Interim Action Work Plan

LNAPL Source and UST Removals
Earley Business Center (Parcel 1B)

Agreed Order No. DE 9553
Facility/Site ID No. 9762715
Cleanup Site ID No. 2395

Public Review Draft

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Professional Certification

This document was prepared under my direction, with the exception of the Site-wide plans presented in Appendix C. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that I was in responsible charge of the work performed for this document.

June 6, 2025

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Table of Contents

Figures

Tables

Appendices

List of Acronyms

Acronym	Explanation
AO	Agreed Order
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
CAP	Cleanup Action Plan
CMP	Compliance Monitoring Plan
CRA	Conestoga-Rovers & Associates
Crete	Crete Consulting, Inc.
EBC	Earley Business Center
Ecology	Washington State Department of Ecology
FS	Feasibility Study
HASP	Health and Safety Plan
IA	Interim Action
IAWP	Interim Action Work Plan
IDP	Inadvertent Discovery Plan
LNAPL	Light Non-Aqueous Phase Liquid
mg/kg	Milligrams per Kilogram
MTCA	Model Toxics Control Act
MW	Monitoring Well
Navy	U.S. Department of the Navy
OCC	Occidental Chemical Corporation
PCE	Tetrachloroethylene
PGG	Pacific Groundwater Group
PIONEER	PIONEER Technologies Corporation
PIRR	Previous Investigation Results Report
Port	Port of Tacoma
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDI	Remedial Design Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study Report
SAP	Sampling and Analysis Plan
Site	Early Business Center Site
SL	Screening Level

Acronym	Explanation
TCE	Trichloroethylene
TEE	Terrestrial Ecological Evaluation
TPCHD	Tacoma-Pierce County Health Department
TPH	Total Petroleum Hydrocarbons
TPH-D	Total Petroleum Hydrocarbons Diesel Range Organics
TPH-G	Total Petroleum Hydrocarbons Gasoline Range Organics
TPH-HO	Total Petroleum Hydrocarbons Heavy Oil Range Organics
µg/L	Micrograms per Liter
U.S.	United States
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tanks
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code
WMP	Waste Management Plan

SECTION 1: INTRODUCTION

1.1 IAWP Purpose

The purpose of this Interim Action (IA) Work Plan (IAWP) for the Port of Tacoma (Port) Earley Business Center (EBC) Site (Site) is to:

- Provide context for conducting an IA that consist of (1) removing source area soil containing light non-aqueous phase liquid (LNAPL) and (2) removing four underground storage tanks (USTs);
- Summarize the conceptual IA, the IA goals, and the Model Toxics Control Act (MTCA) rationale for conducting the proposed IA;
- Summarize the preliminary design for the LNAPL source removal and four UST removals;[1]
- Outline the path forward for completing the IA design and implementing the IA; and
- Enable Ecology to facilitate public participation and tribal engagement for this IAWP.

1.2 IA Purpose

The proposed IA meets the MTCA IA purpose in WAC 173-340-430(1) and is warranted for the following reasons:

- Per WAC 173-340-430(1)(a), the IA will reduce the threat to human health and the environment from the existing LNAPL. Quickly removing LNAPL is required for regulated USTs per WAC 173-340-450(5)(c).[2] Although the Site LNAPL is not associated with a regulated UST, the logic for removing this LNAPL during an IA is appropriate.
- Per WAC 173-340-430(1)(b), the IA will correct "a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed." The “problems” in this case are four very old USTs (N-6, N-23,24, and the Rectangular UST). Removing these USTs as soon as possible would minimize the potential for product leaks from USTs that may have corroded over time. Further, the N-6 UST and the Rectangular UST must be permanently closed in accordance with Chapter 173-360A WAC.
- Per WAC 173-340-430(1)(c), removing the LNAPL, the petroleum-contaminated soil causing the LNAPL, and the four USTs will enable completion of an Remedial Investigation (RI) that provides much more certainty about current and future Site conditions near the USTs.
- Sections VII.C and VII.D of the 2013 Agreed Order (AO) include provisions for conducting an IA, and the November 2023 AO Amendment contemplates conducting an IA prior to preparing the supplemental RI Work Plan (Ecology 2013, 2023a).

This IA only partially addresses the cleanup of this Site (in accordance with WAC 173-340-430(1)) and is not intended to serve as the final MTCA cleanup action. The final cleanup action at this Site has not been

[1] Once the 90% plans and specifications are prepared in accordance with Washington Administrative Code (WAC) 173-340-400(4)(b), they will be provided to the Washington State Department of Ecology (Ecology) for review.

[2] WAC 173-340-450(5)(c): "If free product is discovered at the site, as soon as possible but no later than 30 days after release confirmation, UST system owners and operators must initiate actions to remove the free product.”

determined, and additional remedial actions are likely necessary beyond the IA described in this IAWP. Further, the IA will not preclude the final cleanup action.

1.3 Site Location

The Site is located at 401 East Alexander Avenue in Tacoma, Washington at the end of the Blair-Hylebos Peninsula (Figure 1). Approximately 50 acres of the approximately 80-acre property are upland and are subject to AO DE 9553 between the Port and Ecology (Ecology 2013). The AO originally defined the Site as seven separate sites within the upland property that were "anticipated to be discrete or severable releases of contamination from past property operations." In November 2023, the AO was amended to generally define the Site as the property at 401 East Alexander Avenue and the northwesterly 620 feet of 500 East Alexander Avenue (see Figure 1; Ecology 2023a).[3] The area of interest for this IAWP is the south-central portion of the Site, which is located near the southern entrance to the property and is north of the northwestern portion of the OCC property (see Figure 2).

Consistent with Port practices, all references to direction (i.e., north, south, east, and west) in this document are in relation to "site north," which is parallel to the Hylebos Waterway and Blair Waterway shorelines (see Figure 2). "Site north" is approximately 45 degrees west (counterclockwise) from true north. Both "site north" and true north are shown on the figures for this document.

1.4 IAWP Organization

The remainder of this IAWP is organized as follows:

- Section 2: Background Information
- Section 3: IA Summary, Goals, and Rationale
- Section 4: Preliminary IA Design
- Section 5: IA Path Forward
- Section 6: References

[3] Contamination coming to be located on the property from the adjacent Occidental Chemical Corporation (OCC) site and at the south 400 feet at Pier 25 is being addressed separately under AO DE 16943 between OCC and Ecology, AO DE 22454 between Ecology and OCC, Glenn Springs Holdings, Inc, and Mariana Properties, Inc, and United States Environmental Protection Agency (USEPA) Docket No. 10-97-0011-CERCLA between USEPA and OCC.

SECTION 2: BACKGROUND INFORMATION

A summary of the Site background information most pertinent to this IA (i.e., LNAPL source and four UST removals) is presented in this section. For a more comprehensive summary of all Site background information, refer to the Previous Investigation Results Report (PIRR; Crete Consulting, Inc. [Crete] and Pacific Groundwater Group [PGG] 2013) and the Draft 2016 RI and Feasibility Study (FS) Report (RI/FS; Crete and PGG 2016).

2.1 Land Use

The upland portion of the property was created in the 1910s by filling the former tideflats. During World War I and World War II, the Site was used as a shipyard, where ships were constructed on intertidal shipways and upland areas were used for supporting activities. In 1960, the Port purchased the property. Since then, the Site has been occupied by a variety of tenants and used for industrial purposes.

The upland portion of the site is designated for Port Maritime Industrial use in the City of Tacoma zoning and the Port's Land Use Plan (Port 2014). The Port is currently working on plans for the redevelopment of the upland and shoreline portions of the Site, which will modernize the property and enable marine-dependent uses consistent with today's industry standards. Land use at the Site is expected to remain Port Maritime Industrial (i.e., industrial) for the foreseeable future.

2.2 Utilities

Known underground and overhead utilities are currently present across the Site, including proximate to the IA excavation areas. Underground utilities on the Site include stormwater, sanitary sewer, water, power, and communication lines (see Figure 2). In addition, underground infrastructure for the OCC groundwater pump-and-treat system are located within or near IA excavation areas.

2.3 Environmental Setting

2.3.1 Topography and Drainage

The upland working surface at the Site is relatively flat and almost all the working surface is paved, with widely spaced buildings. The ground surface elevations of the Site upland working surface range from approximately +17 to +19 mean lower low water, and the elevations for the IA excavation areas are approximately +18 to +19 mean lower low water. Most of the Site is paved, including all of the IA excavation areas. An existing stormwater system serves all paved areas of the Site, include the IA excavation areas (see Figure 2). A temporary structure (constructed on top of pavement) is currently present over portions of the LNAPL source excavation and the Rectangular UST (see Figure 2). This temporary structure will be removed by the Port prior to IA implementation. The key areas of the Site that are not covered with pavement or a building are (1) the storage yard in the southwestern portion of the Site, (2) the Blair shoreline, and (3) the northern shoreline and small abutting upland areas. The Site shoreline has variable construction, with the northern shoreward edge consisting of a bulkhead,

historical shipways, and riprap that abut the intertidal area of Commencement Bay. The eastern and western shorelines are slopes covered in riprap with an operating wharf on the Hylebos Waterway.

2.3.2 Geology

The regional geology is dominated by Quaternary ice age glacial deposits. In general, regional glacial deposits include sand and gravel outwash and low permeability glacial till deposits containing clay and silt.

The Site is located within the tideflats of the Puyallup River delta and these pre-development tideflats generally consisted of alternating layers of sandy and lower permeability silt/clay deposits. Sediment dredged from Commencement Bay and its tributaries, as well as other fill material, were used to raise the land elevation during the industrial development of the tideflats. For this Site, sandy dredge materials with variable silt content (Crete and PGG 2016) were used to fill and create the upland portion of this Site in the 1910s (based on historical aerial photographs and maps). The sandy fill at the Site extends to approximately 20 feet below ground surface (bgs) and varies from loose to very dense (Crete and PGG 2016).

The shallowest lithologic units in the IA excavation areas consist of (1) fill sands ranging from silty fine sands to gravelly sands (see Appendix A) and (2) similar underlying native sands. Sand is the overwhelming component of the fill sands and within a given boring, the fill sands are often logged as a relatively homogenous unit within the total drilling depth. However, anthropogenic debris, including brick, concrete, and pipes, have been encountered in borings and test pits proximate to previously removed USTs N-1,2,3,4,25,26. The locations and depths of the anthropogenic debris suggest that this debris was most likely placed in northwestern portion of the N-1,2,3,4,25,26 UST basin when these USTs were historically removed (date unknown).[4] Although it can be difficult to distinguish between fill sand and the similar underlying pre-fill delta sand deposits, OCC logs for 78-50, 78C, and A-4 suggest that the transition from the fill sands to the native sands in the vicinity of the IA excavation areas typically occurs in the vicinity of 20 feet bgs (see Appendix A).

Mud flat deposits consisting of fine-grained silts and clays are present underneath the native sands, although a comprehensive assessment of deeper borings has not yet been documented for the EBC Site to determine typical depths for the shallowest aquitard (referred to as the First Aquitard for the purposes of this IAWP). OCC logs for A-6, 78-50, and 78C suggest that the First Aquitard is likely present with variable thicknesses in the range of roughly 25 to 35 feet bgs in the vicinity of the IA excavation areas (see Appendix A). It is also likely that this First Aquitard is thin or absent at some locations as has been established at other Sites along the Blair-Hylebos Peninsula (e.g., PIONEER Technologies Corporation [PIONEER] 2024) and as suggested by OCC logs for 78-50, WMUA-29, and A-4.

[4] Anthropogenic debris was encountered in HC-N12342526-4 at 6 feet bgs, HC-N12342526-TP-2 at 3 feet bgs, HC-N12342526-TP-3 at 2-4.5 feet bgs, HC-N12342526-TP-4 at 1-3 feet bgs, HC-N12342526-TP-5 at 3-5 feet bgs, N12342526-226 at 4 feet bgs, N12342526-262 at 6.5-7 feet bgs, N12342526-263 at 6-8 feet bgs, N12342526-264 at 7.5 and 10 feet bgs, N12342526-265 at 1.5 and 7 feet bgs, and MW-114 at 6-7 feet bgs and 11-12 feet bgs (see Appendix A).

2.3.3 Hydrogeology

Groundwater in the fill lithologic unit, which is the lithologic unit of interest for this IAWP, is typically encountered from 8 to 11 feet bgs (Crete and PGG 2016). It is presumed that this shallow groundwater generally flows radially outward toward Commencement Bay and the Blair and Hylebos Waterways based on groundwater monitoring by OCC for the "25-foot" groundwater zone and Site upland dimensions relative to marine water (Crete and PGG 2016). Tidal variations in groundwater elevations are most notable near the shoreline (and short-term reversals in flow direction can occur along the shoreline during high tides), and generally decrease with distance from the shoreline (Crete and PGG 2016).

2.4 Overview of IA-Related Operational Features

The operational features of interest for this IAWP are four in-place USTs (i.e., the N-6 UST, the N-23,24 USTs, and the Rectangular UST) and components of the former central heating plant fuel system (see Figure 2). The N-6 UST, the N-23,24 USTs, and the Rectangular UST are the only known remaining USTs on the Site, and are proposed for removal as part of this IA. The key operational features for the former central heating plant fuel system are six former 25,000-gallon USTs (i.e., USTs N-1,2,3,4,25,26) that have been removed.[5] A LNAPL source area is present in the western portion of this former N-1,2,3,4,25,26 UST basin. The LNAPL source area is currently characterized by the presence of LNAPL in MW-114 and total petroleum hydrocarbons (TPH) in the diesel range (TPH-D) plus TPH in the heavy oil range (TPH-HO) soil concentrations greater than ten times the associated soil SL. Five additional features of interest associated with the former central heating plant fuel system include:[6]

- Fuel oil pipeline;
- Fuel oil transfer pump house;
- Truck fill pit;
- Piping associated with the truck fill pit; and
- Fuel oil service pit.

The current status, estimated volume, and presumed product(s) for each UST are presented in Table 1 based on information from previous documents. Per Ecology request, post-excavation confirmation samples for the N-6 UST, N-23,24 USTs, and the Rectangular UST will be conservatively analyzed for the Waste Oils and Unknown Oils list in Table 830-1 of WAC 173-340-900, with the exception that a different Table 830-1 analyte list may be used for N-6 and/or the Rectangular UST if a product type is determined based on remedial design investigation (RDI) sample results (see Section 4.4.3).

A former UST (the "Building 529 UST") abutted the western boundary of the preliminary LNAPL source excavation footprint (see Figure 2). The Building 529 UST was discovered in 2011, and it is unknown

[5] The exact location of the six former USTs varies slightly between different historical documents (see Appendix B). The different representations of the six former UST locations are presented on Figure 2 to demonstrate the uncertainties with the historical documentation. Despite these uncertainties, the historical records demonstrate a high degree of confidence in the general location of the six former USTs.

[6] These features were identified on historical drawings developed by the Navy (see Appendix B).

when the Building 529 UST was installed or if it was associated in any way with the former central heating plant fuel system. The approximately 4,000-gallon steel UST was removed between November 30 and December 3, 2015 pursuant to the AO (Crete 2015, 2016; HydroCon 2016). Removal activities included removing the UST contents (the UST was full with water except for an 1/8-inch layer of oil on top of the water), cleaning the UST, field screening, confirmation soil sampling, and backfilling with excavated soil (which was less than MTCA Method A soil cleanup levels for unrestricted land use). The Building 529 UST confirmation soil sampling activities and results are included in the next section.

2.5 Summary of IA-Related Investigation Activities and Results

A substantial amount of investigation activities have been completed for (or proximate to) the LNAPL source excavation (i.e., USTs N-1,2,3,4,25,26), the N-6 UST, the N-23,24 USTs, and the Rectangular UST. Investigation activities for releases from these six former USTs and four existing USTs include performing ground penetrating radar surveys, conducting air-knife explorations, advancing soil borings, excavating test pits, installing MWs, collecting soil samples, and collecting groundwater samples. Laboratory analyses for these soil and groundwater samples included NWTPH-Dx, NWTPH-Gx, volatile organic compounds (VOCs), benzene, toluene, ethylbenzene, and xylenes (BTEX), polycyclic aromatic hydrocarbons, semi-volatile organic compounds, polychlorinated biphenyls, and metals. However, samples were predominantly analyzed using Ecology's NWTPH-Dx (with silica gel cleanup) and NWTPH-Gx methods.[7] An investigation chronology for sampling and analysis activities relevant to this IA is provided in Table 2. Since (1) soil and groundwater samples were predominantly analyzed for NWTPH-Dx and NWTPH-Gx, and (2) total petroleum hydrocarbons (TPH) diesel range organics (TPH-D), heavy oil range organics (TPH-HO), and gasoline range organics (TPH-G) are pertinent and helpful indicator constituents for this IA, all previous TPH-D+TPH-HO and TPH-G concentrations were tabulated and presented on figures to summarize existing results. TPH-G and TPH-D+TPH-HO soil concentrations are presented in Table 3, while TPH-G and TPH-D+TPH-HO groundwater concentrations are presented in Table 4. TPH-D and TPH-HO were combined in accordance with Ecology guidance (Ecology 2004, 2016).[8] TPH-D+TPH-HO soil and groundwater concentrations are shown on Figure 3. If analytical results were available for NWTPH-Dx with and without silica gel cleanup, the results for NWTPH-Dx without silica gel cleanup were presented on Figure 3. TPH-G soil and groundwater concentrations are presented on Figure 4.

Key findings from the investigation results include:

- TPH-D+TPH-HO soil concentrations exceeded 20,000 milligrams per kilogram (mg/kg), or ten times the soil screening level (SL) of 2,000 mg/kg, in three sampling locations within the

[7] The NWTPH-Dx method specifies that silica gel cleanup "may be used to clean up the sample in cases where there may be potential interferences from non-petroleum based naturally occurring organics" (Ecology 2023b). In some instances, previous soil and groundwater samples were analyzed using sulfuric acid with silica gel cleanup, which is no longer recommended in Ecology's updated Silica Gel Cleanup guidance (Ecology 2023b).

[8] The following decision rules were used for combining non-detect results. If only one consistent was non-detect, the non-detect concentration was assumed to equal one-half of the reporting limit. If neither constituent was detected, the reporting limits were summed.

preliminary LNAPL source excavation footprint (i.e., 47,000 mg/kg at HC-N12342526-4, 61,000 mg/kg at N-1,2,3,4,25,26-262 and 34,000 mg/kg at N-1,2,3,4,25,26-264) as shown on Table 3 and Figure 3.

- LNAPL was encountered in MW-114 (within the preliminary LNAPL source excavation footprint) at thicknesses between 0.21 feet and 2.35 feet (see Table 5).
- TPH-D+TPH-HO soil and groundwater concentrations surrounding the preliminary LNAPL source excavation footprint are relatively low (see Table 3, Table 4, Figure 3, and Figure 4). For instance, there are no TPH-D+TPH-HO exceedances of the 2,000 mg/kg soil SL.[9]
- The highest TPH-D+TPH-HO soil concentrations and the encountered LNAPL are present within the northwest corner of the former N-1,2,3,4,25,26 UST basin, which is also where anthropogenic debris (e.g., bricks, concrete, pipes) was used as fill. It is hypothesized that the anthropogenic debris created a preferential pathway for LNAPL from one or more of these former USTs to accumulate in this area.
- The combined vertical extent of TPH-D+TPH-HO impacts and LNAPL impacts within the preliminary LNAPL source excavation footprint appear to be concentrated at approximately 7 to 12 feet bgs (see Table 5).
- There were no TPH-D+TPH-HO soil or groundwater exceedances and no TPH-G soil exceedances proximate to the N-6 UST (see Table 3, Table 4, Figure 3, and Figure 4).[10]
- Elevated VOCs concentrations from the OCC Site are expected to be present near the bottom of the N-6 UST and elevated VOC vapor concentrations are expected to be present within the N-6 excavation based on investigation results. For example, PCE concentrations in 2010 groundwater samples HC-N6-1 through HC-N6-4 ranged from 8,200 micrograms per liter (µg/L) to 47,000 µg/L (Hart Crowser 2012c).
- There were no TPH-D+TPH-HO soil or groundwater exceedances and no TPH-G soil or groundwater exceedances proximate to the N-23,24 USTs (see Table 3, Table 4, Figure 3, and Figure 4).
- There were no TPH-D+TPH-HO soil or groundwater exceedances and no TPH-G exceedances immediately adjacent to the Rectangular UST (see Table 3, Table 4, Figure 3, and Figure 4).

