETECT	9.21	1,130	134 J	1,264 J
	BH-13-10-15		10 - 15 ft	17.3 U	43.2 U	86.5 U	—	—	—	86.5 U
	BH-13-15-20		15 - 20 ft	14.7 U	36.8 U	73.7 U	—	—	—	73.7 U
BH-14	BH-14-0-5	9/28/2010	0 - 5 ft	14.6 U	36.5 U	72.9 U	—	—	—	72.9 U
	BH-14-5-10		5 - 10 ft	14.1 U	35.4 U	70.7 U	—	—	—	70.7 U
	BH-14-10-15		10 - 15 ft	18.1 U	45.3 U	90.6 U	—	—	—	90.6 U
	BH-14-15-20		15 - 20 ft	22 U	55 U	110 U	—	—	—	110 U
BH-15	BH-15-0-5	9/28/2010	0 - 5 ft	14.1 U	35.3 U	70.7 U	—	—	—	70.7 U
	BH-15-5-10		5 - 10 ft	19.2 U	47.9 U	95.9 U	—	—	—	95.9 U
	BH-15-10-15		10 - 15 ft	23.3 U	58.3 U	117 U	—	—	—	117 U
	BH-15-15-20		15 - 20 ft	20.3 U	50.7 U	101 U	—	—	—	101 U
BH-22	BH-22-0-5	11/8/2010	0 - 5 ft	19.3 U	48.2 U	DETECT	—	5.23 J	72.5	77.7 J
	BH-22-5-10		5 - 10 ft	20.5 U	51.3 U	DETECT	—	15.7 J	96.4	112 J
	BH-22-10-15		10 - 15 ft	23.7 U	59.3 U	119 U	—	—	—	119 U
	BH-22-15-20		15 - 20 ft	23.4 U	58.6 U	117 U	—	—	—	117 U
BH-23	BH-23-0-5	11/8/2010	0 - 5 ft	19.4 U	48.5 U	97 U	—	—	—	97 U
	BH-23-5-10		5 - 10 ft	21.4 U	53.6 U	107 U	—	—	—	107 U
	BH-23-10-15		10 - 15 ft	22 U	54.9 U	110 U	—	—	—	110 U
	BH-23-15-20		15 - 20 ft	25.7 U	64.2 U	128 U	—	—	—	128 U
BH-24	BH-24-0-5	11/9/2010	0 - 5 ft	17.9 U	44.8 U	89.7 U	—	—	—	89.7 U
	BH-24-5-10		5 - 10 ft	15 U	37.4 U	74.8 U	—	—	—	74.8 U
	BH-24-10-15		10 - 15 ft	DETECT	DETECT	DETECT	7.42 U	1,950	209 J	2,159 J
	BH-24-15-20		15 - 20 ft	18.4 U	46 U	92 U	—	—	—	92 U
BH-25	BH-25-0-5	11/9/2010	0 - 5 ft	16.1 U	40.2 U	80.4 U	—	—	—	80.4 U
	BH-25-5-10		5 - 10 ft	17.7 U	44.4 U	88.7 U	—	—	—	88.7 U
	BH-25-10-15		10 - 15 ft	20.2 U	50.5 U	101 U	—	—	—	101 U
	BH-25-15-20		15 - 20 ft	25.9 U	64.7 U	129 U	—	—	—	129 U
BH-26	BH-26-0-5	11/9/2010	0 - 5 ft	16.8 U	42 U	84 U	—	—	—	84 U
	BH-26-5-10		5 - 10 ft	15 U	37.6 U	75.2 U	—	—	—	75.2 U
	BH-26-10-15		10 - 15 ft	22.3 U	55.8 U	112 U	—	—	—	112 U
	BH-26-15-20		15 - 20 ft	18.4 U	46 U	92 U	—	—	—	92 U
BH-27	BH-27-0-5	11/9/2010	0 - 5 ft	15.1 U	37.7 U	75.3 U	—	—	—	75.3 U
	BH-27-5-10		5 - 10 ft	16.8 U	42 U	84 U	—	—	—	84 U
	BH-27-10-15		10 - 15 ft	20.3 U	50.9 U	102 U	—	—	—	102 U
	BH-27-15-20		15 - 20 ft	24.8 U	61.9 U	124 U	—	—	—	124 U
BH-28	BH-28-0-5	11/9/2010	0 - 5 ft	14.5 U	36.3 U	72.6 U	—	—	—	72.6 U
	BH-28-5-10		5 - 10 ft	DETECT	DETECT	77.1 U	1,230	615	32.9 J	648 J
	BH-28-10-15		10 - 15 ft	18.5 U	46.3 U	92.7 U	—	—	—	92.7 U
	BH-28-15-20		15 - 20 ft	26.5 U	66.3 U	133 U	—	—	—	133 U
BH-33	BH-33-SO-0-5	6/16/2011	0 - 5 ft	20.1 U	50.2 U	100 U	—	—	—	100 U
	BH-33-SO-5-10		5 - 10 ft	22.8 U	57 U	114 U	—	—	—	114 U
	BH-33-SO-10-15		10 - 15 ft	24 U	59.9 U	120 U	—	—	—	120 U
	BH-33-SO-15-20		15 - 20 ft	23.8 U	59.4 U	119 U	—	—	—	119 U
BH-34	BH-34-SO-0-5	6/17/2011	0 - 5 ft	20 U	50.1 U	100 U	—	—	—	100 U
	BH-34-SO-5-10		5 - 10 ft	21.8 U	54.4 U	109 U	—	—	—	109 U
	BH-34-SO-10-15		10 - 15 ft	24.6 U	61.5 U	123 U	—	—	—	123 U
	BH-34-SO-15-20		15 - 20 ft	29 U	72.5 U	145 U	—	—	—	145 U