2.6 Regulatory Context

This MTCA Site is currently being addressed pursuant to AO No. DE 9553 between the Port and Ecology, which became effective on April 2, 2013. A draft RI/FS report was prepared in 2016 (Crete and PGG 2016) and a draft Cleanup Action Plan (CAP) was prepared in 2017 (Ecology 2017) under the AO. The AO was amended on November 27, 2023, to prepare a Supplemental RI Work Plan, Supplemental RI Report, FS Report, and a preliminary draft CAP. Sections VII.C and VII.D of the 2013 AO include provisions for conducting an IA, and the AO Amendment contemplates conducting an IA prior to preparing the Supplemental RI Work Plan (Ecology 2013, 2023a).

[9] Soil and groundwater SLs are presented in the Site-wide SL calculations document (see Appendix C).

[10] The reported TPH-G groundwater concentrations in the four previous N-6 groundwater samples may not be representative since the very high tetrachloroethylene (PCE) and trichloroethylene (TCE) groundwater concentrations in these samples may have interfered with the TPH-G analysis.

This IA is being conducted in accordance with MTCA regulations (Chapter 173-340 WAC). Chapter 173-340 WAC citations in this IAWP are from the most recent version of Chapter 173-340 WAC that was adopted on August 23, 2023, and became effective on January 1, 2024. In addition to complying with MTCA regulations, UST removal activities will be completed in accordance with applicable portions of Chapter 173-360A WAC and, as the delegated authority, the Port will coordinate with Tacoma-Pierce County Health Department (TPCHD) and comply with applicable TPCHD UST regulations.

2.7 Adjacent Cleanup Sites

2.7.1 Occidental Chemical Corporation

Between 1929 and 2002, OCC and its predecessor, Hooker Chemical, operated a chemical manufacturing plant on land adjacent to the Site (Crete and PGG 2016). Operations included a chlor-alkali plant (1929-2002) and a TCE/PCE manufacturing facility (1947-1973). Contamination from historical OCC operations have caused high concentrations of PCE, TCE, and associated degradation byproducts that extend across a large portion of the Site in multiple groundwater-bearing units (Conestoga-Rovers & Associates [CRA] 2015; Ecology 2023c). In addition, the Site has been impacted by OCC releases of elevated pH (see Figure 4.13 through 4.18 in CRA 2015) as well as hexachlorobenzene and hexachlorobutadiene (see Figures 4.3 and 4.11 in CRA 2015). The OCC groundwater plumes in some groundwater-bearing zones within the Site have been controlled, at least in part, by a groundwater pump-and-treat system that OCC has operated since 1996. Contamination coming to be located on the EBC Site from the adjacent OCC site and at the south 400 feet at Pier 25 is being addressed separately under AO DE 16943 between OCC and Ecology, AO DE 22454 between Ecology and OCC, Glenn Springs Holdings, Inc, and Mariana Properties, Inc, and USEPA Docket No. 10-97-0011-CERCLA between USEPA and OCC.

2.7.2 Pier 24 and 25 Embankment Remediation Site

In 2007 and 2008 the Port completed sediment remedial actions at EBC Piers 24 (on Commencement Bay) and 25 (on the Hylebos Waterway) pursuant to the 2005 Mouth of Hylebos Consent Decree (Ecology 2013a). Some of the contaminated sediment and debris along the embankment beneath the piers and along the intervening shoreline areas was removed, and the remaining sediment was capped. The site is currently being overseen by the USEPA and is in post-construction long-term monitoring.

SECTION 3: IA SUMMARY, GOALS, AND RATIONALE

3.1 IA Summary Description

The IA design process outlined in Section 4 will determine the IA design details. In general terms, the IA will consist of the following key elements:

- Implementing a variety of engineering controls during construction activities for protection of human health and the environment (e.g., health and safety controls, stormwater controls, spill prevention and controls, dust controls, Site controls, traffic controls, noise controls);
- Decommissioning an existing MW within the preliminary LNAPL source excavation footprint;
- Temporarily bypassing active underground utilities in direct conflict with the excavations;
- Installing a temporary sheet pile wall along the perimeter of the preliminary LNAPL source excavation footprint;
- Dewatering groundwater within the LNAPL source excavation and disposing of generated water at an off-site facility permitted to accept the waste;
- Excavating LNAPL-producing soil source material (and removing associated LNAPL) within the preliminary LNAPL source excavation footprint;
- Decommissioning the N-6 UST, N-23,24 USTs, and the Rectangular UST by completing the applicable actions in WAC 173-360A-0810(2).
- Permanently removing the N-6 UST, N-23,24 USTs, and the Rectangular UST from the ground via excavation;
- Removing the temporary sheet pile wall following completion of all dewatering and excavation activities within the LNAPL source excavation;
- Collecting confirmation soil samples from the excavations for the N-6 UST, N-23,24 USTs, and the Rectangular UST;
- Disposing of excavated soils at an off-site facility permitted to accept the waste;
- Backfilling and compacting the excavated areas with clean soil; and
- Restoring the excavated areas to their original condition (e.g., repaving areas that were excavated).

The IA is intended to be a partial cleanup of Site impacts and is not intended to be the final cleanup action for the Site. In addition, the IA (1) will be a partial cleanup of the TPH impacts in the vicinity of the LNAPL source excavation, (2) will be a partial cleanup of OCC VOC impacts proximate to the N-6 UST, and (3) may be a partial cleanup of soil proximate to the N-6 UST, N-23,24 USTs, and/or the Rectangular UST if it is not practicable to remove all petroleum-contaminated soil impacts surrounding those USTs.

3.2 IA Goals

The goals of this IA are to:

- Remove the LNAPL source, and if deemed practicable based on RDI results, achieve petroleum-related soil SLs;
- Remove the four remaining in-place USTs;

- Remove petroleum-contaminated soil immediately surrounding the N-6 UST, the N-23,24 USTs, and the Rectangular UST and achieve petroleum-related soil SLs;
- Decrease risks to human health and the environment that are associated with the existing contamination;
- Reduce the restoration time frame for the petroleum releases associated with this IA;
- Not preclude reasonable alternatives for a final cleanup action;
- Comply with applicable federal, state, and local laws and regulations;
- Consider public and tribal concerns;
- Utilize sustainable remediation principles (e.g., reuse of acceptable soil) to the extent practicable; and
- Be cost-effective.

3.3 IA Performance Criteria

The IA performance criteria for this IA are the petroleum-related soil and groundwater SLs included in Appendix C (e.g., TPH-G soil SL of 30 mg/kg, TPH-D+TPH-HO soil SL of 2,000 mg/kg). Ideally, the RDI soil samples along the perimeter of the preliminary LNAPL source excavation footprint and the N-6 UST, N-23,24 USTs, and Rectangular UST confirmation monitoring soil samples will achieve all applicable soil SLs. However, based on RDI results, soil remediation levels may be established in consultation with Ecology to focus the LNAPL source excavation dimensions on the source material. In addition, if the certified UST Site Assessor and/or the Port Engineering Project Manager determine during IA fieldwork that it is not practicable to achieve petroleum-related soil SLs for the N-6 UST excavation, the N-23,24 USTs excavation, and/or the Rectangular UST excavation due to health and safety concerns, contract requirements, or an unforeseen situation that could exacerbate contaminant transport, the Port will coordinate with Ecology about further IA or post-IA activities. If soil SLs are not achieved in one or more excavations, the rationale for not achieving soil SLs will be included in the IA Report.

Potentially applicable or relevant and appropriate requirements (ARARs; i.e., federal, state, and local laws and regulations) were identified and evaluated to determine requirements that apply to IA design and implementation (see Appendix D). Based on this evaluation, none of the laws and regulations prevent or preclude IA components from being implemented. However, the IA design will include and require measures to address the ARARs for IA implementation as outlined in Section 4 (e.g., UST decommissioning requirements, waste management requirements, health and safety requirements, implementing an Inadvertent Discovery Plan [IDP], obtaining applicable permits, decommissioning a MW in accordance with Chapter 173-160 WAC, and implementing temporary erosion, stormwater, dust, and noise controls).

A simplified Terrestrial Ecological Evaluation (TEE) was conducted as part of the 2016 Draft RI/FS in accordance with WAC 173-340-7492(2) (Crete and PGG 2016). Based on the exposure assessment in WAC 173-340-7492(2)(a)(ii) and Table 749-1, the simplified TEE indicated that the Site does not pose a threat to terrestrial ecological receptors. However, the 2016 Draft RI/FS was not approved by Ecology. As a result, the TEE criteria were revisited for the components of this IA. The extent of the IA excavation activities on the Site is fully contained by a physical barrier (e.g., asphalt) that prevents plants or wildlife

from being exposed to the soil or groundwater contamination; therefore, no further evaluation is required per WAC 173-340-7491(1)(b). Upon conclusion of the IA, asphalt pavement will be reinstalled in the excavation areas, restoring the physical barrier. The TEE will be further evaluated as part of the RI and FS process.

3.4 Regulatory Rationale for IA

This section provides the demonstration that the proposed IA satisfies MTCA requirements and expectations in WAC 173-340-430(1) through (5) for conducting an IA.

3.4.1 IA Purpose

The IA purpose per WAC 173-340-430(1) is discussed in Section 1.2.

3.4.2 General Requirements

The proposed IA satisfies the IA general requirements pursuant to WAC 173-340-430(2)(b) since the proposed IA will "provide a partial cleanup, that is, clean up hazardous substances from all or part of the site, but not achieve cleanup standards."

3.4.3 Relationship to the Cleanup Action

The IA satisfies the requirement in WAC 173-340-430(3) via WAC 173-340-430(3)(b) since none of the IA remedial components will foreclose reasonable alternatives for the unknown final clean action.

3.4.4 Timing

The proposed IA satisfies the IA timing requirement in WAC 173-340-430(4) because (1) an IA "may occur anytime during the cleanup process" per WAC 173-340-430(4)(a), (2) the IA will not be used to delay or supplant the cleanup process, and (3) the IA will be followed by completing the Supplemental RI, FS, and CAP.

3.4.5 Administrative Options

In accordance with WAC 173-340-430(5), an IA can be conducted under any of the MTCA administrative options, including agreed orders.

3.5 IA Alternatives Considered

In accordance with WAC 173-340-430(7)(b)(ii), this section summarizes “information from the applicable subsections of the remedial investigation/feasibility study” regarding “alternative interim actions considered and an explanation why the proposed alternative was selected.” The only potentially relevant RI/FS for this Site is the Draft 2016 RI/FS (Crete and PGG 2016), which included three cleanup action alternatives. All three of the 2016 alternatives included removal of the four remaining and very old USTs at the Site (i.e., N-6, N-23,24, and the Rectangular UST). UST removal is a very common practice for USTs that are no longer being used, and UST removals usually occur as an IA. Further, removing these four USTs is much more protective of human health and the environment than leaving the USTs in place. Two of the three 2016 alternatives included LNAPL removal if LNAPL was encountered, which it

was in 2019-2020 (Crete 2024). The draft RI/FS alternative that did not include LNAPL removal had monitoring as the only remedial component for the area where LNAPL was subsequently discovered. Given the desire to quickly remove LNAPL in MTCA regulations (see Section 1.2), LNAPL removal via this IA is the most viable alternative for addressing the existing LNAPL.

3.6 Vulnerable Populations and Overburdened Communities

Even though the consideration of impacts on likely vulnerable populations or overburdened communities is a CAP requirement for final cleanup actions per WAC 173-340-380(5)(c), this potential was also considered for this IA. Based on Section 4.2 of Toxics Cleanup Program Implementation Memo #25 (Ecology 2024), the Site is located within a census tract where a potentially exposed population is likely a vulnerable population or overburdened community. Specifically, the census tract ranks a 10 on the Environmental Health Disparities Index from the Washington State Department of Health's Environmental Health Disparities Map and is at the 85th Washington state percentile of the Demographic Index from the United States Environmental Protection Agency's EJScreen mapping tool. However, this IA is not expected to have any impacts on likely vulnerable populations or overburdened communities given the nature of the IA. For instance, this IA will occur within a highly industrial area, there are no residents or permanent occupants at the Site, and the IA will not generate regulated air emissions.

3.7 Climate Change Resiliency

WAC 173-340-360(3)(a)(v) requires cleanup actions to "provide resilience to climate change impacts that have a high likelihood of occurring and severely compromising its long-term effectiveness." However, this requirement technically does not apply to this IA since WAC 173-340-200 excludes IAs from the cleanup action definition. Nonetheless, climate change impacts do not have a high likelihood severely compromising the long-term effectiveness of this IA given the nature of the IA (i.e., excavation, backfilling, and restoration to existing conditions) and the IA timing (e.g., completion in 2025).

SECTION 4: PRELIMINARY IA DESIGN

The IA design will consist of final plan sets and specifications for removing the LNAPL source and four remaining in-place USTs and supporting documents (i.e., Waste Management Plan [WMP], Compliance Monitoring Plan [CMP], Health and Safety Plan [HASP], and IDP) that will accompany and supplement the plan sets and specifications. The IA design is currently in the preliminary design phase. The 60% design plan sets for the LNAPL source and UST removals were provided to Ecology separately in October 2024. Some of the key preliminary design concepts for the LNAPL source and UST removals are summarized in Section 4.2. The CMP, PIONEER HASP, and IDP are complete and included in this section, while the preliminary design for the WMP is summarized in this section. The design will be further developed and finalized as outlined in Section 5.2.

4.1 Remedial Design Investigation

An Ecology-approved RDI sampling and analysis plan (SAP) was prepared ahead of this IAWP (PIONEER 2025). The RDI SAP will be implemented as soon as possible to facilitate completion of the final IA design. RDI results may be used to refine some of the laboratory analyses for confirmation monitoring (see Appendix E).

4.2 Key IA Design Concepts

The IA is being designed to (1) remove the LNAPL source, and (2) remove the four remaining in-place USTs. The IA is also being designed to meet the IA goals and IA cleanup standards in Sections 3.2 and 3.3, respectively. Key design concepts for the IA include:

- Engineering controls (e.g., health and safety controls, stormwater control, temporary erosion and sediment controls, spill prevention and controls, dust controls, Site controls, traffic controls, noise controls) will be used during IA construction activities;
- The IA design and IA implementation will prevent stormwater from contacting contaminated IA media (e.g., excavated soil), and there will be no contaminated contact stormwater discharge. Stormwater protection measures will include, but are not to, scheduling the work during the dry season, direct loading excavated soil to dump trucks to the extent practicable, installing and maintaining impervious stockpile covers, implementing stormwater best management practices, and housekeeping measures;
- The Remediation Contractor will be responsible for verifying utility locations and temporarily bypassing active underground utilities in direct conflict with the IA excavations;
- Although the LNAPL source impacts are well characterized (see Section 2.5), and the preliminary LNAPL source excavation footprint and excavation depth (14 feet bgs) have been established accordingly, the LNAPL source excavation dimensions will be confirmed during the RDI;[11]
- A temporary sheet pile wall will be necessary for the LNAPL source excavation to provide temporary shoring, reduce excavation dewatering, and minimize excavation size;

[11] The LNAPL source excavation dimensions of approximately 45 feet long by approximately 35 feet wide by 14 feet deep is approximately 820 cubic yards (or approximately 1,230 tons of soil if assuming a soil density of 1.5 tons per cubic yard).

- Dewatering will be necessary for the LNAPL source excavation, and it is likely that the very viscous LNAPL will bind to soil within the excavation when dewatered;
- Geotechnical data is being collected during the RDI to help the Remediation Contractor design and bid the temporary sheet pile wall and dewatering for the LNAPL source excavation;
- Dewatering is not planned or expected for the N-6 UST excavation, N-23,24 USTs excavation, or the Rectangular UST excavation;
- A UST service provider certified for decommissioning in accordance with WAC 173-360A Part 9 will be utilized to conduct, or provide direct supervision of, all decommissioning, removal, characterization, and disposal/recycling activities for the USTs;
- USTs will be decommissioned by completing the applicable actions in WAC 173-360A-0810(2)(a), applicable portions of the codes of practice in WAC 173-360A-0810(2)(b)(ii), and applicable portions of TPCHD UST regulations;
- If the historical fuel oil pipeline (or its bedding) is encountered during the IA, the piping and the bedding will be plugged with controlled density fill to prevent a potential preferential pathway for contaminant transport from the IA work area(s).
- Confirmation soil samples will be collected from excavation sidewalls and bottoms of the N-6 UST excavation, the N-23,24 USTs excavation, and the Rectangular UST excavation (see Section 4.4.3 and Appendix E);
- Elevated VOCs concentrations from the OCC Site are expected to be present near the bottom of the N-6 UST and elevated VOC vapor concentrations are expected to be present within the N-6 UST excavation;
- Characterization and profiling of IA soil and groundwater wastes are intended to be completed before the 100% design is completed;
- All petroleum-contaminated soil for waste disposal will be direct loaded to dump trucks or roll-off bins to the extent practicable;
- If potentially clean overburden soil is encountered in a given excavation, this overburden soil will be segregated, stockpiles, and sampled for potential on-site reuse (see Appendix E);
- All excavations will be backfilled with clean soil that is suitable structural fill and compacted to support current industrial uses at the Site and any relevant future Port redevelopment plans; and
- Excavated areas will be restored to their pre-IA condition and repaved (e.g., repaved to match surrounding asphalt surface).

4.3 Waste Management Plan

The characterization, transportation, treatment, storage, and disposal of all waste generated during IA implementation will be conducted in accordance with applicable federal, state, and local waste management regulations. All waste generated during the IA will be disposed of at an off-site facility permitted to receive the waste.

A WMP will be prepared during IA design to describe the characterization, transportation, treatment (if applicable), storage, and disposal of wastes generated during the IA. The WMP will be included with the 90% design submittal to Ecology. The WMP will:

- Identify all anticipated waste streams;

- Identify the expected temporary storage, labeling, and disposition for each anticipated waste stream;
- Identify the proposed or candidate off-site disposal facility(ies) for each anticipated waste stream;
- Provide approved waste profiles from off-site disposal facilities (if applicable);
- Specify requirements for temporary soil stockpiles (e.g., approved locations for creating stockpiles, stockpile covering requirements, maintenance, tracking, and recordkeeping requirements); and
- Specify requirements for any temporary waste containers (e.g., approved locations for containers, type of containers to be used, tracking and recordkeeping requirements).

The anticipated waste streams for this IA are:

- Asphalt that will be recycled at a local asphalt recycling facility (e.g., Dickson Waller Road Recycling Center, Miles Resources, Lloyd Enterprises);
- Excavated soil designated as a waste that will be disposed of off-site (i.e., not reused on-site);
- Decommissioned USTs and associated subsurface infrastructure (e.g., cleaned piping and metal debris);
- Any liquid and/or sludge removed from the USTs during decommissioning activities;
- Groundwater generated during dewatering activities in the LNAPL source excavation area;
- Water generated from equipment and personnel decontamination;
- Personal protective equipment; and
- Miscellaneous construction debris (e.g., disposable equipment/materials, general trash).