Table 2a
RI Soil Sampling Results - Petroleum Hydrocarbons

Station ID	Sample ID	Sample Date	Sample Depth	HCID			NW-TPH			Sum of DRO/ORO mg/kg
				GRO mg/kg	DRO mg/kg	ORO mg/kg	GRO mg/kg	DRO mg/kg	ORO mg/kg	
Cleanup Level ¹				100 ^a	2,000	2,000	100 ^b	2,000	2,000	2000 ^b
BH-35	BH-35-SO-0-5	6/16/2011	0 - 5 ft	20.3 U	50.8 U	102 U	--	--	--	102 U
	BH-35-SO-5-10		5 - 10 ft	DETECT	DETECT	DETECT	80.8	121	137	258
	BH-35-SO-10-15		10 - 15 ft	25.4 U	63.6 U	127 U	--	--	--	127 U
	BH-35-SO-15-20		15 - 20 ft	24.1 U	60.3 U	121 U	--	--	--	121 U
BH-36	BH-36-SO-0-5	6/16/2011	0 - 5 ft	21.2 U	52.9 U	106 U	--	--	--	106 U
	BH-36-SO-5-10		5 - 10 ft	DETECT	DETECT	106 U	120	837	92.1	929
	BH-36-SO-10-15		10 - 15 ft	25 U	62.4 U	125 U	--	--	--	125 U
	BH-36-SO-15-20		15 - 20 ft	25.5 U	63.7 U	127 U	--	--	--	127 U
BH-37	BH-37-SO-0-5	6/16/2011	0 - 5 ft	19.2 U	48.1 U	96.1 U	--	--	--	96.1 U
	BH-37-SO-5-10		5 - 10 ft	20.5 U	51.1 U	102 U	--	--	--	102 U
	BH-37-SO-10-15		10 - 15 ft	25.4 U	63.5 U	127 U	--	--	--	127 U
	BH-37-SO-15-20		15 - 20 ft	24 U	60 U	120 U	--	--	--	120 U
BH-38	BH-38-SO-0-5	6/16/2011	0 - 5 ft	19.7 U	49.2 U	98.5 U	--	--	--	98.5 U
	BH-38-SO-5-10		5 - 10 ft	22 U	54.9 U	110 U	--	25 U	50 U	110 U
	BH-38-SO-10-15		10 - 15 ft	23.9 U	59.7 U	119 U	--	--	--	119 U
	BH-38-SO-15-20		15 - 20 ft	22.8 U	56.9 U	114 U	--	--	--	114 U
BH-39	BH-39-SO-0-5	6/16/2011	0 - 5 ft	21.1 U	52.7 U	105 U	--	--	--	105 U
	BH-39-SO-5-10		5 - 10 ft	21.8 U	54.5 U	109 U	--	--	--	109 U
	BH-39-SO-10-15		10 - 15 ft	24.6 U	61.4 U	123 U	--	--	--	123 U
	BH-39-SO-15-20		15 - 20 ft	25.6 U	64 U	128 U	--	--	--	128 U
TP-2	TP-2-4-6E	9/28/2010	4 - 6 ft	14.8 U	37.1 U	74.1 U	--	--	--	74.1 U
	TP-2-4-6W		4 - 6 ft	16.4 U	40.9 U	81.9 U	--	--	--	81.9 U
	TP-2-6-8W		6 - 8 ft	DETECT	DETECT	DETECT	783	2,840	312 J	3,152 J
	TP-2-8-9E		8 - 9 ft	15.3 U	38.3 U	76.7 U	--	--	--	76.7 U
TP-5	TP-5-4-5	2/16/2011	4 - 5 ft	--	--	--	116	898	57.4 J	955.4 J
TP-6	TP-6-1-4	10/29/2010	1 - 4 ft	17.8 U	44.5 U	88.9 U	--	--	--	88.9 U
	TP-6-4-10		4 - 10 ft	26 U	64.9 U	130 U	--	--	--	130 U
TP-7	TP-7-1-5	10/28/2010	1 - 5 ft	22.9 U	57.4 U	115 U	--	--	--	115 U
	TP-7-6-10		6 - 10 ft	25 U	62.6 U	125 U	--	--	--	125 U
TP-8	TP-8-1-6	10/29/2010	1 - 6 ft	16.8 U	42.1 U	84.2 U	--	--	--	84.2 U
	TP-8-6-9		6 - 9 ft	21.5 U	53.6 U	107 U	--	--	--	107 U
TP-9	TP-9-1-5	10/28/2010	1 - 5 ft	22.7 U	56.7 U	113 U	--	--	--	113 U
	TP-9-8-10		8 - 10 ft	23.5 U	58.7 U	117 U	--	--	--	117 U
TP-10	TP-10	6/15/2011	4.5 - 5 ft	20.5 U	51.3 U	103 U	--	--	--	103 U
TP-11	TP-11	6/15/2011	6 - 6.5 ft	20.8 U	DETECT	104 U	--	90.8	59	59
CS-11	CS-11	11/5/2010	0 - 10 cm	19.4 U	48.4 U	DETECT	--	23.4 J	232	255 J
CS-12	CS-12	11/4/2010	0 - 10 cm	20.8 U	51.9 U	104 U	--	--	--	104 U
CS-13	CS-13	11/4/2010	0 - 10 cm	20.6 U	51.6 U	103 U	--	--	--	103 U
CS-14	CS-14	11/2/2010	0 - 10 cm	DETECT	DETECT	105 U	10.3	159	38.1 J	197 J
CS-15	CS-15	11/2/2010	0 - 10 cm	22 U	54.9 U	DETECT	--	11.2 J	59.9 J	71.1 J
CS-20	CS-20	1/26/2011	0 - 10 cm	--	--	--	11.6 U	8.24 J	26.3 J	34.54 J
CS-21	CS-21	1/28/2011	0 - 10 cm	--	--	--	10.7 U	7.22 J	18.3 J	25.52 J
CS-22	CS-22	4/18/2011	10 - 12 ft	27.1 U	67.8 U	136 U	--	--	--	136 U
CS-23	CS-23	4/19/2011	10 - 12 ft	26.3 U	65.7 U	131 U	--	--	--	131 U
CS-24	CS-24	4/19/2011	10 - 12 ft	26.7 U	66.7 U	133 U	--	--	--	133 U
CS-25	CS-25	4/19/2011	10 - 12 ft	26.1 U	65.1 U	130 U	--	--	--	130 U
CS-26	CS-26	4/19/2011	10 - 12 ft	23.8 U	59.5 U	119 U	--	--	--	119 U
CS-27	CS-27	4/26/2011	10 - 12 ft	23.3 U	58.2 U	116 U	7.36 U	23.9	23.5 U	23.9
CS-28	CS-28	4/26/2011	10 - 12 ft	DETECT	DETECT	DETECT	1,480	8,260	430 U	8,260
CS-29	CS-29	7/13/2011	10 - 12 ft	DETECT	DETECT	95.4 U	1,980	525	114	639
CS-30	CS-30	7/20/2011	10 - 12 ft	23.4 U	58.5 U	117 U	--	--	--	117 U