Key WMP concepts identified at this time include:

- Waste characterization samples are being collected during the RDI to support waste profiling prior to excavation activities.
- Applicable sampling and analysis will be conducted during the RDI to determine if soil that will be excavated is a characteristic dangerous waste (aka hazardous waste) per WAC 173-303-090(8) a state-specific toxic dangerous waste per WAC 173-303-100(5), or a state-specific persistent dangerous waste per WAC 173-303-100(6).
- OCC-related waste that contains PCE and/or TCE (e.g., excavated soil that is designated as a waste, groundwater that is generated and designated as a waste) is not a listed hazardous waste based on USEPA's 1997 determination (see Appendix F).
- Two candidate disposal facilities for disposal of non-hazardous solid waste generated during IA implementation are the Waste Connections Wasco County Landfill in The Dalles, Oregon and the Land Recovery, Incorporated Landfill in Graham, Washington.
- All generated water (e.g., dewatering water) will be treated and disposed of at an off-site facility permitted to receive the waste such as the Tacoma Public Utilities sewer, Emerald, or the PRS Group.
- Some pre-treatment (e.g., oil-water separator, filter or equivalent to reduce turbidity) will likely be necessary prior to transmitting IA-generated water for disposal.

4.4 Compliance Monitoring Plan

A CMP for IA activities was prepared in accordance with the requirements of WAC 173-340-410. There are three types of compliance monitoring defined in WAC 173-340-410: protection monitoring, performance monitoring, and confirmation monitoring. The anticipated elements for each type of IA compliance monitoring are summarized in the following sub-sections.

4.4.1 Protection Monitoring

Per WAC 173-340-410(1)(a), the purpose of protection monitoring is to "confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of an interim action or cleanup action as described in the health and safety plan." The applicable protection monitoring for this IA (e.g., vapor monitoring, dust monitoring, noise monitoring, heat/cold stress monitoring) is included in the PIONEER HASP (see Section 4.5).

4.4.2 Performance Monitoring

Per WAC 173-340-410(1)(b), the purpose of performance monitoring is to "confirm that the interim action or cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards such as construction quality control measurements or monitoring necessary to demonstrate compliance with a permit or, where a permit exemption applies, the substantive requirements of other laws." For this IA, performance monitoring will consist of "other performance standards such as construction quality control measurements or monitoring necessary to demonstrate compliance with a permit." Specifically, the applicable performance monitoring for this IA will consist of PIONEER/Crete oversight of the Remediation Contractor to ensure:

- Successful completion of all construction QC components included in the final design;
- Adherence to the plan sets and specifications for the LNAPL source and UST removals;
- Appropriate implementation of the WMP, CMP, Remediation Contractor HASP, and IDP; and
- Compliance with all requirements for IA-related permits (see Section 5.4), including any permit-required monitoring.

4.4.3 Confirmation Monitoring

Per WAC 173-340-410(1)(c), the purpose of confirmation monitoring is to "confirm the long-term effectiveness of the interim action or cleanup action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained." Confirmation soil samples (e.g., sidewall and bottom soil samples) will be collected from the N-6 UST excavation, the N-23,24 USTs excavation, and the Rectangular UST excavation. The SAP for the confirmation soil samples, which was prepared in accordance with WAC 173-340-820, WAC 173-340-830, and applicable components of Ecology guidance (Ecology 1995), is included in Appendix E. The Site-wide QAPP that will support the confirmation soil sampling and associated laboratory analyses is included in Appendix C. Confirmation soil samples will be evaluated relative to the Site-wide soil SLs presented in Appendix C.

4.5 Health and Safety Plan

PIONEER has prepared a HASP for PIONEER employees and subcontractors who may perform IA fieldwork such as Remediation Contractor oversight (see Appendix C). In addition, IA specifications will require the Remediation Contractor to prepare and implement its own HASP (that is at least as stringent as the PIONEER HASP) for all IA activities conducted by Remediation Contractor employees and subcontractors. IA specifications will also require the Remediation Contractor to (1) submit its HASP to the Port and PIONEER for approval, and (2) utilize 40-hour hazardous waste operations and emergency response-trained personnel with current refresher certifications for all IA fieldwork.

4.6 Inadvertent Discovery Plan

In accordance with WAC 173-340-815(3)(a) and Governor Executive Order 21-02, Ecology will consult with the Department of Archaeology and Historic Preservation and affected tribes prior to IA implementation about the potential effects of the IA on potential cultural resources at the Site.

Although the potential for encountering cultural resources (e.g., human remains, tribal artifacts, historical resources, archaeological resources) during the IA is likely low, the Site-wide IDP (see Appendix C) will be implemented if a cultural resource is inadvertently discovered during IA activities. The IDP shall be readily available during all IA implementation activities, and all field personnel shall be familiar with the contents and location of the IDP. In addition, it is recommended for all field personnel to watch the following Ecology training video before beginning fieldwork: https://www.youtube.com/watch?v=ioX-4cXfbDY.

If a cultural resource is discovered during investigation activities, all work in the vicinity of the discovery shall stop immediately and a discovery protection boundary shall be established around the discovery (see Step B in Section 3 of the IDP). All field personnel shall follow the IDP procedures and treat all cultural resources with respect. On-site PIONEER field personnel shall promptly notify the project lead contacts (primary and alternate). The primary project lead contact (or the alternate if the primary is not available) shall then promptly notify the Ecology Project Manager (or the alternate Ecology contact if the Ecology Project Manager is not available), who will notify the Department of Archaeology and Historic Preservation. As indicated in the IDP, it is acceptable to contact the Department of Archaeology and Historic Preservation directly if Ecology cannot be reached. Fieldwork within the discovery protection boundary will not continue until the Department of Archaeology and Historic Preservation has issued an approval for work within the discovery protection boundary to proceed.

SECTION 5: IA PATH FORWARD

5.1 Public Participation and Tribal Engagement for the IAWP

Pursuant to WAC 173-340-430(6)(a) and WAC 173-340-600(16), Ecology will engage the public about the proposed IA described in this IAWP before approving the IAWP. Ecology will utilize multiple methods to notify the public about the IAWP in accordance with WAC 173-340-600(2)(a), which includes the following notification methods: publishing on Ecology's website, emailing an electronic alert to people who request an electronic alert, publishing in the Contaminated Site Register, mailing written notices to people who request a written notice, mailing written notices to people residing within the potentially affected vicinity of the IA, sending a written notice to appropriate news media, and publishing in an appropriate newspaper. Ecology will invite members of the public to review and comment on the IAWP for at least 30 days per WAC 173-340-600(2)(b). Comments received by Ecology during the public participation period will be considered by Ecology before the IAWP is finalized and approved. If ten or more persons request a public meeting regarding this IAWP, Ecology will host a public meeting for the purpose of receiving comments from the public. If necessary, this section of the IAWP may be updated to summarize Ecology's responses to public comments prior to finalizing the IAWP.

In accordance with WAC 173-340-620, Ecology will:

- Develop a tribal engagement plan for this Site;
- Initiate meaningful engagement with affected tribes about this IA before approving the IAWP; and
- Engage with affected tribes in addition to and independent of the public participation process.

5.2 Finalizing the IA Design

Washington-licensed professional engineers are (and will continue to be) in responsible charge for the preparation and completion of the IA design. Plans and specifications in WAC 173-340-400(4)(b) will be further developed and documented as the IA design is finalized. Following submittal of the IAWP to Ecology, the Port team will continue advancing (1) the plan sets for the LNAPL source and UST removals, (2) the specifications for the LNAPL source and UST removals, and (3) the WMP. The 90% design will be submitted to Ecology for review. Following any Ecology comments on the 90% design, the final (100%) IA design will be prepared and submitted to Ecology for approval.

5.3 Construction Quality Control

Construction QC is part of design and will be finalized along with the plan sets, specifications, and WMP. The IA design will include a variety of construction QC requirements to ensure that the IA construction activities being conducted by the Remediation Contractor are completed correctly, effectively, and safely. The construction QC requirements will include, but are not limited to:

- Implementing the WMP;
- Implementing the CMP;
- Implementing the HASPs and associated health and safety requirements;

- Implementing the IDP, if necessary;
- Implementing engineering controls;
- Review and approval of Remediation Contractor submittals;
- Testing for import soil proposed for backfill and compaction; and
- Conducting oversight of all Remediation Contractor activities to ensure compliance with the plan sets, specifications, supporting plans, and permit requirements.

5.4 Permits/Approvals

The IA will be conducted with oversight from Ecology and TPCHD. The following permits/approvals may be required for this IA:

- TPCHD Waste Disposal Authorization approval
- City of Tacoma Site Development Permit for excavation and grading activities (if applicable)
- Tacoma Fire Department Permit #2000.3 (Underground Tank – Removal or Decommissioning – Commercial)
- TPCHD Site Cleanup/UST Removal Permit[12]
- Ecology 30-Day Notice for UST Systems

However, per the MTCA law, WAC 173-340-710(9), and Section VIII.P.2 of AO DE 9553 (Ecology 2013), the Port is exempt from the procedural requirements of local permits/approvals and select state permits/approvals (although the Port must comply with the associated substantive requirements). The purpose of MTCA's permit/approval exemptions is to expedite cleanup of contaminated sites. The City of Tacoma Site Development Permit, the Tacoma Fire Department Permit #2000.3, and the TPCHD Site Cleanup/UST Removal Permit were previously identified as exempt permits/approvals in Exhibit D of AO No. DE 9553 (which involved public participation prior to finalizing the AO).

The path forward for permits/approvals is expected to be:

- The Port/PIONEER will seek TPCHD Waste Disposal Authorization approval after the RDI results are obtained;
- The Port and Ecology will collaborate and coordinate to identify the associated substantive requirements for the exempt City of Tacoma Site Development Permit (if such a permit is applicable) and the exempt Tacoma Fire Department Permit #2000.3 in consultation with these local governments;
- The Port will complete the substantive requirements for the City of Tacoma Site Development Permit (if such a permit is applicable) and the Tacoma Fire Department Permit #2000.3;
- The Port will renew its TPCHD Site Cleanup/UST Removal Permit by May 17, 2025; and
- The Remediation Contractor will submit the 30-Day Notice for UST Systems immediately following contract award.[13]

[12] TPCHD already issued this permit to the Port on May 17, 2024. This permit must be renewed after one year if site closure is not achieved.

[13] If necessary, a waiver of the 30-day wait period may be requested from the regional Ecology UST inspector (as allowed on the notice form).

5.5 Public Works Contracting

The Port will competitively bid the IA implementation work for the to-be-determined Remediation Contractor as a public works solicitation. The solicitation will include this IAWP, the final plan sets, the final specifications, and the supplemental plans as attachments. The solicitation will be posted and advertised in accordance with standard Port procurement procedures, such as posting on the Port's procurement website (https://www.portoftacoma.com/business/contracting/procurement) and sending email updates to all Port procurement subscribers. The bidding process will include opportunities for bidders to ask questions. The Port will collect bids on the time and date advertised. The Port will review each bid proposal with the evaluation requirements included in the solicitation and select the lowest bidder of the bidders that had responsive and responsible bids. The Port will then enter into a contract with the selected Remediation Contractor.

5.6 Key Anticipated IA Roles and Responsibilities

The key anticipated IA roles and responsibilities are summarized in Table 6. Contact information in this table will be updated following the Port's selection of and contracting with the Remediation Contractor.

5.7 IA Reporting

A draft IA Report with be prepared and submitted to the Ecology Site Manager for review. The IA Report is expected to include (1) as-built drawings, (2) the final excavation limits, (3) a summary of the Remediation Contractor's construction activities and the oversight activities, (4) a photolog of representative photos taken during the phase, (5) a discussion of any deviations from the final design, (6) applicable testing and construction QC results (including laboratory reports if applicable), (7) laboratory reports and a data evaluation for confirmation soil samples, and (8) waste disposal documentation (e.g., bills of lading/waste manifests).

In addition, required forms for permanent closure of the USTs will be submitted to the Ecology UST Program. The Remediation Contractor will submit the Permanent Closure Notice for USTs to the Ecology UST Program within 30 days of completing permanent closure activities. The Remediation Contractor will also submit the Site Check/Site Assessment Checklist for USTs to the Ecology UST Program within 30 days (if no contamination is encountered in the UST excavations) or 90 days (if contamination is encountered in the UST excavations). The aforementioned IA Report submitted to the Ecology Site Manager will supersede the UST Site Assessment Report/Site Characterization Report requirements.

5.8 IA Schedule

The IA schedule is contingent upon a variety of factors, including (1) approval of this IAWP, (2) Ecology approval of the plans and specifications, (3) obtaining permits/approvals, and (4) Port contracting. As a result, the IA implementation schedule will be refined over time as the IAWP is approved, the final design is approved, permits are obtained, and the Port contracts with a Remediation Contractor. In the meantime, the current schedule for key near-term IA tasks includes:

- January through November 2025: Finalize substantive requirements for exempt permits.
- May 2025: RDI fieldwork conducted.

- June 2025: Public review draft IAWP completed and ready for public participation.
- July-August 2025: Public participation period.
- September 2025: 90% plan sets, specifications, and WMP submitted to Ecology.
- January 2026: 100% plan sets, specifications, and WMP approved by Port and Ecology, and public works solicitation issued.
- February 2026 through May 2025: IA bid period, contract award, and Remediation Contractor pre-construction submittals.
- June 2026: IA construction starts.

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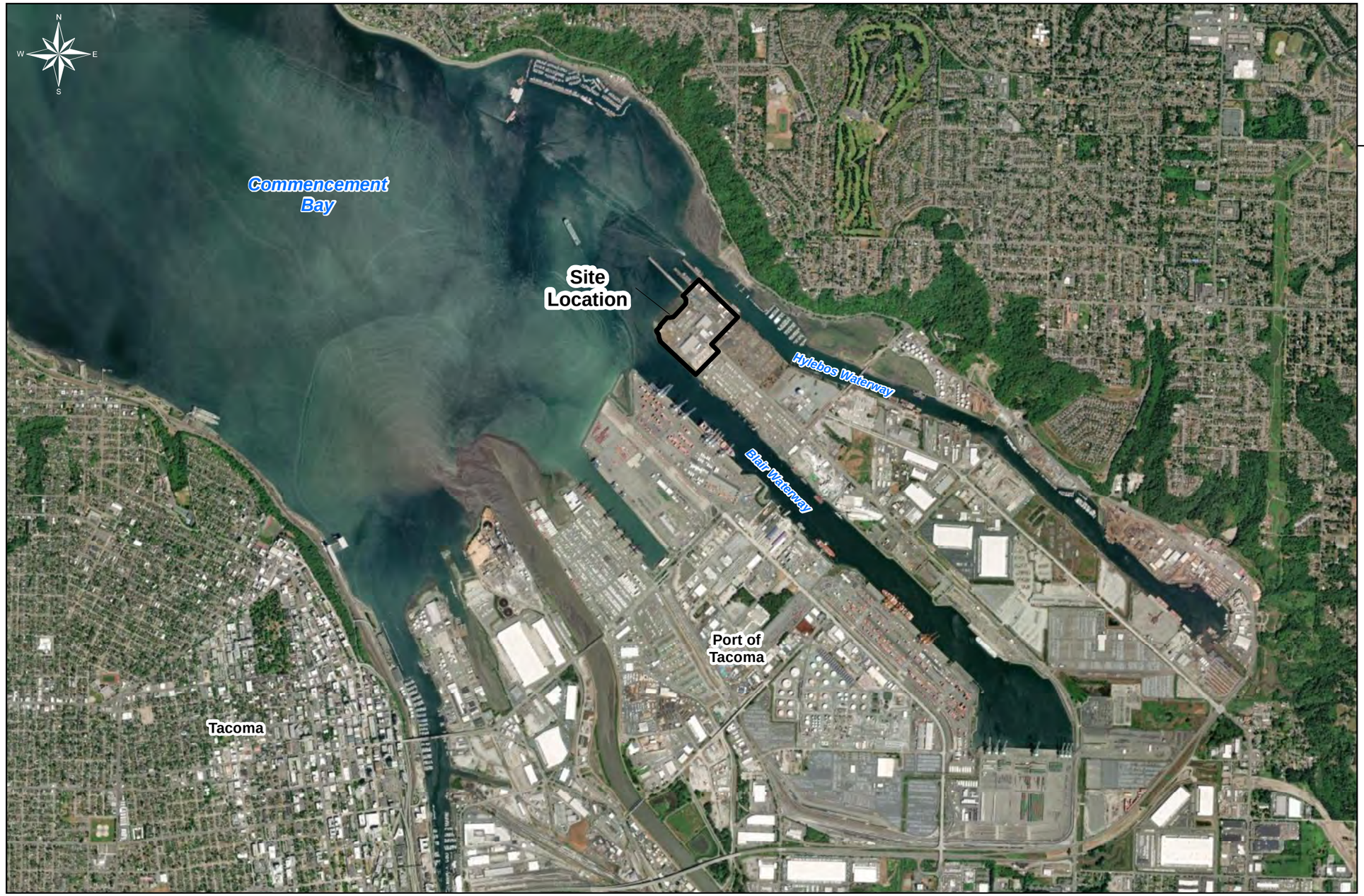
Figures



Legend

EBC Site Boundary

0 1 Miles

PIONEER TECHNOLOGIES CORPORATION

Vicinity Map
Interim Action Work Plan
Earley Business Center Site

Figure 1

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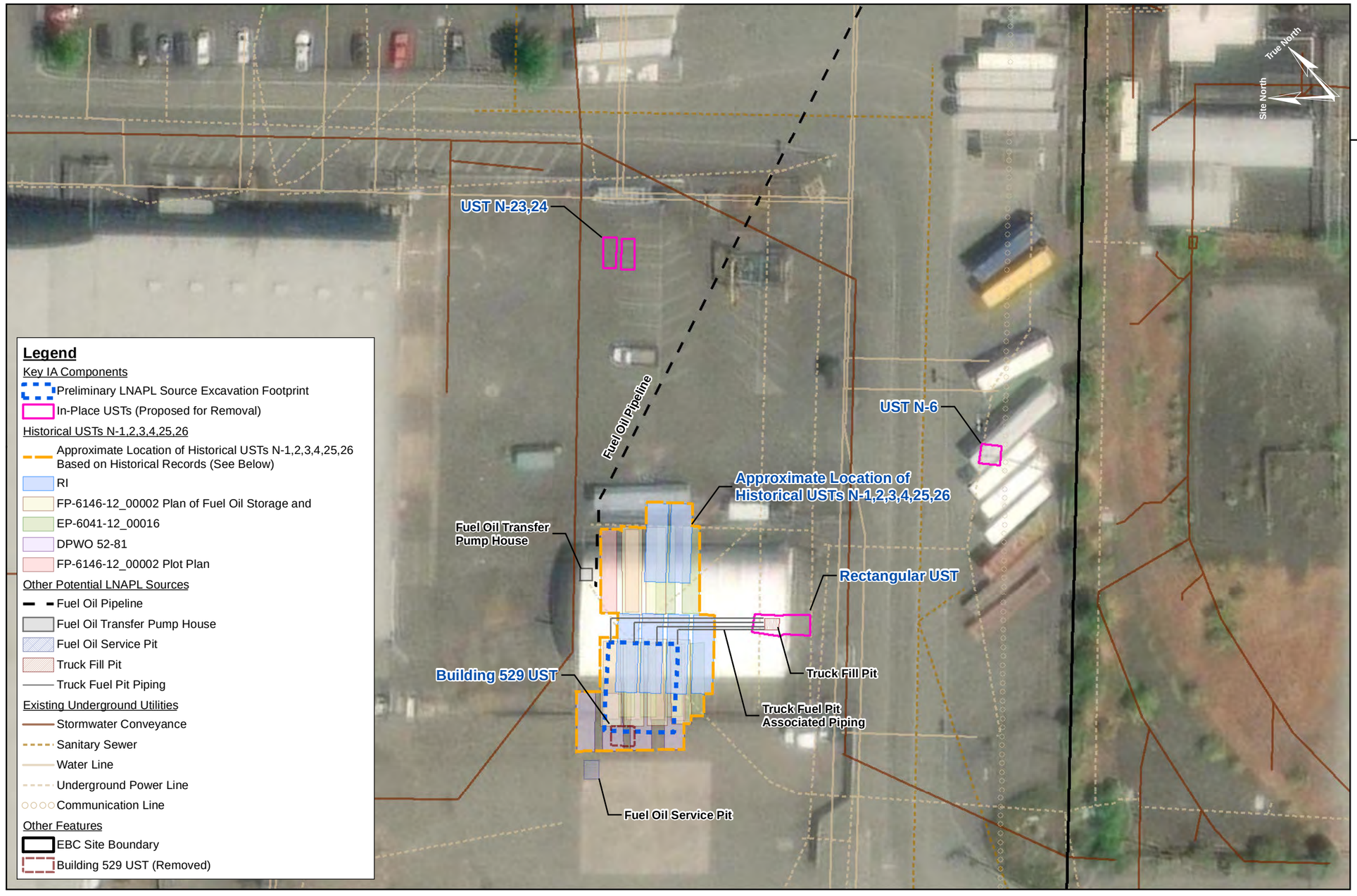

Legend

Key IA Components
- Preliminary LNAPL Source Excavation Footprint
- In-Place USTs (Proposed for Removal)

Historical USTs N-1,2,3,4,25,26
- Approximate Location of Historical USTs N-1,2,3,4,25,26 Based on Historical Records (See Below)
- RI
- FP-6146-12_00002 Plan of Fuel Oil Storage and
- EP-6041-12_00016
- DPWO 52-81
- FP-6146-12_00002 Plot Plan

Other Potential LNAPL Sources
- Fuel Oil Pipeline
- Fuel Oil Transfer Pump House
- Fuel Oil Service Pit
- Truck Fill Pit
- Truck Fuel Pit Piping

Existing Underground Utilities
- Stormwater Conveyance
- Sanitary Sewer
- Water Line
- Underground Power Line
- Communication Line

Other Features
- EBC Site Boundary
- Building 529 UST (Removed)

Notes:
- The exact location of the historical USTs N-1,2,3,4,25,26 varies slightly between different historical documents. The different representations of the UST locations are presented on this figure to demonstrate the uncertainties with the historical documentation. Despite these uncertainities, the historical records demonstrate a high degree of confidence of the general location of the historical six 25,000 gallon USTs.
- Geospatial data were provided by other consultants or georeferenced from reports prepared by other consultants. All locations are approximate.