Table 2a
RI Soil Sampling Results - Petroleum Hydrocarbons

Notes:

MTCA	Model Toxics Control Act	—	Not analyzed
ft	feet	Bold	Detected
cm	centimeters	J	Estimated
mg	milligram	U	Compound analyzed, but not detected above detection limit
kg	kilogram	UJ	Compound analyzed, but not detected above estimated detection limit

1. Cleanup levels presented for petroleum based on MTCA Method A cleanup levels for screening purposes. Petroleum fractionation testing was used along with Ecology's TPH Workbook to develop a site-specific cleanup level (Appendix B). A site-specific TPH soil cleanup level of 2,724 mg/kg was developed based on protection of direct contact for unrestricted land use, and for protection of groundwater quality.
 - a. Gasoline mixtures without benzene and total of ethylbenzene, toluene, and xylenes less than 1% of the gasoline mixture have a screening level of 100 mg/kg. Mixtures with benzene, etc. have a screening level of 30 mg/kg.
 - b. If the sum of TPH-diesel and oil exceed the MTCA cleanup criteria, the result is considered an exceedance.
 1. Detected concentration is greater than MTCA Method A screening level.
 2. Soil at this sample location was excavated after sample collection and no longer represents current site conditions unless otherwise stated.
- QA3 validation applied.
- Totals are calculated as the sum of all detected results and 1/2 the undetected reporting limit. If all are undetected results, the highest reporting limit value is reported as the sum.

Table 2b
RI Soil Sampling Results - VOCs and Lead

Station ID	BH-11	BH-13	BH-24	BH-28	BH-35	BH-36	TP-2	TP-5	CS-14	CS-20	CS-21	CS-27	CS-28	CS-29
Sample Name	BH-11-5-10	BH-13-5-10	BH-24-10-15	BH-28-5-10	BH-35-5-10	BH-36-5-10	TP-2-6-8W	TP-5-4-5	CS-14	CS-20	CS-21	CS-27	CS-28	CS-29
Sample Date	9/27/2010	9/28/2010	11/9/2010	11/9/2010	6/16/2011	6/16/2011	9/28/2010	2/16/2011	11/2/2010	1/26/2011	1/28/2011	4/26/2011	4/26/2011	7/13/2011
Depth	5 - 10 ft	5 - 10 ft	10 - 15 ft	5 - 10 ft	5 - 10 ft	5 - 10 ft	6 - 8 ft	4 - 5 ft	0 - 10 cm	0 - 10 cm	0 - 10 cm	10 - 12 ft	10 - 12 ft	10 - 12 ft
Cleanup Level														
Conventional Parameters (percent)														
Total Solids	80.1	89.4	76.8	89.4	88.1	87.9	81.1	77.2	81.6	59.9	60.1	79.6	85.7	85.7
Volatiles Organics (mg/kg)														
Benzene	0.03	0.0165 U	0.0185 U	0.0157 U	0.0153 U	0.0097 J	0.0553 U	0.0164 U	0.0087 U	0.0289 U	0.0268 U	0.0184 U	0.0647	0.0172 U
Ethylbenzene	6.0	0.0325 U	0.0183 J	0.0515 U	0.0305 U	0.0267 U	0.0783 J	0.0347	0.0174 U	0.0578 U	0.0537 U	0.0368 U	0.154 U	0.0686 U
Toluene	7.0	0.0651 U	0.0611 U	0.103 U	0.0611 U	0.0533 U	0.261 U	0.0654 U	0.0348 U	0.116 U	0.107 U	0.0736 U	0.308 U	0.0343 U
m,p-Xylene	--	0.0851 U	0.0611 U	0.103 U	0.0611 U	0.0533 U	0.159 J	0.0654 U	0.0522 U	0.116 U	0.107 U	0.0736 U	0.157 U	0.0343 U
o-Xylene	--	0.0325 U	0.0306 U	0.0669 U	0.0305 U	0.0192 J	0.123 J	0.0327 U	0.0209 U	0.0578 U	0.107 U	0.0368 U	0.123	0.0686 U
Total Xylene (U = 1/2)	9.0	0.0651 U	0.0611 U	0.103 U	0.0611 U	0.0458 U	0.282 J	0.0654 U	0.0522 U	0.116 U	0.107 U	0.0736 U	0.28	0.208
1,2-Dibromoethane (ED8)	0.005	0.0325 U	0.0306 U	0.0515 U	0.0305 U	0.0277 U	0.131 U	0.0327 U	0.0174 U	0.0578 U	0.0537 U	0.0368 U	0.154 U	0.0343 U
1,2-Dichloroethane	--	0.0202 J	0.022 J	0.0515 U	0.0305 U	0.0267 U	0.151 U	0.0327 U	0.0174 U	0.0578 U	0.0537 U	0.0368 U	0.154 U	0.0343 U
Methyl tert-butyl ether (MTBE)	0.1	0.0651 U	0.0611 U	0.103 U	0.0611 U	0.0533 U	0.261 U	0.0327 U	0.0348 U	0.0578 U	0.0537 U	0.0368 U	0.308 U	0.0686 U
Metals (mg/kg)														
Lead	6.41	11.6	5.36	4.46	5.29	5.66	13.2	12.6	--	9.45	11.9	--	8.42	4.32

Notes:
 MTCA - Model Toxics Control Act
 ft - feet
 cm - centimeters
 mg - milligram
 kg - kilogram

-- Not analyzed
 Bold - Detected result
 J - Estimated value
 U - Compound analyzed, but not detected above detection limit
 UJ - Compound analyzed, but not detected above estimated detection limit

Detected concentration is greater than MTCA Method A screening level
 Non-detected concentration is above one or more identified screening levels
 Soil at this sample location was excavated after sample collection and no longer represents current site conditions unless otherwise stated
 O&A validation applied.

Total 17 LPAH (Low PAH) are the total of 2-Methylnaphthalene, Naphthalene, Acenaphthylene, Fluorene, Phenanthrene and Anthracene.
 Total 17 HPAH (High PAH) are the total of Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-c,d)pyrene, Indeno(1,2,3-c,d)perylene, Benzo(a,h)anthracene and Benzo(a,h)perylene.
 Totals are calculated as the sum of all detected results and 1/2 the undetected reporting limit. If all are undetected results, the highest reporting limit value is reported as the sum.