0 25 50 100 Feet

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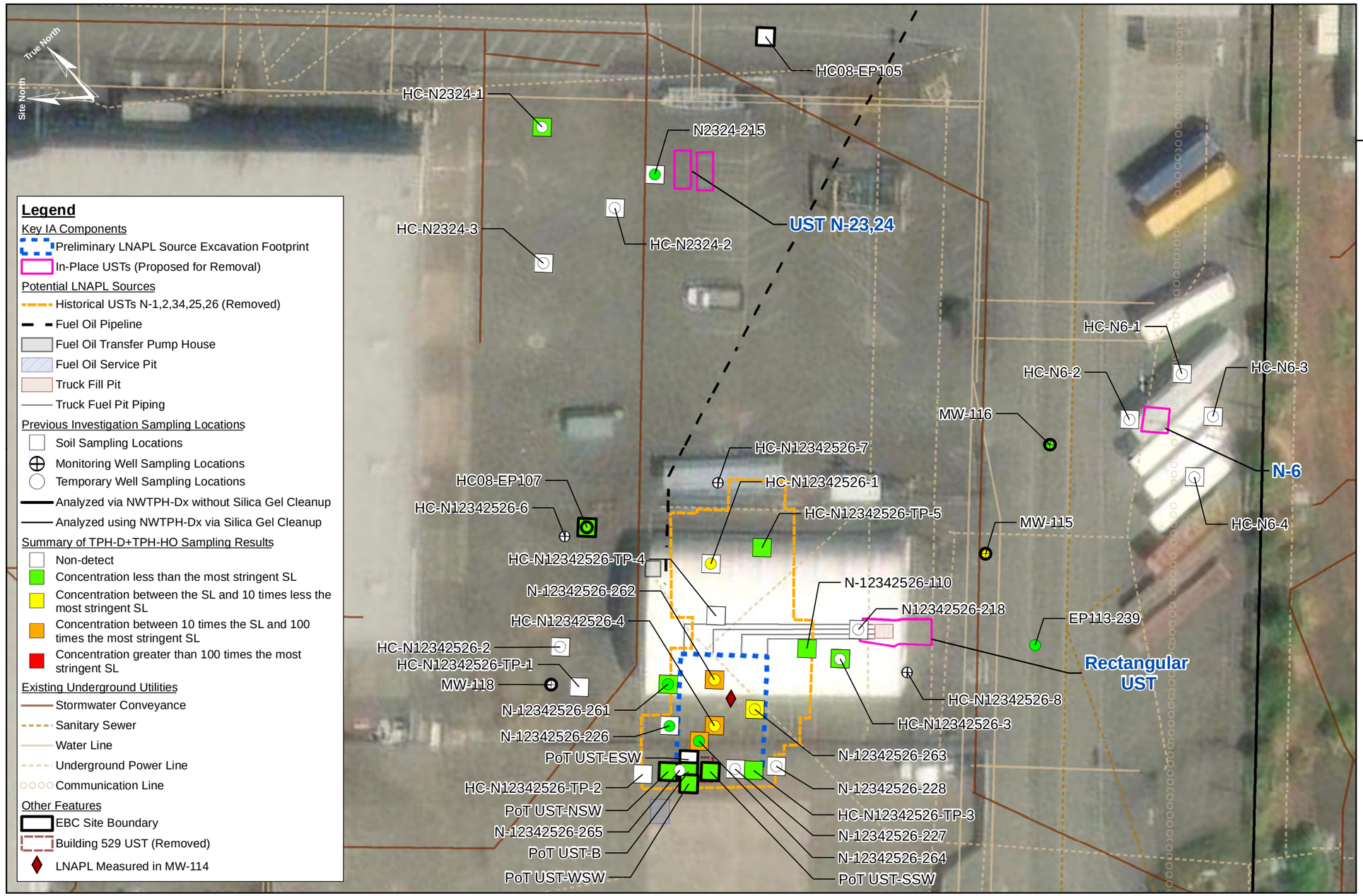
IA-Related Site Features
Interim Action Work Plan
Earley Business Center Site

Figure 2

Document Path: G:\Projects\Port_of_Tacoma\EBC\Maps\UST_Interim Action WP\Figure 2_IA-Related Site Features.mxd; Author: VN; Date Saved: 3/23/2025



Legend

Key IA Components
- Preliminary LNAPL Source Excavation Footprint
- In-Place USTs (Proposed for Removal)

Potential LNAPL Sources
- Historical USTs N-1,2,34,25,26 (Removed)
- Fuel Oil Pipeline
- Fuel Oil Transfer Pump House
- Fuel Oil Service Pit
- Truck Fill Pit
- Truck Fuel Pit Piping

Previous Investigation Sampling Locations
- Soil Sampling Locations
- Monitoring Well Sampling Locations
- Temporary Well Sampling Locations
- Analyzed via NWTPH-Dx without Silica Gel Cleanup
- Analyzed using NWTPH-Dx via Silica Gel Cleanup

Summary of TPH-D+TPH-HO Sampling Results
- Non-detect
- Concentration less than the most stringent SL
- Concentration between the SL and 10 times less the most stringent SL
- Concentration between 10 times the SL and 100 times the most stringent SL
- Concentration greater than 100 times the most stringent SL

Existing Underground Utilities
- Stormwater Conveyance
- Sanitary Sewer
- Water Line
- Underground Power Line
- Communication Line

Other Features
- EBC Site Boundary
- Building 529 UST (Removed)
- LNAPL Measured in MW-114

Notes:
- Only IA-related soil and groundwater sampling locations and results are presented on this figure.
- Geospatial data were provided by other consultants or georeferenced from reports prepared by other consultants. All locations are approximate.
- TPH-D+TPH-HO Soil SL = 2,000 mg/kg
- TPH-D+TPH-HO GW SL = 2,100 ug/L

0 25 50 100 Feet

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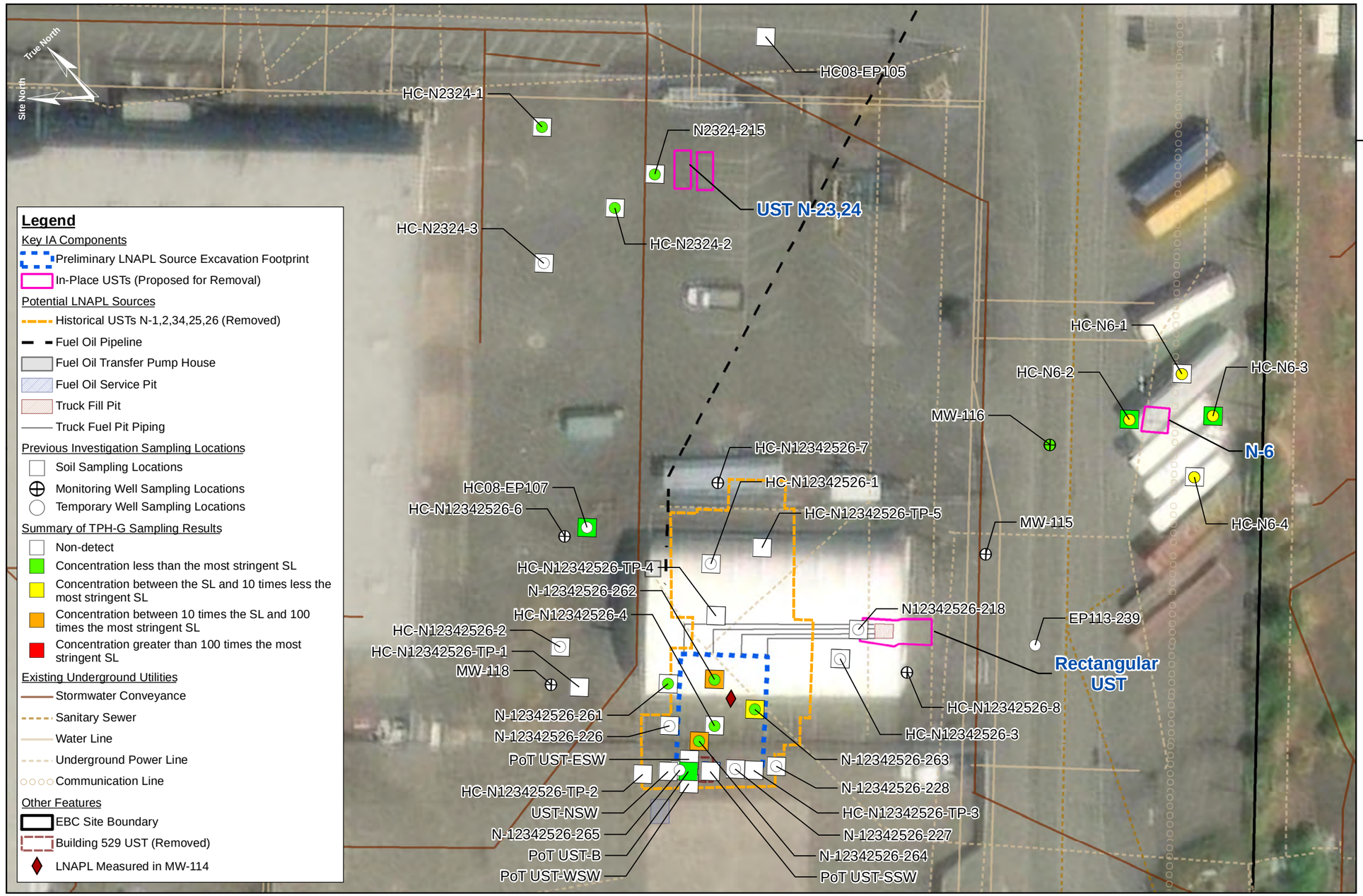
IA-Related Soil and Groundwater Sampling Locations and Results (TPH-D+TPH-HO) Interim Action Work Plan Earley Business Center Site

Figure 3

Document Path: G:\Projects\Port_of_Tacoma\EBC\Maps\UST_Interim Action WP\Figure 3_IA Related Soil and GW Results_TPHD+TPHHO.mxd; Author: VN; Date Saved: 3/23/2025



Legend

Key IA Components
- Preliminary LNAPL Source Excavation Footprint
- In-Place USTs (Proposed for Removal)

Potential LNAPL Sources
- Historical USTs N-1,2,34,25,26 (Removed)
- Fuel Oil Pipeline
- Fuel Oil Transfer Pump House
- Fuel Oil Service Pit
- Truck Fill Pit
- Truck Fuel Pit Piping

Previous Investigation Sampling Locations
- Soil Sampling Locations
- Monitoring Well Sampling Locations
- Temporary Well Sampling Locations

Summary of TPH-G Sampling Results
- Non-detect
- Concentration less than the most stringent SL
- Concentration between the SL and 10 times less the most stringent SL
- Concentration between 10 times the SL and 100 times the most stringent SL
- Concentration greater than 100 times the most stringent SL

Existing Underground Utilities
- Stormwater Conveyance
- Sanitary Sewer
- Water Line
- Underground Power Line
- Communication Line

Other Features
- EBC Site Boundary
- Building 529 UST (Removed)
- LNAPL Measured in MW-114

Notes:
- Only IA-related soil and groundwater sampling locations and results are presented on this figure.
- Geospatial data were provided by other consultants or georeferenced from reports prepared by other consultants. All locations are approximate.
- TPH-G Soil SL = 30 mg/kg
- TPH-G GW SL = 1,700 ug/L

0 25 50 100 Feet

PIONEER TECHNOLOGIES CORPORATION

IA-Related Soil and Groundwater Sampling Locations and Results (TPH-G)
Interim Action Work Plan
Earley Business Center Site

Figure 4

Document Path: G:\Projects\Port_of_Tacoma\EBC\Maps\UST_Interim Action WP\Figure 4_IA Related Soil and GW Results_TPHG.mxd; Author: VN; Date Saved: 3/23/2025

Tables

Table 1: IA-Related UST Details

IA Excavation Location	UST ID	Current UST Status	UST Product in Source Document	Estimated Volume (gallons)	Source Document	Presumed UST Product(s) Based on Existing Information
LNAPL Source	Former N-1,2,3,4,25,26	RI activities confirmed USTs were previously removed (Crete and PGG 2016) and these USTs are documented as "Removed" in Ecology's UST System Summary database	Fuel Oil	25,000 (each)	Hart Crowser 2012a and d and Department of the Navy DPWO Drawing No. 52-81 (Appendix B)	Fuel Oil [1]
					Crete and PGG 2013	
					Crete and PGG 2016	
			N/A	N/A	Ecology UST System Summary, Accessed 06/19/2024	
N-6	N-6	RI activities confirmed UST is still in-place (Crete and PGG 2016)	Oil Tank	1,600	Hart Crowser 2012c and Department of the Navy DPWO Drawing No. 52-81 (Appendix B)	Fuel/Heating Oil
			Fuel Oil	1,600	Crete and PGG 2013	
			Heating Oil and Oil Tank	N/A	Crete and PGG 2016	
			Unknown	N/A	Ecology UST System Summary, Accessed 06/19/2024	
N-23,24	N-23	RI activities confirmed UST is still in-place (Crete and PGG 2016) and this UST is documented as "Closed in Place" in Ecology's UST System Summary database	Gas[2]	N/A	Hart Crowser 2012b and Department of the Navy DPWO Drawing No. 52-81 (Appendix B)	Leaded Gasoline and Fuel/Heating Oil
			No. 5 Diesel Fuel[3]	1,000 - 5,000	Hart Crowser 2012b	
			Fuel Oil	1,000 - 5,000	Crete and PGG 2013	
			Heating Oil	N/A	Ecology UST System Summary, Accessed 06/19/2024	
	N-24	RI activities confirmed UST is still in-place (Crete and PGG 2016) and this UST is documented as "Closed in Place" in Ecology's UST System Summary database	Gas	N/A	Hart Crowser 2012b and Department of the Navy DPWO Drawing No. 52-81 (Appendix B)	Leaded Gasoline
			Gasoline	1,000 - 5,000	Hart Crowser 2012b	
			Leaded Gas	1,000 - 5,000	Crete and PGG 2013	
			Leaded Gasoline	N/A	Ecology UST System Summary, Accessed 06/19/2024	
Rectangular UST	Rectangular UST	RI activities confirmed UST is still in-place (Crete and PGG 2016)	Unknown	Unknown	Hart Crowser 2012a and d	Unknown Oil
					Crete and PGG 2013	
					Crete and PGG 2016	
					Ecology UST System Summary, Accessed 06/19/2024	

Notes:

N/A: not available

[1] Bunker C, which is a type of fuel oil, is the presumed product based on visual observations and the viscous nature of the LNAPL encountered in MW-114, results of previous investigations, and historical documents that identify the use of a fuel oil system and differentiate the "oil tanks" in question from "gas tanks" elsewhere on the Site.

[2] UST N-23 is identified on historical Navy drawings as a "Gas Tank" (Appendix B); however, Port records indicate that UST N-23 was converted to Port usage and documented UST P-15 (Hart Crowser 2012b). Recent reports indicate UST N-23 was used for storing fuel or heating oil, rather than gas. Since the Port purchased the Property from the Navy in 1960, it was assumed that the tank was primarily used for storing fuel or heating oil after UST N-23 become in-service for Port usage.

[3] No. 5 Diesel Fuel, also referred to as Bunker B, is classified as a heating oil.