Table 2c
RI Soil Sampling Results - PAHs, Metals, and Petroleum Fractionation

Analyte	Station ID	BH-11	BH-35	BH-36	TP-11
	Sample Name	BH-11-5-10	BH-35-50-5-10	BH-36-50-5-10	TP-11
	Sample Date	9/27/2010	6/16/2011	6/16/2011	6/15/2011
	Depth	5 - 10 ft	5 - 10 ft	5 - 10 ft	6 - 6.5 ft
Conventional Parameters (percent)	Cleanup Level				
Total solids	--	80.1	88.1	87.9	93.1
Polycyclic Aromatic Hydrocarbons (mg/kg)					
1-Methylnaphthalene	--	0.118 U	--	--	--
2-Methylnaphthalene	--	0.119 U	--	--	--
Benzo(a)anthracene	--	0.0592 U	--	--	--
Benzo(a)pyrene	0.1	0.0592 U	--	--	--
Benzo(b)fluoranthene	--	0.0592 U	--	--	--
Benzo(k)fluoranthene	--	0.0592 U	--	--	--
Benzo(b+k)fluoranthene	--	0.0592 U	--	--	--
Chrysene	--	0.0592 U	--	--	--
Dibenzo(a,h)anthracene	--	0.0592 U	--	--	--
Indeno(1,2,3-c,d)pyrene	--	0.0592 U	--	--	--
Naphthalene	--	0.118 U	--	--	--
Total cPAH TEQ (U = 1/2)	0.1	0.0592 U	--	--	--
Total Naphthalenes (U = 1/2)	5.0	0.119 U	--	--	--
Metals (mg/kg)					
Arsenic	20	6.54	--	--	--
Barium	--	16.3	--	--	--
Cadmium	2.0	0.432 J	--	--	--
Chromium	2,000	22.6	--	--	--
Lead	250	6.41	--	--	--
Mercury	2.0	0.0381 J	--	--	--
Selenium	--	2.4 U	--	--	--
Silver	--	1.2 U	--	--	--
Extractable Petroleum Hydrocarbons (mg/kg)					
C8-C10 Aliphatic	--	--	2.3 U	4.8	2 U
C10-C12 Aliphatic	--	--	3.4	31	2 U
C12-C16 Aliphatic	--	--	20	180	5.4
C16-C21 Aliphatic	--	--	33	140	36
C21-C34 Aliphatic	--	--	56	39	21
C8-C10 Aromatic	--	--	2.3 U	2.3 U	2 U
C10-C12 Aromatic	--	--	2.3 U	2.5	2 U
C12-C16 Aromatic	--	--	3.6	28	2 U
C16-C21 Aromatic	--	--	15	87	2.7
C21-C34 Aromatic	--	--	16	26	4.9
Volatile Petroleum Hydrocarbons (mg/kg)					
C5-C6 Aliphatic	--	--	12 U	9.7 U	--
C6-C8 Aliphatic	--	--	12 U	9.7 U	--
C12-C13 Aromatic	--	--	40	9.7 U	--
Benzene	--	--	1.2 U	0.970 U	--
Ethylbenzene	--	--	1.2 U	0.970 U	--
Toluene	--	--	1.2 U	0.970 U	--
m,p-Xylene	--	--	2.4 U	1.9 U	--
o-Xylene	--	--	1.2 U	0.970 U	--
n-Pentane (C5)	--	--	1.2 U	0.970 U	--
n-Hexane	--	--	1.2 U	0.970 U	--
n-Octane (C8)	--	--	1.2 U	0.970 U	--
n-Decane (C10)	--	--	2.2	0.970 U	--
n-Dodecane (C12)	--	--	3.7	0.970 U	--
Methyl tert-butyl ether (MTBE)	--	--	1.2 U	0.970 U	--

Notes:

MTCA - Model Toxics Control Act

ft - feet

mg - milligram

kg - kilogram

PAH - Polycyclic Aromatic Hydrocarbon

-- Not analyzed

Bold - Detected result

J - Estimated value

U - Compound analyzed, but not detected above detection limit

UJ - Compound analyzed, but not detected above estimated detection limit

 Detected concentration is greater than MTCA Method A screening level

 Non-detected concentration is above one or more identified screening levels

 Soil at this sample location was excavated after sample collection and no longer represents current site conditions unless otherwise stated
QA1 validation applied.

Totals are calculated as the sum of all detected results and 1/2 the undetected reporting limit. If all are undetected results, the highest reporting limit value is reported as the sum.

Total Naphthalenes includes Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene.

cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

Table 3a
Historical Compliance Groundwater Sampling Results

Analyte	Sample Number	MW-13A					MW-15	
		Sample Date	2/18/2002	5/23/2002	8/7/2002	11/1/2002	8/7/2002	11/1/2002
Total Petroleum Hydrocarbons (µg/l)	Cleanup Level							
Gasoline Range Hydrocarbons	800	50 U	50 U	50 U	50 U	163	149	
Diesel Range Hydrocarbons	500	250 U	250 U	250 U	250 U	250 U	250 U	
Residual Range Hydrocarbons	500	750 U	750 U	750 U	750 U	750 U	700 U	
Volatile Organics (µg/l)								
Benzene	23	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	
Ethylbenzene	2,100	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	
Toluene	15,000	0.20 U	0.20 U	0.20 U	0.20 U	0.871	0.20 U	
Total Xylene (U = 1/2)	1,000	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	

Notes:

A summary of the development of groundwater cleanup levels is presented in Table 6 and are based on the protection of marine surface water.

B Detected result

J Estimated value

U Compound analyzed, but not detected above detection limit

Data is from the GeoEngineers November 2002 Quarterly Groundwater Monitoring Reports (December 5, 2002)

**Table 4
RI Soil Vapor Sampling Results**

Analyte	Location ID	BH-36	BH-39
	Sample Name	BH-36-SV	BH-39-SV
	Sample Date	6/17/2011	6/16/2011
	Sample Depth	4.5 - 4.5 ft	5 - 5 ft
Total Petroleum Hydrocarbons (µg/m3)		Screening Level¹	
APH (C5-C8 Aliphatic)	270,000	8,000	184
APH (C8-C12 Aliphatic)	14,000 ²	6,480	135 U
APH (C8-C10 Aromatic)	18,000 ³	2,800	160
APH (C10-C12 Aromatic)	--	130 U	120 U
Volatile Organics (µg/m3)			
1,2-Dibromoethane (Ethylene dibromide)	1.1	8.9 U	8.3 U
1,2-Dichloroethane	9.6	4.7 U	4.4 U
Benzene	32	93	11
Ethylbenzene	46,000	300	25
m,p-Xylene	4,600	1,300	110
Methyl tert-butyl ether (MTBE)	960	4.2 U	3.9 U
o-Xylene	4,600	410	30
Toluene	220,000	1,400	150
Total Xylene (U = 1/2)	--	1,710	140

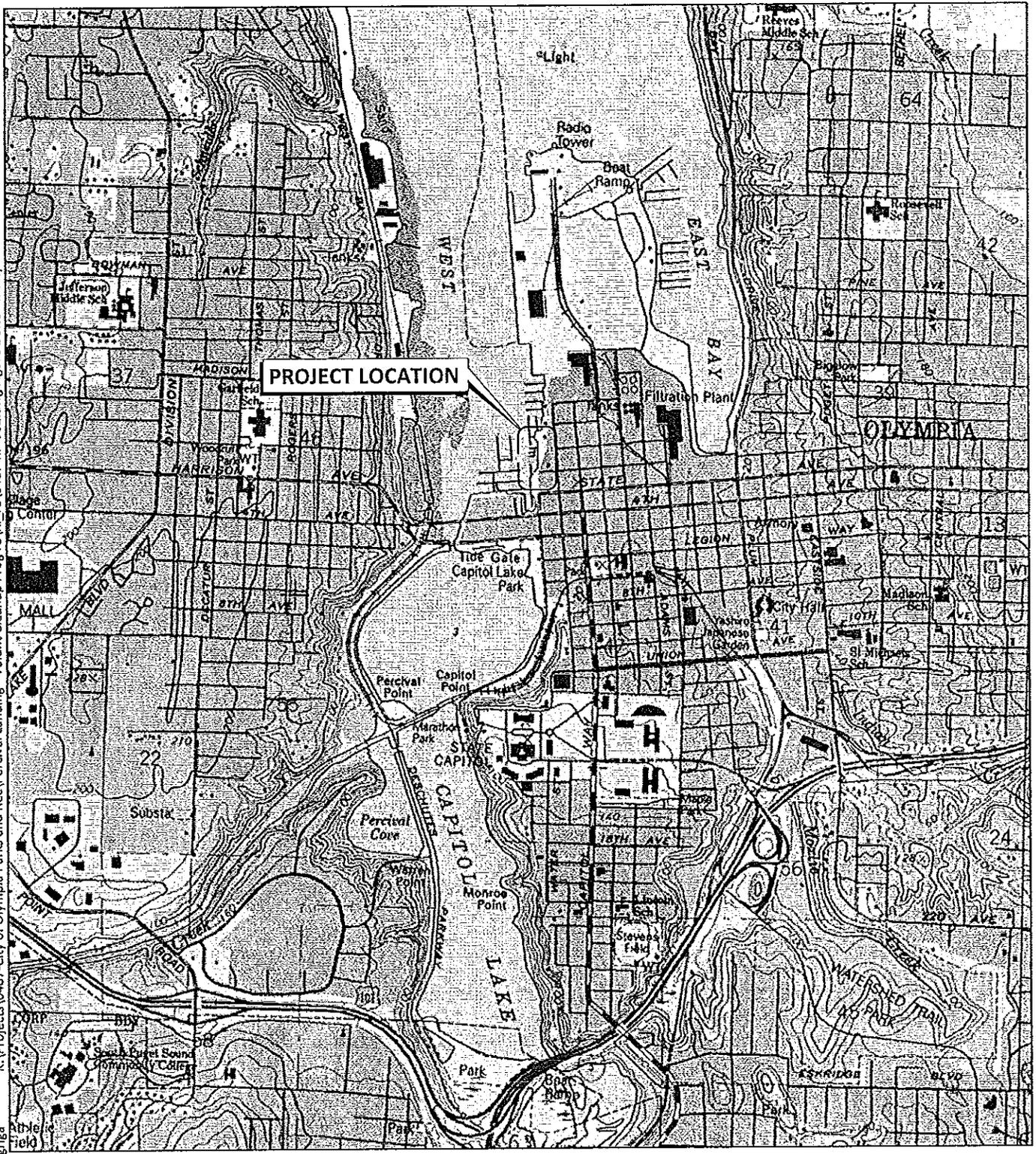
Notes:

Totals are calculated as the sum of all detected results and 1/2 the undetected reporting limit. If all are undetected results, the highest reporting limit value is reported as the sum.

- 1 Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, Table B-1
- 2 Criteria is for C9-C12 fraction but analytical data included C8 range therefore the concentration is a conservative value
- 3 Criteria is for C9-C10 fraction but analytical data included C8 range therefore the concentration is a conservative value

- Bold** Detected result
- N Normal Field Sample
- U Compound analyzed, but not detected above detection limit
-  Detected concentration is greater than screening level
-  Non-detected concentration is above screening level

K:\Projects\0487-City of Olympia Parks and Rec\Perceval Landing - Volunt Cleanup Prog FSVRL_FS10487-RP-002.dwg Figure 1 Site Vicinity
Apr 09, 2012 3:07pm teriga