Table 2: IA-Related Investigation Chronology

Fieldwork Date(s)	Activity	Media	# of Locations [1]	Location IDs	Field Measurements	Laboratory Analyses	Reference
Oct 2008	Advanced borings, collected soil samples, and collected grab GW sample to characterize Site for proposed terminal development.	Soil	2	HC08-EP105 and HC08-EP107 [2]	PID, sheen test	pH*, NWTPH-Dx, NWTPH-Gx, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, PCBs*, chloride*, sulfides*, resistivity*, redox potential*	Hart Crowser 2009
		GW	1	HC08-EP107 [2]	pH, conductivity, temperature	NWTPH-Dx, NWTPH-Gx, arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, VOCs	
Sep 2010	Advanced borings, collected soil samples, and collected grab GW samples to investigate UST N-6.	Soil	4	HC-N6-1 through HC-N6-4	PID, sheen test	NWTPH-Gx, NWTPH-Dx with SGC, VOCs	Hart Crowser 2012c
		GW			--		
	Advanced borings, collected soil samples, and collected grab GW samples to investigate USTs N-1,2,3,4,25,26.	Soil	4	HC-N12342526-1 through HC-N12342526-4	PID, sheen test	NWTPH-Gx, NWTPH-Dx with SGC, BTEX	Hart Crowser 2012d
		GW			--		
	Advanced borings, collected soil samples, and collected grab GW samples to investigate USTs N-23,24.	Soil	3	HC-N2324-1 through HC-N2324-3	PID, sheen test	NWTPH-Gx, NWTPH-Dx with SGC, BTEX	Hart Crowser 2012b
		GW			--		
Sep to Nov 2011	Advanced test pits to determine if USTs N-1,2,3,4,25,26 were still in-place and the lateral extent of petroleum impacts.	Soil	5	HC-N12342526-TP-1 through HC-N12342526-TP-5	Sheen test	NWTPH-Gx, NWTPH-Dx with SGC, VOCs, PAHs*, SVOCs*, lead*, RCRA 8 metals*	Hart Crowser 2012a
	Advanced borings proximate to USTs N-1,2,3,4,25,26.	Soil	4	HC-N12342526-5 through HC-N12342526-8	PID, sheen test	--	
	Installed, developed, and sampled MWs.	GW	3	HC-N12342526-6 through HC-N12342526-8	--	NWTPH-Gx, NWTPH-Dx with SGC, VOCs, total and dissolved arsenic, cadmium, chromium, lead, and mercury	
Feb 2014	Performed ground penetrating radar surveys for USTs N-6, N-23,24, and N-1,2,3,4,25,26.	--	--	--	--	--	Grete and PGG 2016
	Conducted air-knife explorations to locate USTs N-6 and N-23,24.	--	--	--	--	--	
	Advanced borings, collected soil samples, and collected grab GW samples to further investigate USTs N-1,2,3,4,25,26 and N-23,24.	Soil	2	N12342526-218, N2324-215	--	NWTPH-Gx, NWTPH-Dx with SGC, VOCs*	
		GW	2		--	NWTPH-Gx, NWTPH-Dx with SGC, VOCs*	
Apr 2014	Advanced borings, collected soil samples, and collected grab GW samples to further investigate USTs N-1,2,3,4,25,26.	Soil	4	N-12342526-110, N-12342526-226 through N-12342526-228	PID*	NWTPH-Gx*, NWTPH-Dx with SGC, BTEX*	
		GW	3	N-12342526-226 through N-12342526-228	pH, conductivity, temperature, dissolved oxygen, oxidation-reduction potential	NWTPH-Gx, NWTPH-Dx with SGC, BTEX	
	Advanced boring and collected grab GW sample to further investigate HC08-EP113 area.	GW	1	EP113-239 [2]	PID	NWTPH-Gx, NWTPH-Dx with SGC, BTEX	
Sep 2014	Advanced borings, collected soil samples, and collected grab GW samples to further investigate USTs N-1,2,3,4,25,26 and the Building 529 UST.	Soil	5	N-12342526-261 through N-12342526-265	PID*	NWTPH-Gx, NWTPH-Dx with SGC	
		GW	5		--	NWTPH-Gx, NWTPH-Dx with SGC	
Nov 2015	Collected a sample from the 1/8-inch-thick oil layer floating on top of water within the Building 529 UST during UST decommissioning activities.	Liquid	1	PoT-UST-Product	--	NWTPH-Gx, NWTPH-Dx, BTEX, RCRA 8 metals, cPAHs, halogenated VOCs, PCBs	HydroCon 2016
	Collected excavation sidewall, bottom, and stockpile samples from the Building 529 UST excavation.	Soil	6	PoT UST-NSW, PoT UST-SSW, PoT UST-ESW, PoT UST-WSW, PoT UST-B, and PoT UST-Composite	PID	NWTPH-Gx, NWTPH-Dx, BTEX, cPAHs	
	Collected split samples for the aforementioned Building 529 UST excavation-related samples.	Soil	6	PofT-NSW, PofT-SSW, PofT-ESW, PofT-WSW, PofT-Bottom, and PofT-Stockpile	--	NWTPH-Dx with SGC	Crete 2016
Feb to Mar 2019	Installed, developed, and surveyed MWs to further investigate USTs N-1,2,3,4,25,26 and the EP-113 area release.	GW	4	MW-114 through MW-116 and MW-118 [2,3]	PID, LNAPL thickness*, pH*, conductivity*, temperature*, turbidity*	--	Crete 2024
Apr 2019	Conducted GWM event.	GW	4	MW-114 through MW-116 and MW-118 [2,3]	LNAPL thickness*, SWL, pH*, conductivity*, temperature*, dissolved oxygen*, oxidation-reduction potential*, turbidity*	NWTPH-Gx*, NWTPH-Dx without SGC*, NWTPH-Dx with SGC*, chlorinated VOCs*	
May 2019 to Feb 2020	Collected four additional rounds of LNAPL thickness measurements in source area MW for USTs N-1,2,3,4,25,26.	GW	1	MW-114	LNAPL thickness	--	
Jul 2006	OCC advanced a boring that happened to be near UST N-6 and collected soil samples.	Soil	1	WMUA-29 [2]	PID	VOCs, SVOCs*	CRA 2015
Various	OCC installed extraction/injection wells and MWs that happened to be near USTs N-1,2,3,4,25,26 and N-23,24.	--	--	A-4, A-6, 78-25, 78-50, 78C [2]	PID*	Any constituent data associated with these locations were not reviewed or evaluated.	CRA 2015

Notes:

--: not applicable or not available; BTEX: benzene, toluene, ethylbenzene, and xylenes; cPAHs: carcinogenic polycyclic aromatic hydrocarbons; GW: groundwater; GWM: groundwater monitoring; LNAPL: light non-aqueous phase liquid; MW: monitoring well; OCC: Occidental Chemical Corporation; PAHs: polycyclic aromatic hydrocarbons; PCB: polychlorinated biphenyls; PID: photoionization detector; RCRA: Resource Conservation and Recovery Act; SGC: silica gel cleanup; SVOC: semi-volatile organic compounds; SWL: static water level; VOCs: volatile organic compounds

* This analysis was performed on a subset of the samples.

[1] This column counts the number of unique sample locations for a given activity (not the total number of samples or the number of analyses for a given activity). In other words, this column does not account for multiple samples at different depths in a given location or field duplicates.

[2] Although other locations were associated with this investigation activity, only the specific location IDs proximate and relevant to the IA are included in this table.

[3] Although MW-115 and MW-116 are associated with the EP-113 area release, these locations were included in the chronology since they are proximate to N-6 and the Rectangular UST, respectively.

Table 3: IA-Related TPH Soil Sampling Results

Location ID	Sample Date	Sample Depth (ft bgs)	Soil Concentration (mg/kg)							
			TPH-G	Q	TPH-D	Q	TPH-HO	Q	TPH-D + TPH-HO[(1)]	Q
Borings Proximate to UST N-6										
HC-N6-1	9/22/2010	9.5 - 12	7.6	U	31	U	62	U	93	U
HC-N6-2	9/22/2010	9 - 12	**14**		30	U	60	U	90	U
HC-N6-3	9/22/2010	10 - 12	**6.6**		29	U	59	U	88	U
HC-N6-4	9/22/2010	9 - 12	6.2	U	30	U	59	U	89	U
Borings Proximate to USTs N-23,24										
HC08-EP105	*10/1/2008*	*1 - 4*	7.6	U	*5.1*	*U*	*10.0*	*U*	*15*	*U*
HC-N2324-1	9/27/2010	8 - 10	5.3	U	28	U	**95**		**109**	
HC-N2324-2	9/27/2010	8 - 10	7.1	U	32	U	64	U	96	U
HC-N2324-3	9/28/2010	8 - 10	7.0	U	31	U	61	U	92	U
N2324-215	2/13/2014	6 - 7	2.0	U	50	U	250	U	300	U
Borings Proximate to LNAPL Source and Rectangular UST										
HC08-EP107	*10/1/2008*	*2.5 - 4*	**6.8**		***6.4***		***37***		***43***	
HC-N12342526-1	9/24/2010	10 - 13	6.1	U	31	U	62	U	93	U
HC-N12342526-2	9/24/2010	8 - 10	7.4	U	33	U	65	U	98	U
HC-N12342526-3	9/24/2010	1 - 4	5.0	U	**46**		**98**		**144**	
	9/24/2010	12 - 14	6.0	U	30	U	60	U	90	U
HC-N12342526-4	9/24/2010	10 - 12	6.6	U	**22,000**		**25,000**		**47,000**	
HC-N12342526-TP-1	9/29/2011	8.5 - 9.5	7.5	U	34	U	68	U	102	U
HC-N12342526-TP-2	9/29/2011	8.5 - 9.5	9.0	U	35	U	69	U	104	U
HC-N12342526-TP-3	9/29/2011	8.5 - 9.5	5.7	U	26	U	**160**		**173**	
HC-N12342526-TP-4	9/28/2011	2 - 3	5.8	U	27	U	54	U	81	U
		8.5 - 9.5	6.6	U	30	U	59	U	89	U
HC-N12342526-TP-5	9/28/2011	8.5 - 9.5	6.5	U	**38**		**100**		**138**	
N12342526-218	2/13/2014	8 - 10	2.0	U	50	U	250	U	300	U
N12342526-110	4/16/2014	9.5 - 10.5	--		**380**		**370**		**750**	
N12342526-226	4/15/2014	8 - 9	2.0	U	50	U	250	U	300	U
N12342526-227	4/15/2014	9 - 10	2.0	U	50	U	250	U	300	U
N12342526-228	4/15/2014	9 - 10	2.0	U	50	U	250	U	300	U
N12342526-261	9/23/2014	9.1 - 10	2.0	U	25	U	**69**		**82**	
N12342526-262	9/23/2014	8.5 - 9	**440**		**29,000**		**32,000**		**61,000**	
N12342526-263	9/23/2014	8.4 - 8.9	**37**		**2,600**		**3,000**		**5,600**	
N12342526-264	9/23/2014	9 - 10	**1,400**		**21,000**		**13,000**		**34,000**	
N12342526-265	9/23/2014	9 - 10	2.0	U	25	U	50	U	75	U
PoT UST-NSW	11/30/2015	4.5	2.0	U	***260***		***390***		***650***	
			--		**170**		250	U	**295**	
PoT UST-ESW	11/30/2015	4.5	2.0	U	*50*	*U*	*250*	*U*	*300*	*U*
			--		50	U	250	U	300	U
PoT UST-SSW	11/30/2015	4.5	2.0	U	***210***	*X*	***870***		***1,080***	
			--		**86**	X	**360**		**446**	
PoT UST-WSW	11/30/2015	4.5	2.0	U	***58***		*250*	*U*	***183***	
			--		50	U	250	U	300	U
PoT UST-B	11/30/2015	7.5	**4.0**		***370***		***280***		***650***	
			--		**360**		**300**		**660**	

Notes:

--: Constituent not analyzed; bgs: below ground surface; ft: feet; mg/kg: milligrams per kilogram; Q: qualifier; SL: screening level; U: constituent not detected at shown reporting limit; X: chromatograph patterns do not resemble the fuel standard used for quantitation

Constituent results are shown as two significant figures in standard notation, except numbers greater than 100 are rounded to a whole number.

Italicized font indicates the sample was analyzed using Ecology Method NWTPH-Dx without silica gel cleanup.

Bold font indicates the concentrations were detections.

Yellow highlighted concentrations were > the SL and ≤ 10x the SL.

Orange highlighted concentrations were > 10x the SL and ≤ 100x the SL.

Red highlighted concentrations were > 100x the SL.

SLs were based on the most stringent soil SLs, as identified in Appendix C.

TPH-G Soil SL = 30 mg/kg; TPH-D+TPH-HO Soil SL: 2,000 mg/kg

[(1)] TPH-D and TPH-HO were combined in accordance with Ecology guidance (Ecology 2004, 2016). If only one constituent was non-detect, the non-detect concentration was assumed to equal one-half of the reporting limit. If neither constituent was detected, the reporting limits were summed.

Table 4: IA-Related TPH Groundwater Sampling Results

Location ID	Sample Date	Sample Depth (ft bgs)	Groundwater Concentrations (ug/L)							
			TPH-G	Q	TPH-D	Q	TPH-HO	Q	TPH-D + TPH-HO[1]	Q
Borings and MWs Proximate to UST N-6										
HC-N6-1	9/22/2010	10 - 12	**8,700**[2]		170	U	420	U	590	U
HC-N6-2	9/22/2010	10 - 12	**5,500**[2]		750	U	420	U	1,170	U
HC-N6-3	9/22/2010	10 - 12	**6,700**[2]		1,200	U	430	U	1,630	U
HC-N6-4	9/22/2010	10 - 12	**8,600**[2]		2,100	U	420	U	2,520[3]	U
MW-116	4/23/2019	N/A	**100**		***95***	*X*	*250*	*U*	***220***	*X*
			--		50	U	250	U	300	U
Borings and MWs Proximate to UST N-23,24										
HC-N2324-1	9/27/2010	9 - 12	**300**		260	U	410	U	670	U
HC-N2324-2	9/27/2010	9 - 12	**170**		260	U	410	U	670	U
HC-N2324-3	9/28/2010	9 - 12	100	U	260	U	420	U	680	U
N2324-215	2/13/2014	7 - 8	**750**		**160**		250	U	**285**	
Borings and MWs Proximate to LNAPL Source and Rectangular UST										
HC08-EP107	*10/1/2008*	*10.75 - 11.75*	250	U	***340***		*500*	*U*	***590***	
HC-N12342526-1	9/24/2010	11 - 14	100	U	**530**		**1,800**		**2,330**	
HC-N12342526-2	9/24/2010	9 - 12	100	U	260	U	420	U	680	U
HC-N12342526-3	9/24/2010	12 - 15	100	U	260	U	420	U	680	U
HC-N12342526-4	9/24/2010	10 - 13	**950**		**1,500**		**670**		**2,170**	
HC-N12342526-6	11/10/2011	8.5 - 13	100	U	260	U	410	U	670	U
HC-N12342526-7	11/10/2011	8.5 - 13	100	U	260	U	410	U	670	U
HC-N12342526-8	11/10/2011	9 - 13	100	U	260	U	410	U	670	U
N12342526-218	2/13/2014	11	100	U	50	U	250	U	300	U
N-12342526-226	4/15/2014	9 - 10	100	U	**690**		250	U	**815**	
N-12342526-227	4/15/2014	10 - 11	100	U	50	U	250	U	300	U
N-12342526-228	4/15/2014	10 - 11	100	U	50	U	250	U	300	U
EP113-239	4/15/2014	9 - 10	100	U	**230**		250	U	**355**	
N-12342526-261	9/23/2014	10 - 14	**250**		**120**		250	U	**245**	
N-12342526-262	9/23/2014	9 - 13	**500**		**1,700**		**880**		**2,580**	
N-12342526-263	9/23/2014	9 - 12	**660**		**4,600**		**3,100**		**7,700**	
N-12342526-264	9/23/2014	10 - 11	**300**		**1,100**		**350**		**1,450**	
N-12342526-265	9/23/2014	10 - 11	100	U	50	U	250	U	300	U
MW-115	4/23/2019	11	100	U	***2,500***	*X*	***790***	*X*	***3,290***	*X*
			--		**70**		250	U	**195**	
MW-118[4]	4/23/2019	11	100	U	*60*	*U*	*300*	*U*	*360*	*U*
			--		**270**	X	300	U	**420**	X

Notes:

N/A: not available

--: Constituent not analyzed; bgs: below ground surface; ft: feet; Q: qualifier; SL: screening level; U: constituent not detected at shown reporting limit; µg/L: micrograms per liter; X: chromatograph patterns do not resemble the fuel standard used for quantitation

Constituent results are shown as two significant figures in standard notation, except numbers greater than 100 are rounded to a whole number.

Italicized font indicates the sample was analyzed using Ecology Method NWTPH-Dx without silica gel cleanup.

Bold font indicates the concentrations were detections.

Yellow highlighted concentrations were > the SL and ≤ 10x the SL.

Orange highlighted concentrations were > 10x the SL and ≤ 100x the SL.

Red highlighted concentrations were > 100x the SL.

SLs were based on the most stringent groundwater SLs, as identified in Appendix C.

TPH-G GW SL = 1,700 µg/L; TPH-D+TPH-HO GW SL = 2,100 µg/L

[1] TPH-D and TPH-HO were combined in accordance with Ecology guidance (Ecology 2004, 2016). If only one constituent was non-detect, the non-detect concentration was assumed to equal one-half of the reporting limit. If neither constituent was detected, the reporting limits were summed.

[2] These reported TPH-G concentrations in the N-6 groundwater samples may not be representative of actual TPH-G concentrations based on the following lines of evidence: (a) the N-6 groundwater sample locations were adjacent to a known OCC PCE/TCE source area, (b) "no field evidence of petroleum-related impacts was observed in the four shallow push probe explorations" and "no evidence of petroleum-related contamination was observed during the field screening of the purge water" (Hart Crowser 2012c), (c) the PCE + TCE concentrations in the four N-6 groundwater samples were 1.7 to 5.6 times higher than the TPH-G concentrations in the same sample (Hart Crowser 2012c), (d) PCE and TCE elute within the NWTPH-Gx range, (e) the laboratory indicated that the NWTPH-Gx chromatograms for all four groundwater samples "were not similar to a typical gasoline chromatogram" (Hart Crowser 2012c), and (f) benzene, toluene, ethylbenzene, and xylenes (key components of gasoline) were not detected in any of the four groundwater samples (Hart Crowser 2012c).

[3] The laboratory reported elevated reporting limits for TPH-D, likely due to interferences present in the sample and the need to dilute the samples prior to analysis (Hart Crowser 2012c). TPH-D and TPH-HO were combined in accordance with Ecology guidance (Ecology 2004, 2016). Since both TPH-D and TPH-HO were non-detect at this location, the full reporting limits were summed. This is likely a conservative assumption and results in an overestimate of the TPH-D and TPH-HO concentration at HC-N6-4. Thus, these results are not considered TPH-D and TPH-HO exceedances for the purposes of this IAWP.

[4] The chain-of-custody and analytical report reported the results for this sample as MW-113-0419 (Crete 2024).

Table 5: Groundwater Elevations, LNAPL Measurements, and TPH-D+TPH-HO Results at Locations Proximate to the Preliminary LNAPL Source Excavation Footprint

Inside LNAPL Source Excavation Footprint

Depth (ft bgs)	MW-114 Sheen/Odor	MW-114 LNAPL (ft) 3/14/2019	MW-114 LNAPL (ft) 8/15/2019	MW-114 LNAPL (ft) 11/15/2019	MW-114 LNAPL (ft) 2/5/2020	HC-N12342526-4 Sheen/Odor	HC-N12342526-4 Soil	HC-N12342526-4 Groundwater	N-12342526-262 Sheen/Odor	-262 Soil	-262 Groundwater	-263 Sheen/Odor	-263 Soil	-263 Groundwater	-264 Sheen/Odor	-264 Soil	-264 Groundwater
0.0-0.5																	
0.5-1.0																	
1.0-1.5																	
1.5-2.0																	
2.0-2.5																	
2.5-3.0																	
3.0-3.5									NS/NO								
3.5-4.0																	
4.0-4.5						NS/NO						NS/NO					
4.5-5.0	NS/NO																
5.0-5.5															NS/NO		
5.5-6.0																	
6.0-6.5																	
6.5-7.0		0.21															
7.0-7.5																	
7.5-8.0					0.99												
8.0-8.5									HS/O								
8.5-9.0										61,000			5,600				
9.0-9.5				1.00								O				34,000	
9.5-10			2.35			HS/HO											
10-10.5														7,700			1,450
10.5-11							47,000				2,580				HO		1,450
11-11.5	HS							2,170									
11.5-12																	
12-12.5															Bottom of Boring		
12.5-13						SS/SO											
13-13.5									Bottom of Boring								
13.5-14																	
14-14.5	NS/NO					Bottom of Boring						Bottom of Boring					
14.5-15																	
15-15.5	Bottom of MW																
15.5-16																	
16-16.5																	
16.5-17																	
17-17.5																	
17.5-18																	

Along Perimeter of LNAPL Source Excavation Footprint

Depth (ft bgs)	HC-N12342526-TP3 Sheen/Odor	HC-N12342526-TP3 Soil	N-12342526-226 Sheen/Odor	-226 Soil	-226 Groundwater	-227 Sheen/Odor	-227 Soil	-227 Groundwater	-261 Sheen/Odor	-261 Soil	-261 Groundwater	-265 Sheen/Odor	-265 Soil	-265 Groundwater
0.0-0.5														
0.5-1.0														
1.0-1.5														
1.5-2.0			NS/NO											
2.0-2.5														
2.5-3.0														
3.0-3.5														
3.5-4.0														
4.0-4.5			SO											
4.5-5.0	NS/NO								NS/NO					
5.0-5.5														
5.5-6.0												NS/NO		
6.0-6.5						NS/NO								
6.5-7.0														
7.0-7.5														
7.5-8.0														
8.0-8.5				300 U										
8.5-9.0		173	NS/NO											
9.0-9.5		173					300 U			82			75 U	
9.5-10	Bottom of Test Pit				815		300 U							
10-10.5														300 U
10.5-11								300 U						300 U
11-11.5														
11.5-12														
12-12.5			Bottom of Boring								245	Bottom of Boring		
12.5-13														
13-13.5						Bottom of Boring								
13.5-14														
14-14.5									Bottom of Boring					
14.5-15														
15-15.5														
15.5-16														
16-16.5														
16.5-17														
17-17.5														
17.5-18														

Proximate to (and Outside of) LNAPL Source Excavation Footprint

Depth (ft bgs)	HC08-EP107 Sheen/Odor	HC08-EP107 Soil	HC08-EP107 Groundwater	MW-118 Sheen/Odor	MW-118 Groundwater	HC-N12342526-1 Sheen/Odor	-1 Soil	-1 Groundwater	-2 Sheen/Odor	-2 Soil	-2 Groundwater	-3 Sheen/Odor	-3 Soil	-3 Groundwater	-TP-1 Sheen/Odor	-TP-1 Soil	-TP-2 Sheen/Odor	-TP-2 Soil	-TP-4 Sheen/Odor	-TP-4 Soil	TP-5 Sheen/Odor	TP-5 Soil	-6 Sheen/Odor	-6 Groundwater	-7 Sheen/Odor	-7 Groundwater	-8 Sheen/Odor	-8 Groundwater	N-12342526-110 Sheen/Odor	-110 Soil	-228 Sheen/Odor	-228 Soil	-228 Groundwater
0.0-0.5																																	
0.5-1.0																																	
1.0-1.5												NS/NO																					
1.5-2.0																																	
2.0-2.5													144							81 U													
2.5-3.0												MS/O																					
3.0-3.5		43																															
3.5-4.0																																	
4.0-4.5																													NS/NO				
4.5-5.0						NS/NO									NS/NO		NS/NO		NS/NO		NS/NO												
5.0-5.5	SS																																
5.5-6.0									NS/NO																						NS/NO		
6.0-6.5																							NS/NO		NS/NO		NS/NO						
6.5-7.0																																	
7.0-7.5				NS/NO																													
7.5-8.0																																	
8.0-8.5										98 U																670 U							
8.5-9.0																				89 U		138											
9.0-9.5																102 U		104 U	PI	89 U	PI	138											
9.5-10										98 U		NS/NO			Bottom of Test Pit		Bottom of Test Pit		Bottom of Test Pit		Bottom of Test Pit									750		300 U	
10-10.5							93 U	2,330																									300 U
10.5-11	NS/NO										680 U													670 U		670 U		670 U					
11-11.5					360 U																												
11.5-12		590				MS/O																											
12-12.5	Bottom of Boring						93 U	2,330	Bottom of Boring																						Bottom of Boring		
12.5-13																													HS/HO				
13-13.5													90 U										Bottom of MW		Bottom of MW		Bottom of MW						
13.5-14														680 U																			
14-14.5																																	
14.5-15						NS/NO																											
15-15.5				Bottom of Boring																													
15.5-16																																	
16-16.5						Bottom of Boring						Bottom of Boring																					
16.5-17																													Bottom of Boring				
17-17.5																																	
17.5-18																																	

Notes:

bgs: below ground surface; ft: feet; HS: heavy or strong sheen; HO: heavy or strong odor; LNAPL: light non-aqueous phase liquid; MS: moderate sheen; NS: no sheen; NO: no odor; O: odor; PI: field observations indicated petroleum-related impacts at the specified depth; S: sheen; SO: slight odor; SS: slight sheen; U: constituent not detected at shown reporting limit; X: chromatograph patterns do not resemble the fuel standard used for quantitation

This table presents the soil and groundwater TPH-D+TPH-HO concentrations at locations proximate to (i.e., inside of, along the perimeter of, and outside of) the preliminary LNAPL source excavation footprint. Only locations that are relevant to the IA are presented in this table. TPH-D and TPH-HO were combined in accordance with Ecology guidance (Ecology 2004, 2016a). If only one constituent was non-detect, the non-detect concentration was assumed to equal one-half of the reporting limit. If neither constituent was detected, the reporting limits were summed.

Italicized font indicates the sample was analyzed using Ecology Method NWTPH-Dx without silica gel cleanup.

Bold font indicates the concentrations were detections.

Yellow highlighted concentrations were > the SL and ≤ 10x the SL.

Orange highlighted concentrations were > 10x the SL and ≤ 100x the SL.

Red highlighted concentrations were > 100x the SL.

Tan highlighted cells indicate the presence of LNAPL. The measured thickness is reported.

Depth to groundwater (ft bgs) as documented in associated logs (Appendix A and Crete 2024 for MW-114 and MW-118).

Preliminary LNAPL source excavation footprint (assuming maximum depth of 14 ft bgs).

Table 6: Key Anticipated IA Roles and Responsibilities

Role	Name	Contact Information	Key Investigation Responsibilities
Ecology Site Manager	Sandy Smith, PE, LHG	sasm461@ecy.wa.gov 360-999-9588 (C)	▪ Lead public participation and tribal engagement for IAWP ▪ Review and approve IAWP ▪ Review and approve IA plans and specifications ▪ Conduct field oversight as necessary
Port Engineering PM	David Myers, CSI, NCARB	dmyers@portoftacoma.com 253.428.8612 (O) 253.405.5593 (C)	▪ Provide Port engineering direction for IA implementation ▪ Lead remediation contractor bidding and contracting process ▪ Ensure necessary permits are obtained ▪ Manage team performance, budget, and schedule for IA implementation ▪ Support IA communication with Ecology
Port Environmental PM	Melisa Bod	mbod@portoftacoma.com 253-592-6789 (O) 253-219-2679 (C)	▪ Port's Designated Project Coordinator for Agreed Order DE 9553 ▪ Provide Port technical support for IA implementation ▪ Ensure integration of IA and Supplemental RI ▪ Support IA communication with Ecology
PIONEER PM	Troy Bussey, PE, LG, LHG	busseyt@uspioneer.com 360-570-1700 (O) 360-810-0640 (C)	▪ Manage overall completion of the IA ▪ Review consultant team documents ▪ Communicate and coordinate with Port PM(s), Ecology, and consultant team
PIONEER Project Engineer and PSR	Hannah Morse, PE	morseh@uspioneer.com 360-570-1700 (O) 360-556-7642 (C)	▪ Prepare IAWP ▪ Provide oversight of Remediation Contractor IA field activities ▪ Implement PIONEER HASP ▪ Prepare IA Report (Co-Authored with Crete Design Engineer)
PIONEER Geologist and SSO for RDI Fieldwork	Joel Hecker, LG, LHG	heckerj@uspioneer.com 360-570-1700 (O) 360-828-3739 (C)	▪ Coordinate and oversee completion of all RDI fieldwork ▪ Implement PIONEER HASP
PIONEER Health and Safety Manager	Kevin Gallagher, ASP, CSP	gallagherk@uspioneer.com 360-570-1700 (O) 206-226-3623 (C)	▪ Provide health and safety support as necessary
Crete Design Engineer	Grant Hainsworth, PE	grant.hainsworth@creteconsulting.com 253-797-6323 (C)	▪ Finalize the IA design plans, specifications, and EDR ▪ Provide support for Remediation Contractor bidding and construction ▪ Prepare IA Report (Co-Authored with PSR)
Sage Geotechnical PM	Calvin McCaughan, PE	calvinm@sagegeotechnical.com 253-306-2362 (O)	▪ Support development of shoring and dewatering design ▪ Provide oversight of implementation of RDI geotechnical data activities ▪ Provide support for Remediation Contractor bidding and construction
Licensed Driller (Holocene Drilling)	Anisa Harnden	aharnden@holocenedrilling.com 253-848-6500	▪ Advance soil borings for RDI activities
Project Laboratory (ARI)	Kelly Bottem	kellyb@arilabs.com 206-695-6200 (O)	▪ Perform laboratory analyses for RDI and confirmation soil samples ▪ Perform associated laboratory quality control
Geotechnical Laboratory (Hayre McElroy)	TBD		▪ Perform laboratory analyses for ASTM D422 ▪ Perform associated laboratory quality control
Data Quality Validator (QA/QC Solutions)	James McAteer	jjmcateer@msn.com 503-763-6948	▪ Perform independent data quality validation of laboratory data from the project laboratory
Remediation Contractor[1]	TBD		▪ Communicate and coordinate with the Port Engineering PM, Crete Design Engineer, and PIONEER PRS ▪ Adhere to the plans, specifications, contract requirements, and permit requirements ▪ Complete all UST decommissioning and site assessment tasks ▪ Implement remediation contractor HASP

Notes:

PM: project manager; PSR: Port Site Representative; RDI: remedial design investigation; SSO: site safety officer; TBD: to be determined

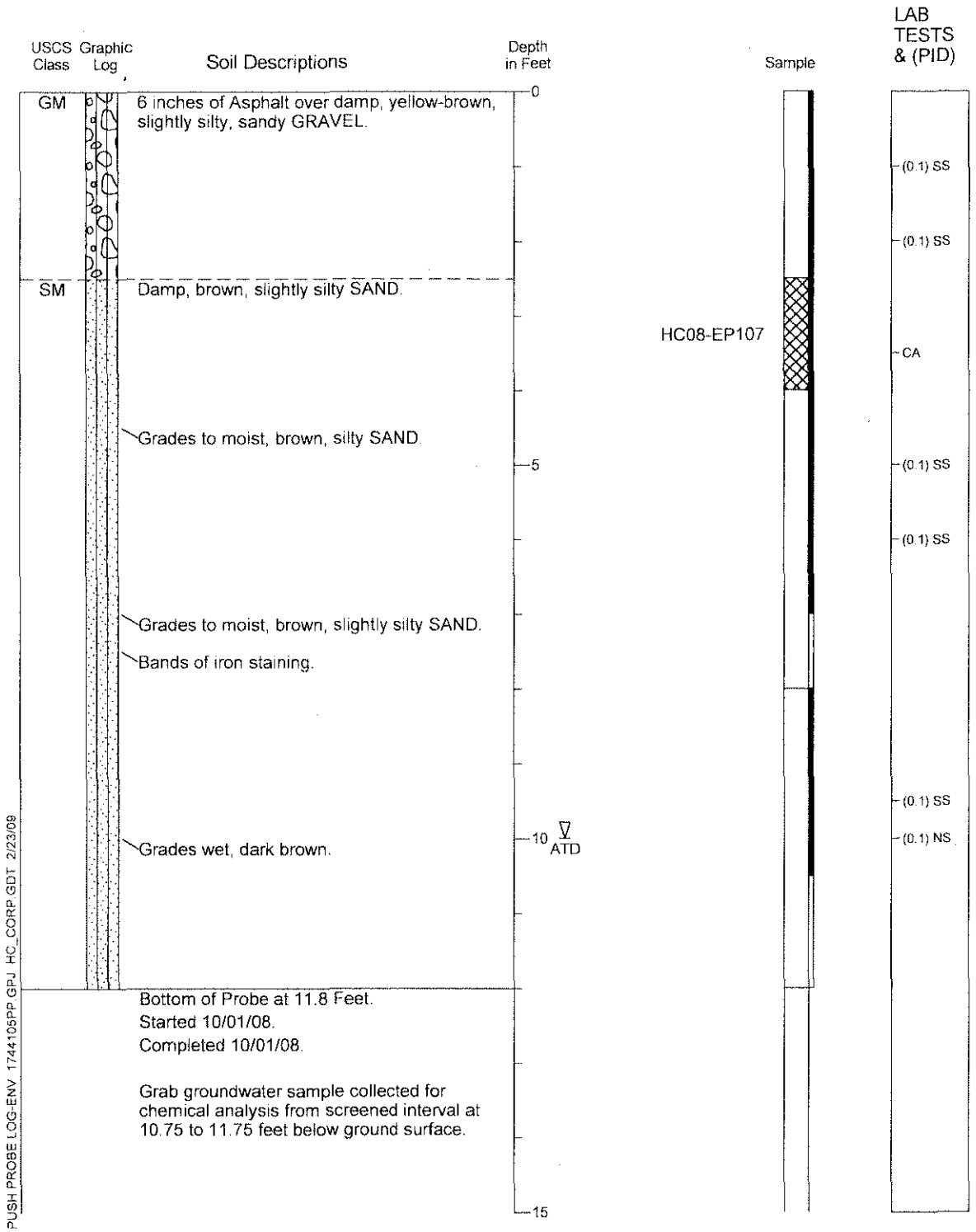
[1] Key remediation contractor roles are anticipated to include PM, supervisor/foreman, SSO, and UST service provider certified for decommissioning and site assessment.

Appendix A

Push Probe Log HC08-EP107

Location: N 715801.48 E 1166730.28
Approximate Ground Surface Elevation: 17.89 Feet
Horizontal Datum: NAD 83/07
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: A. Goodwin/K. Reinauer Reviewed By: G. Both



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. HS = High Sheen; MS = Moderate Sheen; SS = Slight Sheen; NS = No Sheen

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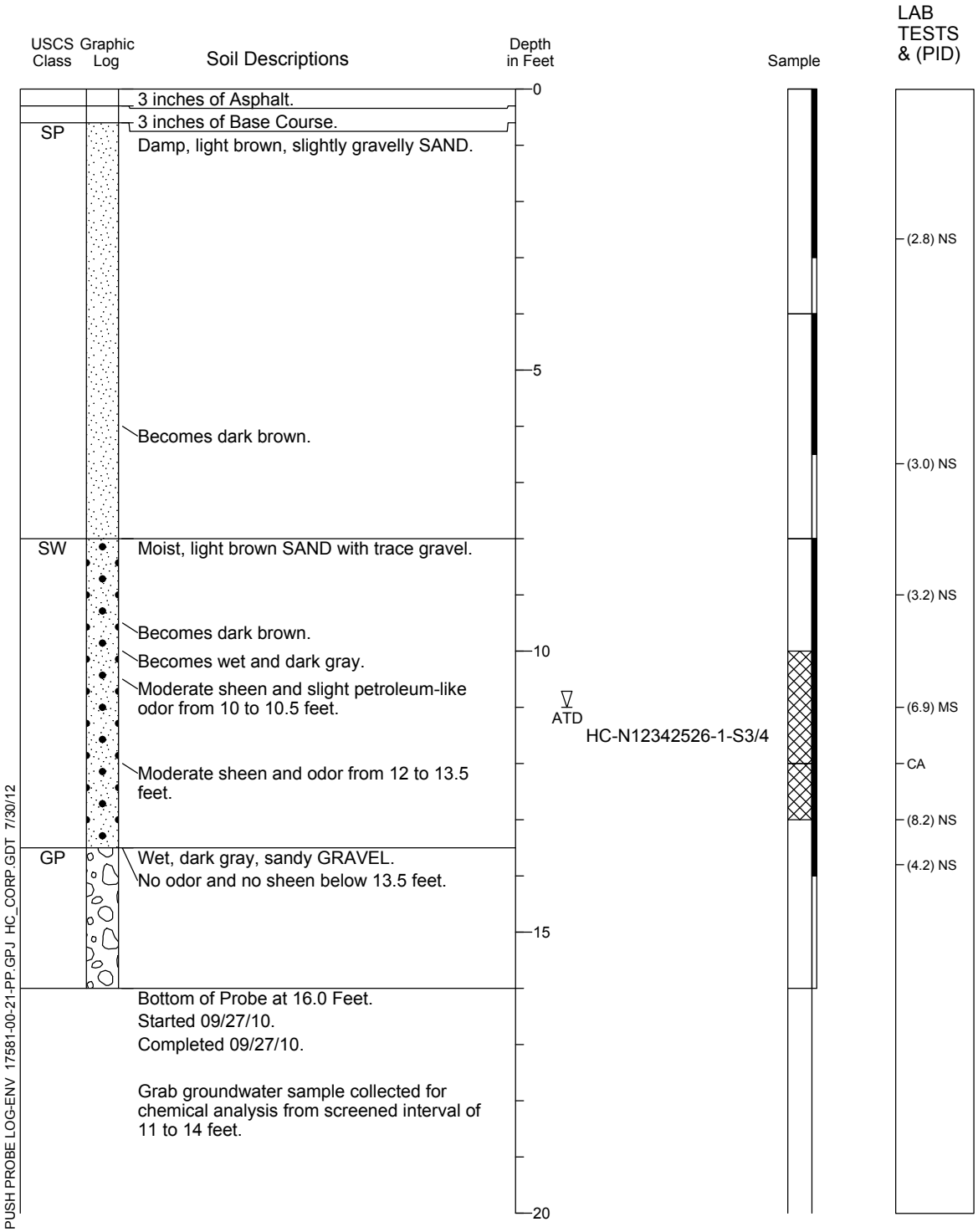
17441-05 10/08

Figure A-8

Push Probe Log HC-N12342526-1

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

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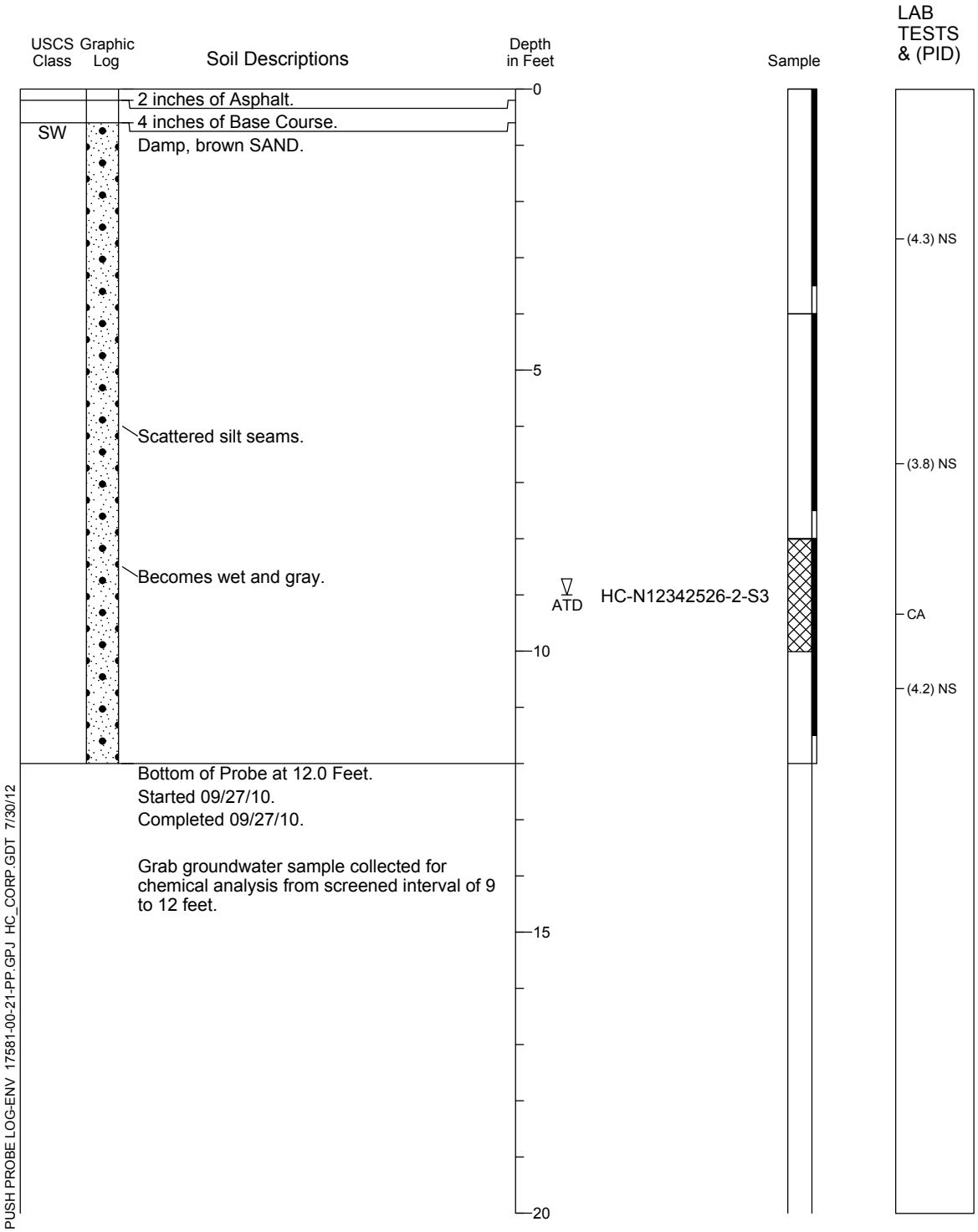
17581-00 *9/10*