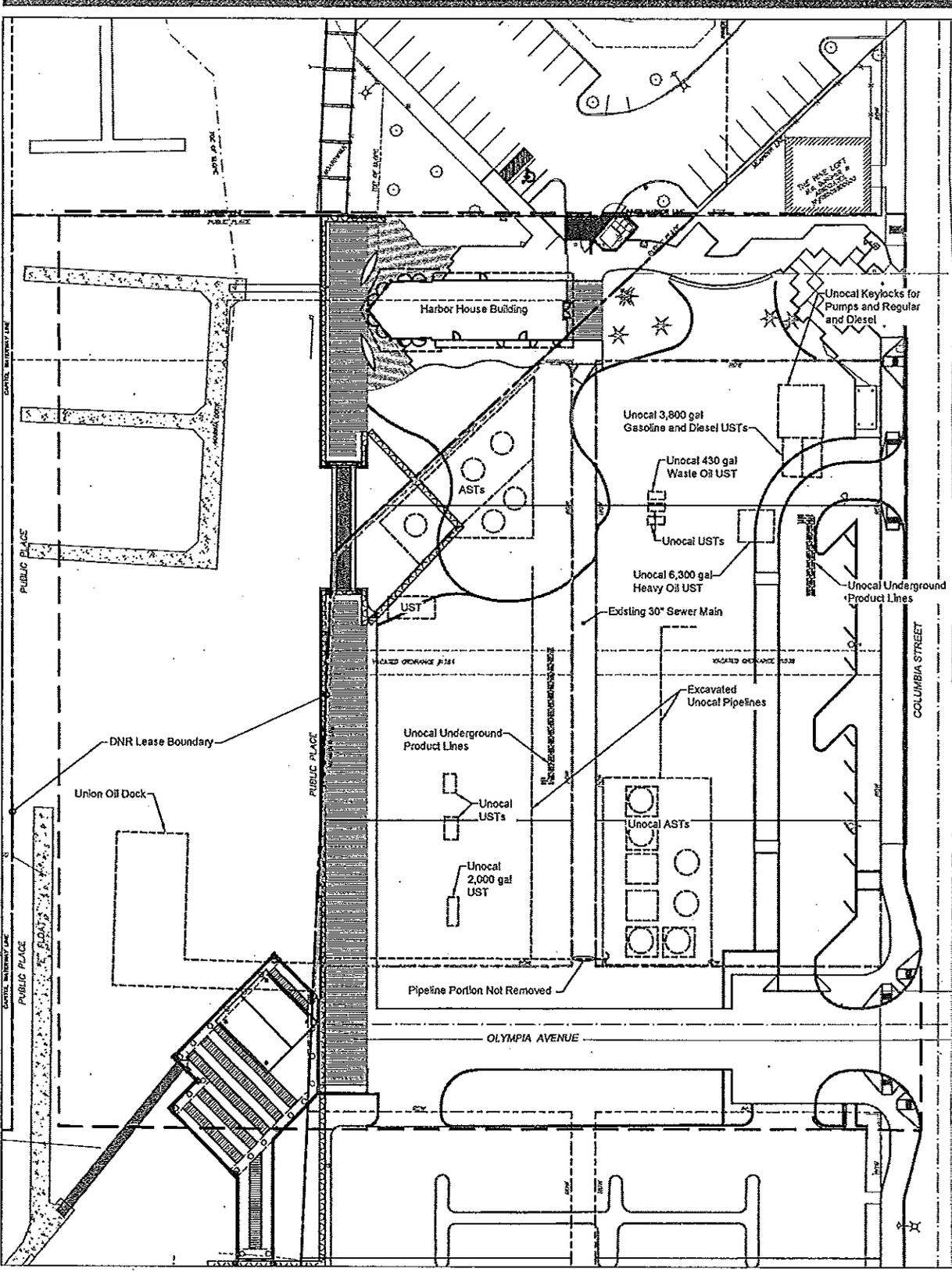


SOURCE: Base map prepared from Terrain Navigator Pro
USGS 7.5 minute quadrangle map(s) of Tumwater, WA.



Figure 1
Site Vicinity
Remedial Investigation / Feasibility Study
Former Unocal Bulk Plant 0828 and Hulco Property

Aug 20, 2012 3:40pm g:\p\Projects\0828-CIB of Olympia Pier and Rec\Perceval Landing - Volunt Cleanup Ping FSR\ FSD\087-RR-Occulog Figure 2 Current and Historical Property Boundaries and Features
 Contour Interval 10'



NOTE: UNOCAL location data from 1995 Geo Engineers figure.
SOURCE: Percival Landing Major Rehabilitation OA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.
HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORS.
VERTICAL DATUM: National Ocean Service Mean Lower Low Water (MLLW), 1983-2001 Epoch.

- LEGEND:**
- Former Unocal and Hulco Property RI-FS Study Area
 - - - Approximate Location of Historical Features
 - Historic Hulco Property Boundary
 - Historic Unocal Property Boundary
 - DNC Lease Boundary

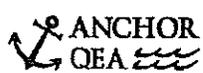
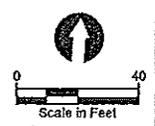
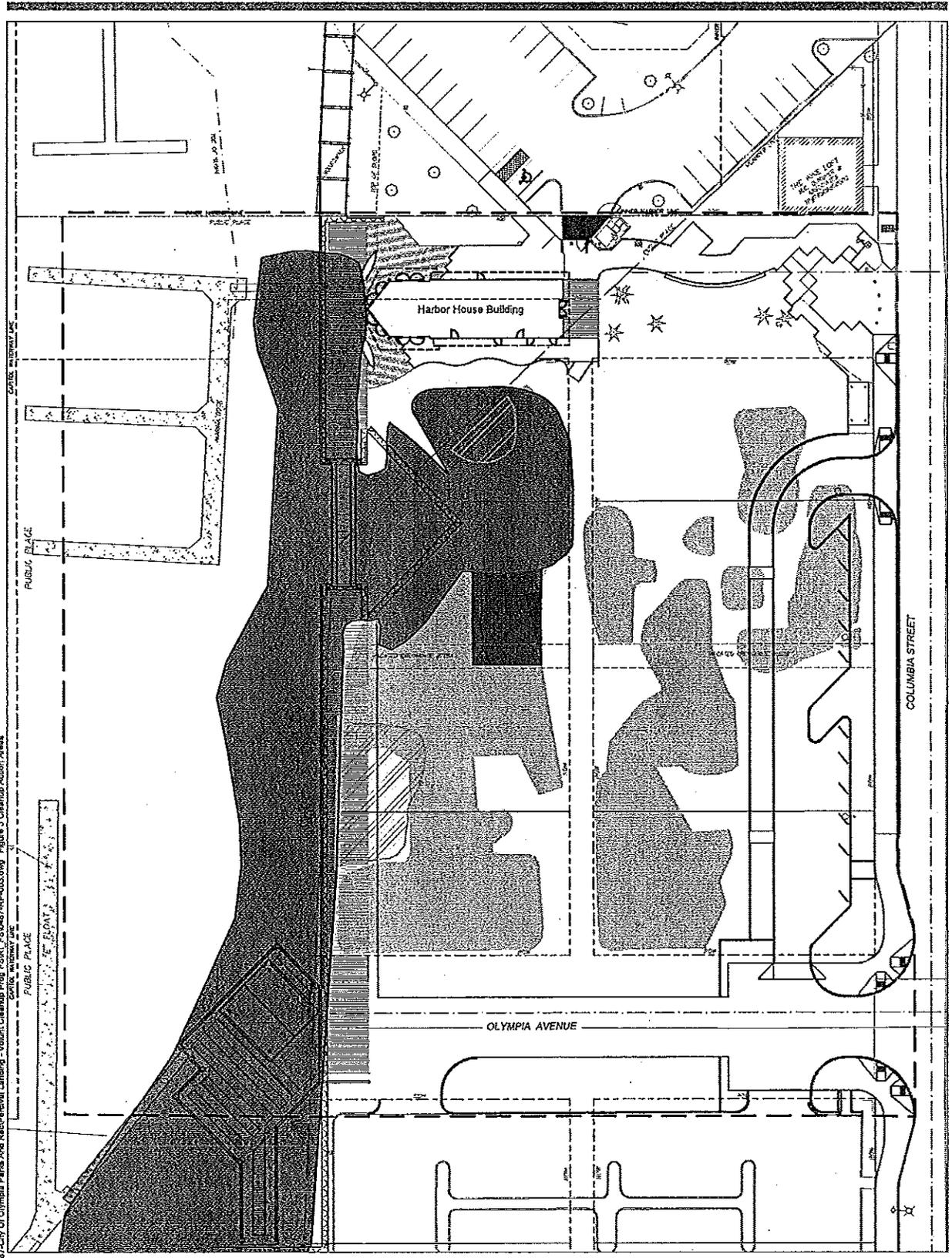