Figure B-2

Push Probe Log HC-N12342526-2

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 17581-00-21-PP.GPJ HC_CORP.GDT 7/30/12

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

HARTCROWSER

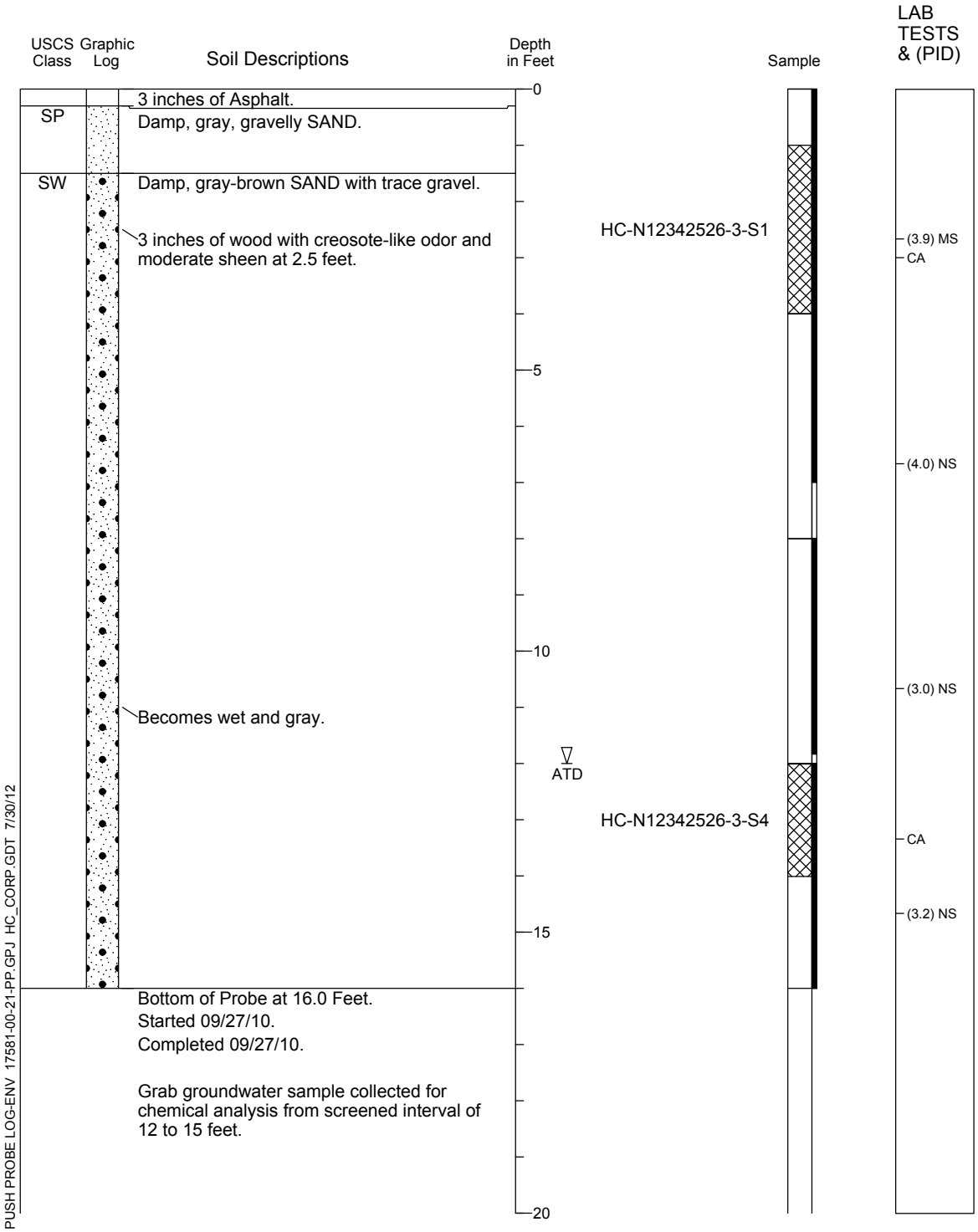
17581-00 *9/10*

Figure B-3

Push Probe Log HC-N12342526-3

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

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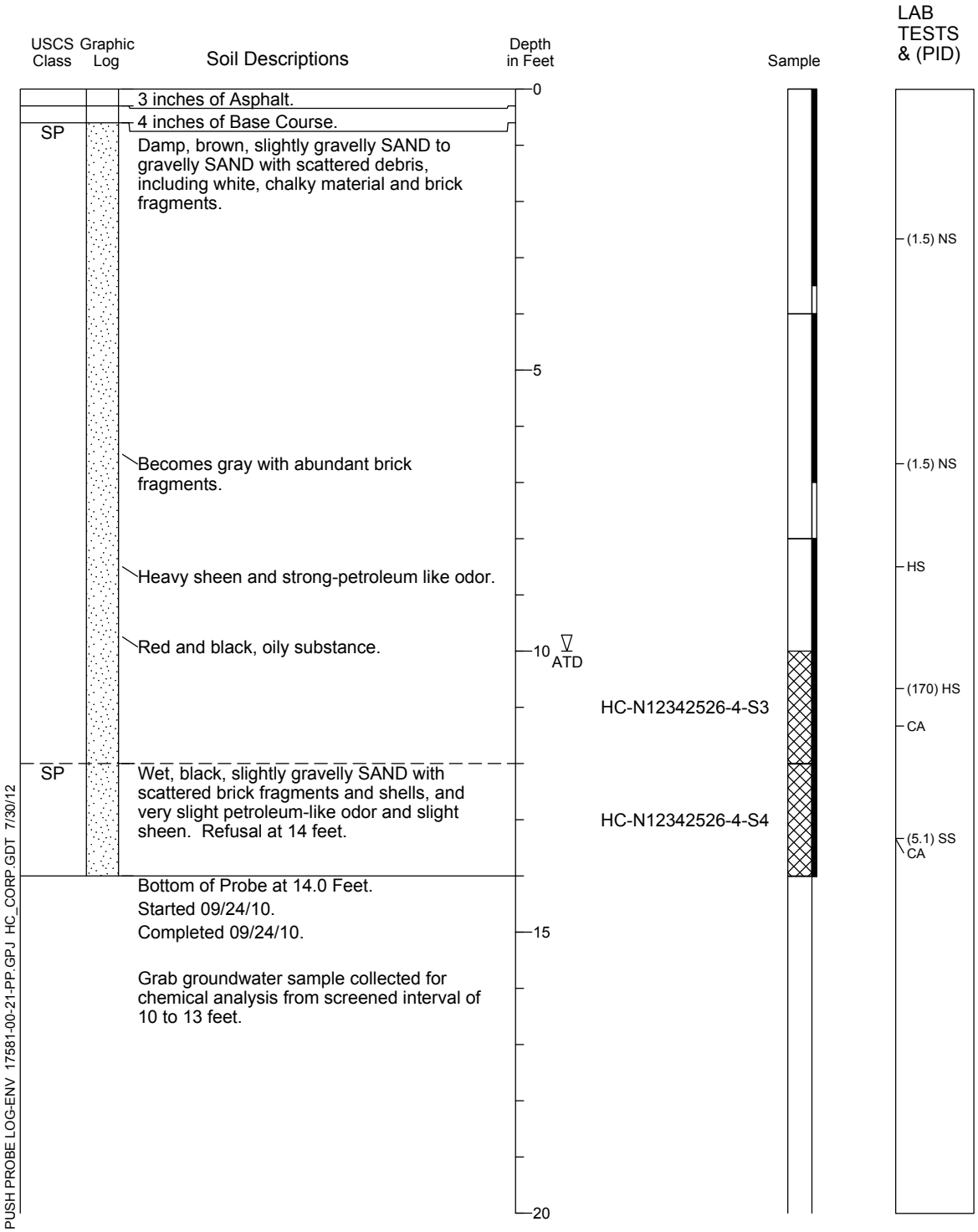
17581-00 *9/10*

Figure B-4

Push Probe Log HC-N12342526-4

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 17581-00-21-PP.GPJ HC_CORP.GDT 7/30/12

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

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17581-00 *9/10*

Figure B-5

Test Pit Log HC-N12342526-TP-1

Location: N 47.280328 E -122.408731
Approximate Ground Surface Elevation: 17.5 Feet
Logged By: C. Rust Reviewed By: P. Cordell

Horizontal Datum: WGS 1984
Vertical Datum: MLLW

USCS Class	Graphic Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
		Asphalt.	0				
GP		Dry, brown, slightly silty, sandy GRAVEL. (FILL)					
SW		Dry to moist, brown, slightly silty, fine SAND with trace shell hash. (No debris)					
		2.5 feet concrete footing on east side wall.		HC-N12342526-TP-1-1			
			5				
SW		Wet, gray, slightly silty, fine SAND with no sheen or odor and silt lenses.		HC-N12342526-TP-1-2			CA
		Bottom of Test Pit at 9.5 Feet.	10				
		Started 09/29/11.					
		Completed 09/29/11.					
		No field indications of petroleum related impacts.	15				

Test Pit Log HC-N12342526-TP-2

Location: N 47.280178 E -122.408704
Approximate Ground Surface Elevation: 17.5 Feet
Logged By: C. Rust Reviewed By: P. Cordell

Horizontal Datum: WGS 1984
Vertical Datum: MLLW

USCS Class	Graphic Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
GP		3 inches of Asphalt over dry, brown, slightly silty, sandy GRAVEL. (FILL)	0				
SW		Dry to moist, brown, slightly silty, fine SAND with shell hash.					
		1-inch, old metal pipe at 3 feet on wet sidewall.		HC-N12342526-TP-2-1			
			5				
		Wet, gray, slightly silty to silty, fine SAND with shell hash.		HC-N12342526-TP-2-2			CA
		Bottom of Test Pit at 9.5 Feet.	10				
		Started 09/29/11.					
		Completed 09/29/11.					
		No field indications of petroleum related impacts.	15				

NEW TEST PIT LOG 1758100-21-TP.GPJ HC_CORP.GDT 1/5/12

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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17581-00 9/11

Figure A-5

Test Pit Log HC-N12342526-TP-3

Location: N 47.280118 E -122.408528
Approximate Ground Surface Elevation: 17.5 Feet
Logged By: C. Rust Reviewed By: P. Cordell

Horizontal Datum: WGS 1984
Vertical Datum: MLLW

USCS Class	Graphic Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
GP		Asphalt	0				
SP		Dry, brown, slightly silty, sandy GRAVEL. (FILL)					
SP		Dry to moist, tan-brown, slightly fine SAND. (FILL)					
		Moist, dark brown, slightly silty, fine SAND with debris, brick, rebar. (FILL)		HC-N12342526-TP-3-1			
SW		Moist to wet, gray to brown, slightly silty, fine SAND with trace gravel.	5				
		4-inch steel pipe (probably old sewer) on west sidewall at 4.5 feet at bottom of fill layers.					
				HC-N12342526-TP-3-2 ATD			CA
		Bottom of Test Pit at 9.5 Feet.	10				
		Started 09/29/11.					
		Completed 09/29/11.					
		No field indications of petroleum related impacts.	15				

Test Pit Log HC-N12342526-TP-4

Location: N 47.280295 E -122.408437
Approximate Ground Surface Elevation: 17.5 Feet
Logged By: C. Rust Reviewed By: P. Cordell

Horizontal Datum: WGS 1984
Vertical Datum: MLLW

USCS Class	Graphic Log	Soil Descriptions	Depth in Feet	Sample	Water Content in Percent	PID	LAB TESTS
GP		Asphalt.	0				
SW		Dry, brown, slightly silty, sandy GRAVEL. (FILL)					
		Dry to moist, brown, slightly silty, fine SAND with trace gravel, debris, brick, wire, pipe, concrete.		HC-N12342526-TP-4-1			CA
SW		Moist, brown, slightly silty, fine SAND.	5				
		1-inch, loose pipe (no odor), concrete pad on east sidewall.					
				HC-N12342526-TP-4-2 ATD			CA
SW		Wet, gray, slightly silty, fine SAND with slight field indications of petroleum related impacts.	10				
		Bottom of Test Pit at 9.5 Feet.					
		Started 09/28/11.					
		Completed 09/28/11.					
		Field indications of petroleum related impacts from 9.0 to 9.5 feet.	15				

NEW TEST PIT LOG 1758100-21-TP.GPJ HC_CORP.GDT 1/6/12

HARTCROWSER

17581-00 9/11

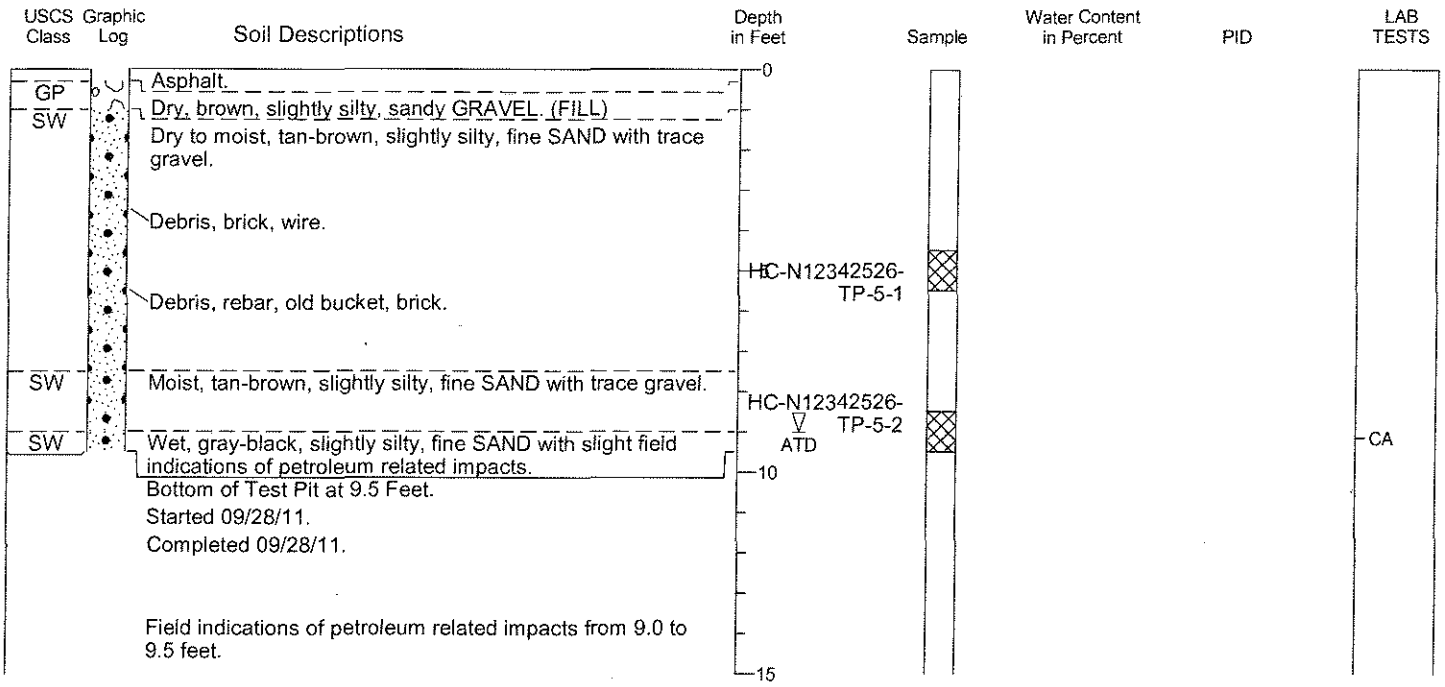
Figure A-6

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

Test Pit Log HC-N12342526-TP-5

Location: N 47.280279 E -122.408327
Approximate Ground Surface Elevation: 17.5 Feet
Logged By: C. Rust Reviewed By: P. Cordell

Horizontal Datum: WGS 1984
Vertical Datum: MLLW



NEW TEST PIT LOG 1758100-21-TP.GPJ HC_CORP.GDT 1/6/12

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

HARTCROWSER

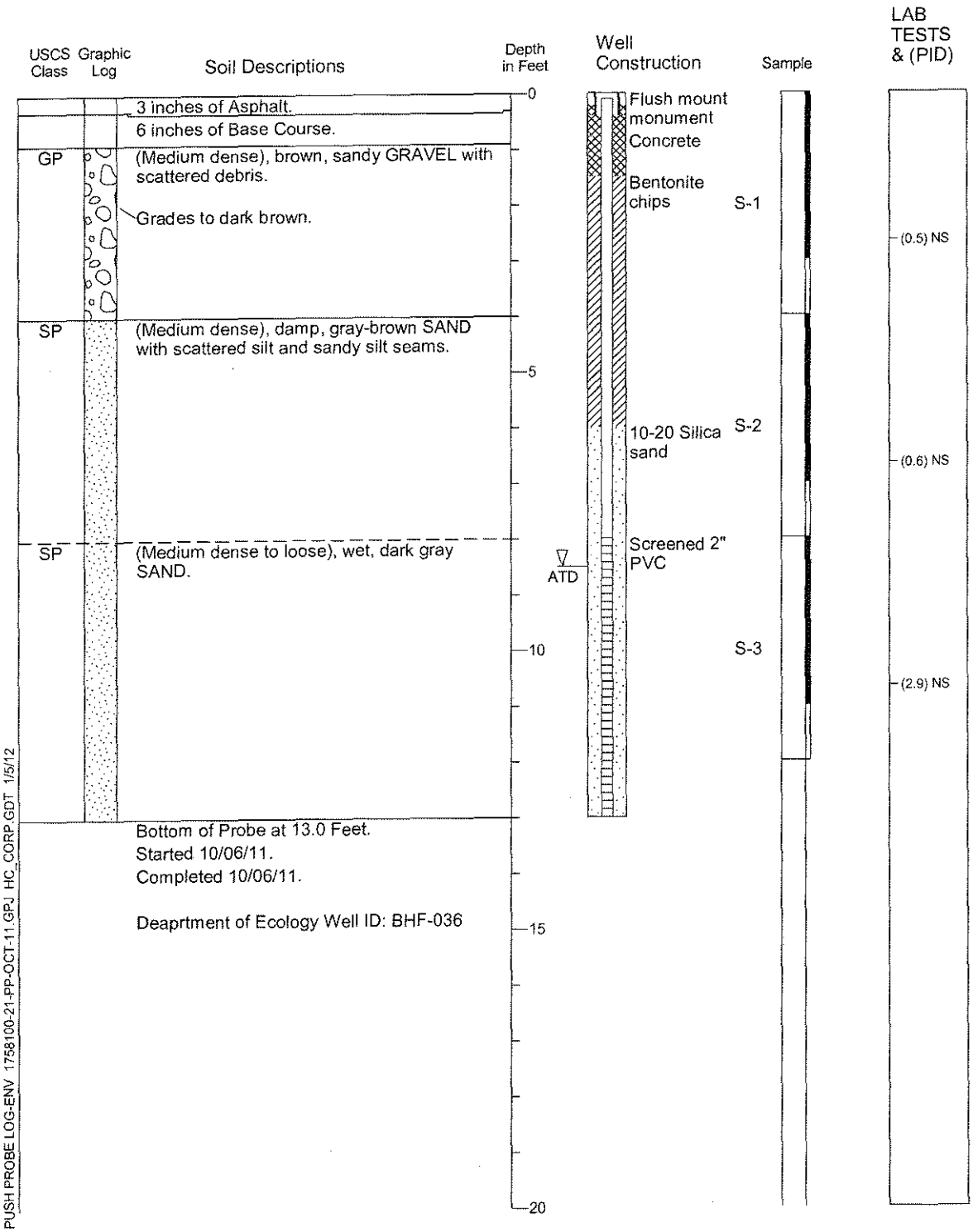
17581-00 9/11

Figure A-7

Push Probe Log HC-N12342526-6

Location: N 47.2804526 E -122.4085753
Approximate Ground Surface Elevation: Feet
Horizontal Datum: WGS 1984
Vertical Datum: MLLW
Top of Well Casing Elevation: 17.19 Feet