Figure 2
 Current and Historical Property Boundaries and Features
 Remedial Investigation / Feasibility Study
 Former Unocal Bulk Plant 0828 and Hulco Property



Aug 29, 2012 3:40pm (p) K:\Projects\City of Olympia Parks and Recreation\Landfill - Volant Cleanup Prod FSRI_F50487-RI-FS.dwg Figure 3 Cleanup Action Areas

NOTE: UNOCAL location data from 1995 Geo Engineers figure.
SOURCE: Percival Landing Major Rehabilitation QA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.
HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORS.
VERTICAL DATUM: National Ocean Service Mean Lower Low Water (MLLW), 1983-2001 Epoch.

- LEGEND:**
- Former Unocal and Hulco Property RI-FS Study Area
 - Approximate Location of 1995 Excavation Areas
 - Approximate Location of 2001 Excavation Areas
 - 2011 Excavation Area

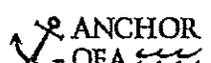
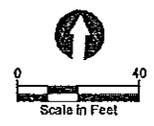
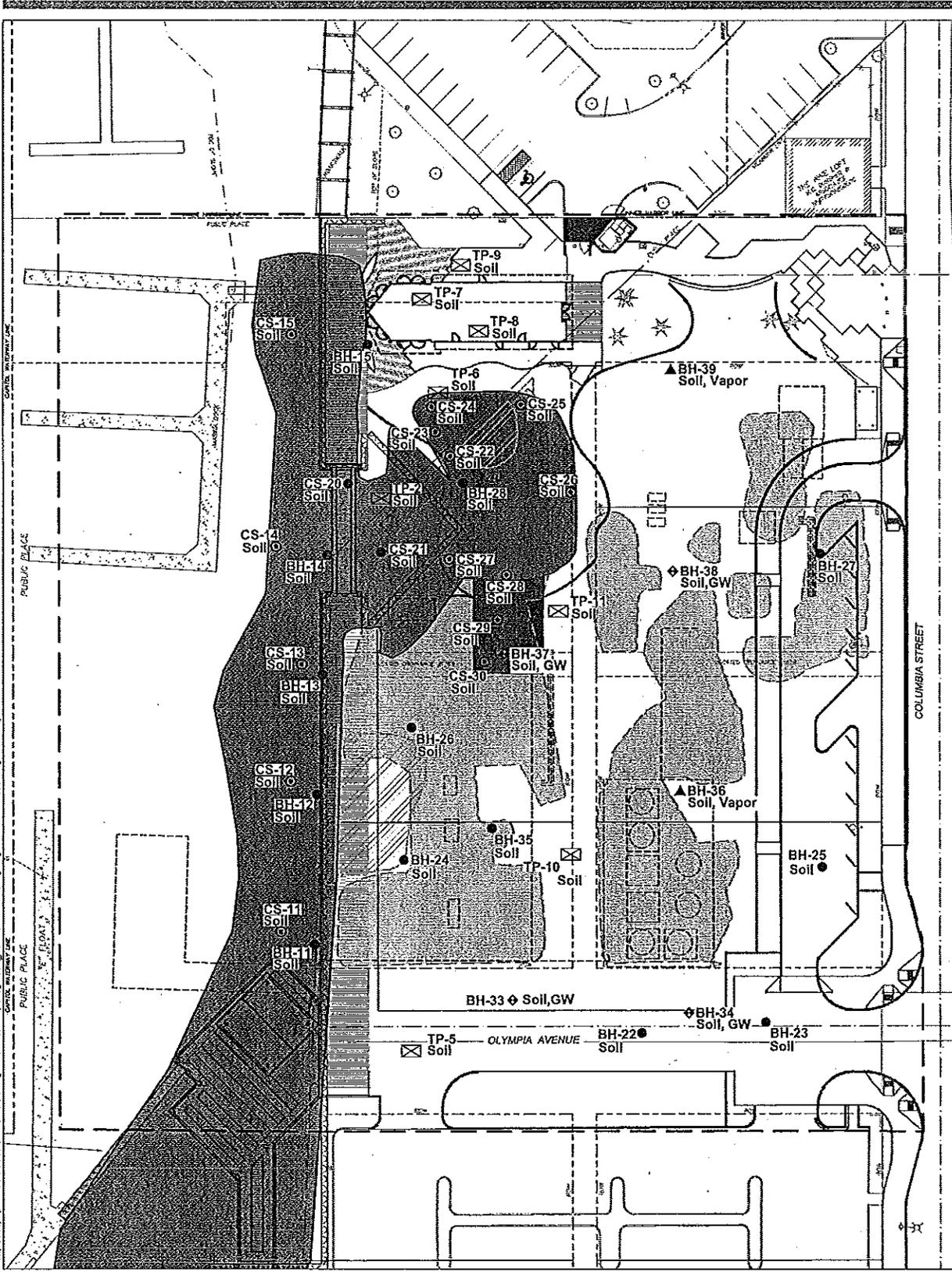


Figure 3
 Cleanup Action Areas
 Remedial Investigation / Feasibility Study
 Former Unocal Bulk Plant 0828 and Hulco Property



Aug 26, 2012 3:41 pm 1/3/12 K:\Programs\0497-City of Olympia Parks And Rec\Perennial Landfill - Valant Cleanup Prog FBRL_FSO497-PP-003.dwg Figure 4 Remedial Investigation Sample Locations

SOURCE: Perchval Landing Major Rehabilitation QA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.
 HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORS.
 VERTICAL DATUM: National Ocean Service Mean Lower Low Water (MLLW), 1983-2001 Epoch.

- LEGEND:**
- BH-11 ● Geoprobe (Soil)
 - BH-34 ◆ Geoprobe (Soil and Groundwater)
 - BH-36 ▲ Geoprobe (Soil and Soil Vapor)
 - TP-2 ☒ Test Pit
 - CS-11 ○ Confirmation Sample Location

- Former Unocal and Hulco Property RI-FS Study Area
- - - Approximate Location of Historical Features
- ▨ Approximate Location of 1995 Excavation Areas
- ▧ Approximate Location of 2001 Excavation Areas
- ▩ 2011 Excavation Area

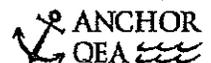
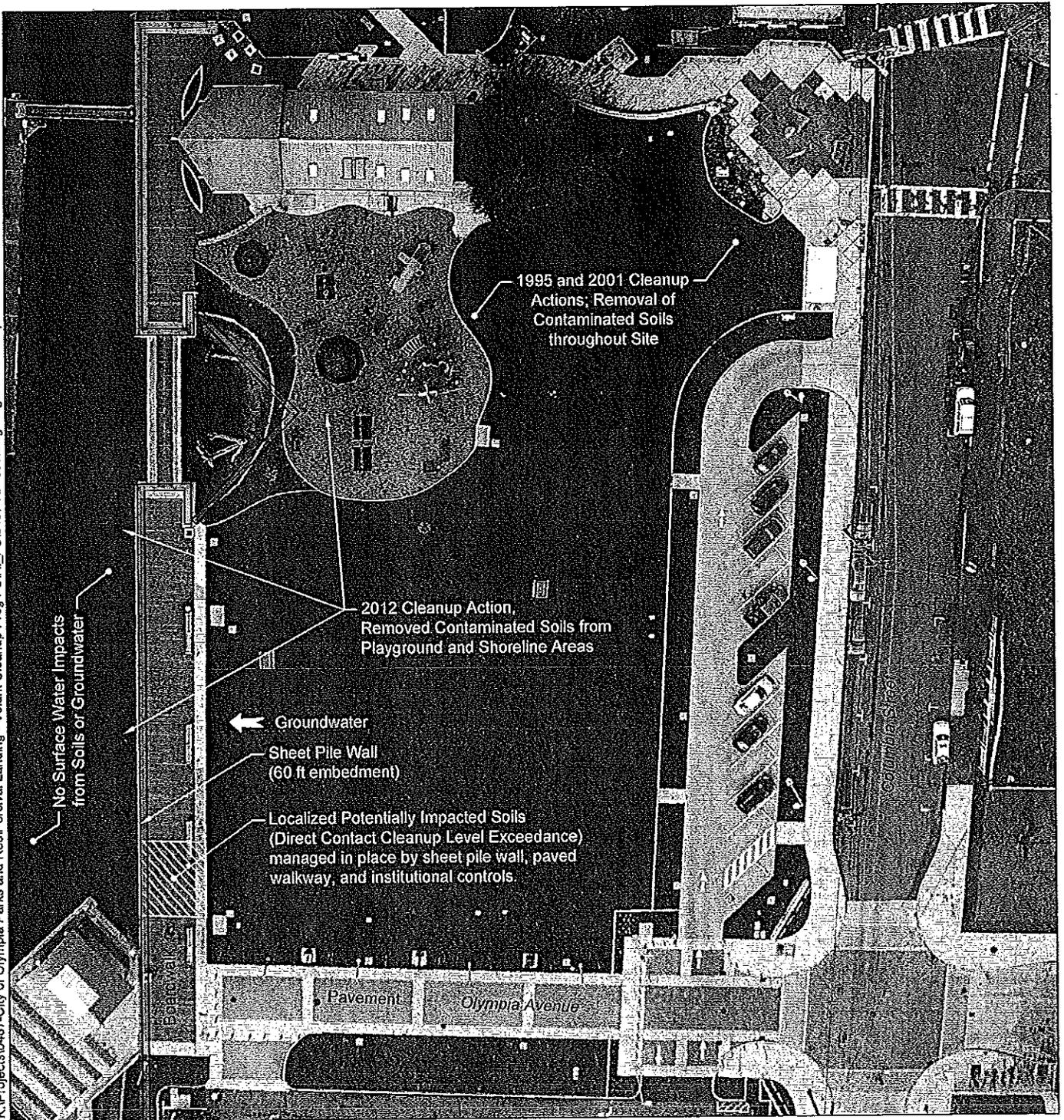


Figure 4
 Remedial Investigation Sample Locations
 Remedial Investigation / Feasibility Study
 Former Unocal Bulk Plant 0828 and Hulco Property

K:\Projects\0487-City of Olympia Parks and Rec\PerCival Landing - Volunt Cleanup Prog FSR\FSR\FS0487-RP-003.dwg Figure 8 Conceptual Site Model



Aug 29, 2012 3:41pm tgriga

AERIAL: Aerial Images NW, March 2012
NOT TO SCALE

LEGEND:

— Approximate Sheet Pile Wall Location



Figure 8
Conceptual Site Model
Remedial Investigation / Feasibility Study
Former Unocal Bulk Plant 0828 and Hulco Property