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 1758100-21-PP-OCT-11.GPJ HC_CORP.GDT 1/5/12

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

HARTCROWSER

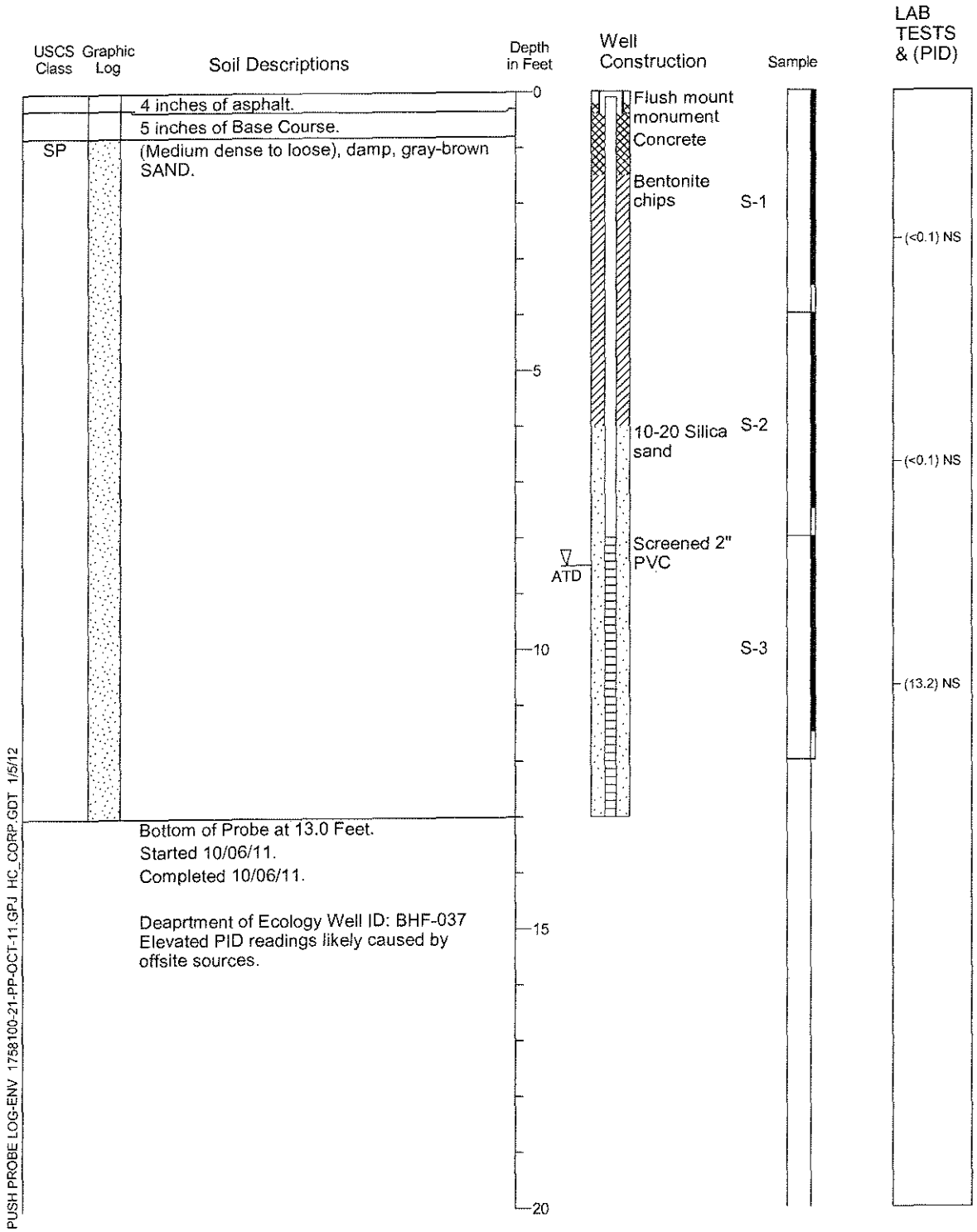
17581-00 10/11

Figure A-2

Push Probe Log HC-N12342526-7

Location: N 47.2803827 E -122.408327
Approximate Ground Surface Elevation: Feet
Horizontal Datum: WGS 1984
Vertical Datum: MLLW
Top of Well Casing Elevation: 18.31 Feet

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 1758100-21-PP-OCT-11.GPJ HC_CORP.GDT 1/5/12

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

HARTCROWSER

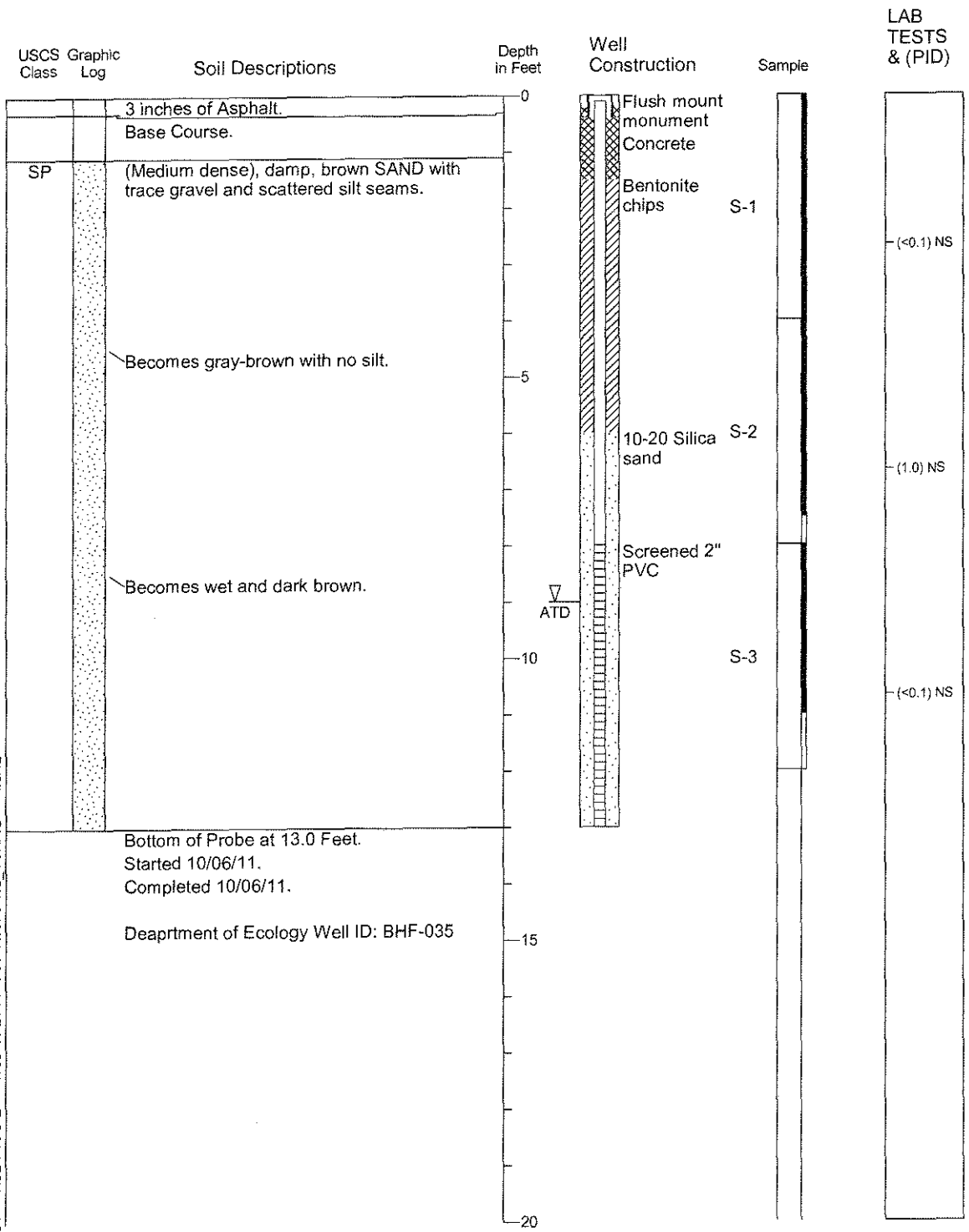
17581-00 10/11

Figure A-3

Push Probe Log HC-N12342526-8

Location: N 47.2800841 E -122.4083042
Approximate Ground Surface Elevation: Feet
Horizontal Datum: WGS 1984
Vertical Datum: MLLW
Top of Well Casing Elevation: 18.06 Feet

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 1758100-21-PP-OCT-11.GPJ HC_CORP.GDT 1/5/12

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen; SS = Slight Sheen; MS = Moderate Sheen; HS = Heavy Sheen

HARTCROWSER

17581-00 *10/11*

Figure A-4

A boring log for N12342526-218 was not included in the draft 2016 RI/FS Report and is no longer available.

PROJECT: Earley Business Center

Log of Boring N12342526-110

BORING LOCATION: 715703.7 1166766	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Holt Services	DATE STARTED: 4/16/14 / DATE FINISHED: 4/16/14
DRILLING METHOD: Hollow Stem Auger	TOTAL DEPTH (ft.): 16.5 / SCREEN INTERVAL (ft.):
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 8.5 / COMPL. / CASING:
SAMPLING METHOD: Split Spoon	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: 140 lbs / DROP: 30	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					4" Asphalt	
1						
2						
3			8		POORLY GRADED SAND (SP): light brown, moist, loose, medium sand with some gravel	
4	N12342526-110-S-5					
5						
6			11			
7					SILTY SAND (SM): dark brown, moist, loose, silty fine sand with trace gravel	
8			5			
9						
10	N12342526-110-S-10					
11			3		WELL GRADED SAND (SW): black, wet, very loose, fine to medium sand with very strong hydrocarbon odor and sheen visible. Increasing fines content at bottom of boring.	
12						
13			6			No Monitoring Well Installed at this location
14						
15	N12342526-110-S-15					
16			6			
17						

PROJECT: Earley Business Center

Log of Boring No. N12342526 - 226

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 4/15/14 / DATE FINISHED: 4/15/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 8 / COMPL. / CASING: NA
SAMPLING METHOD: 5-foot continuous core systems [5' x 3"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0	N12342526-226-W-WT and -S-WT				Asphalt and Base Material	
1					POORLY GRADED SAND (SP): brown, moist, medium sand with some subround gravels	
2						
3						
4						
5					WELL GRADED SAND (SW): dark brown, moist, fine to medium sand with 3-inch lense of brittle, consolidated fill material with slightly oily odor at 4'	
6						
7						
8				0		Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump
9						
10					WELL GRADED SAND (SW): Becomes gray in color and wet	
11						
12						Bottom of boring at 12 feet

PROJECT: Earley Business Center

Log of Boring No. N12342526 - 227

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 4/15/14 / DATE FINISHED: 4/15/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 13 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 9.5 / COMPL. / CASING: NA
SAMPLING METHOD: 5-foot continuous core systems [5' x 3"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					Asphalt and Base Material	
1–2					POORLY GRADED SAND (SP): brown, moist, medium sand with some subround gravels	Hand Auger to 36 inches
3–4					WELL GRADED SAND (SW): brown, moist, fine to medium sand with lense of small diameter sub angular gravel	
5–7					No Recovery	
8–12	N12342526-227-W-WT and -S-WT			0	WELL GRADED SAND (SW): brown, moist, fine to medium sand (wet at 9.5')	Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump
13						Bottom of boring at 12 feet

PROJECT: Earley Business Center

Log of Boring No. N12342526 - 228

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 4/15/14 / DATE FINISHED: 4/15/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 10 COMPL. / CASING: NA
SAMPLING METHOD: 5-foot continuous core systems [5' x 3"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

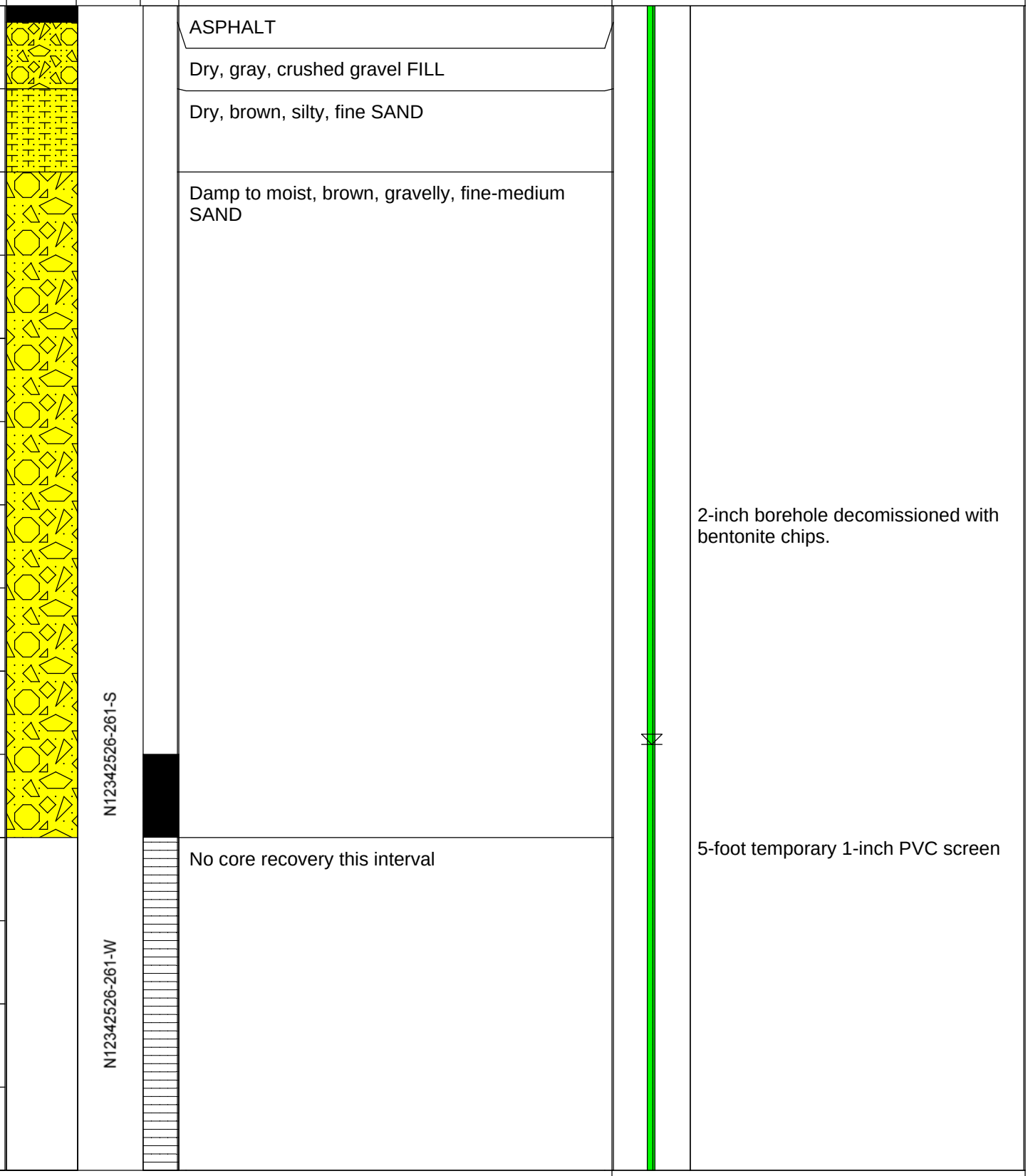
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					4 inches of Asphalt and underlying Base Material	
1					POORLY GRADED SAND (SP): brown, moist, medium sand with some subround gravels	
2						
3						
4						
5						
6						
7					WELL GRADED SAND (SW): gray, moist, fine to medium sand trace silt and trace sub-angular gravel with some oxidation at 9.5'. Becomes wet at 10'	
8						
9	N12342526-228-W-WT and -S-WT					
10				0		Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump
11						
12						Bottom of boring at 12 feet

PROJECT: Earley Business Center

Log of Boring No. EP113 - 239

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 4/15/14 / DATE FINISHED: 4/15/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 13 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 8 / COMPL. / CASING: NA
SAMPLING METHOD: 5-foot continuous core systems [5' x 3"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					Asphalt overlying sandy gravel	
1						
2						
3						
4						
5					WELL GRADED SAND (SW): light brown, moist, fine to medium sand	
6						
7						
8	EP113-239-W-WT and -S-WT			0		
9						Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump. No hydrocarbon odor observed.
10					WELL GRADED SAND (SW): light brown, wet, fine to medium sand	
11						
12						
13						Bottom of boring at 13 feet



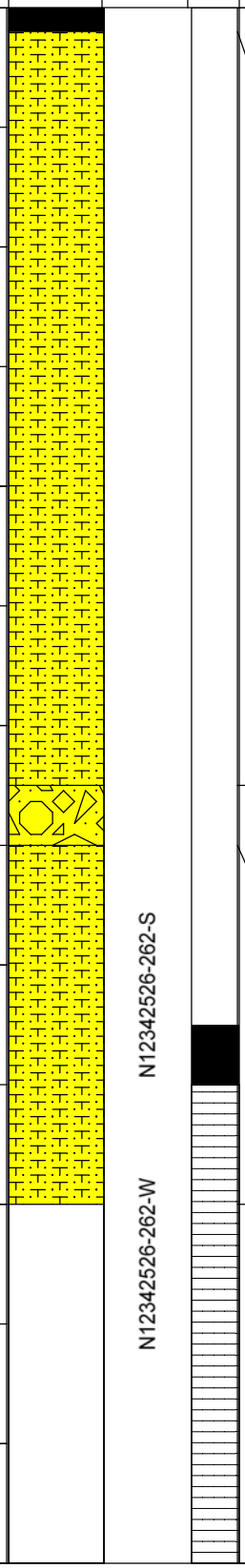
Address: 401 Alexander Avenue
City, State: Tacoma, WA
Tax Parcel ID: 00000-0000
Location (TRS): N/A
Lat/Long: N/A
Consulting Firm: PGG / Crete
Logged by: GSW

Drilling Firm: ESN NW
Drilling Method: Direct Push
Ecology ID: N/A
DTW: ~8.9 ft bgs
MP Elevation: N/A
V. Datum: N/A
Date: 9/23/2014

Figure
Boring Log and As-Built
N12342526-261

Port of Tacoma EBC
Remedial Investigation
JS1208

PGG



Description

ASPHALT

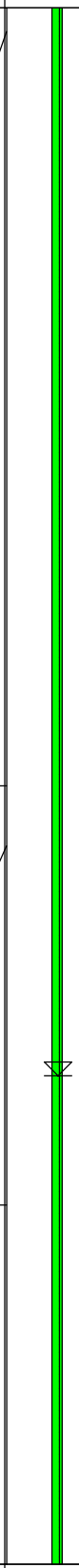
Moist, brown, fine-medium SAND; trace gravel; no odor or staining

Damp, white/light gray, powdered or decayed concrete cobble

Wet, brown SAND with mixed woody debris; diesel to oil range petroleum odor near water table, with heavy petroleum sheen; no recovery below water table

No core recovery this interval

Well Construction



2-inch borehole decomissioned with bentonite chips.

4-foot temporary telescoping stainless steel screen

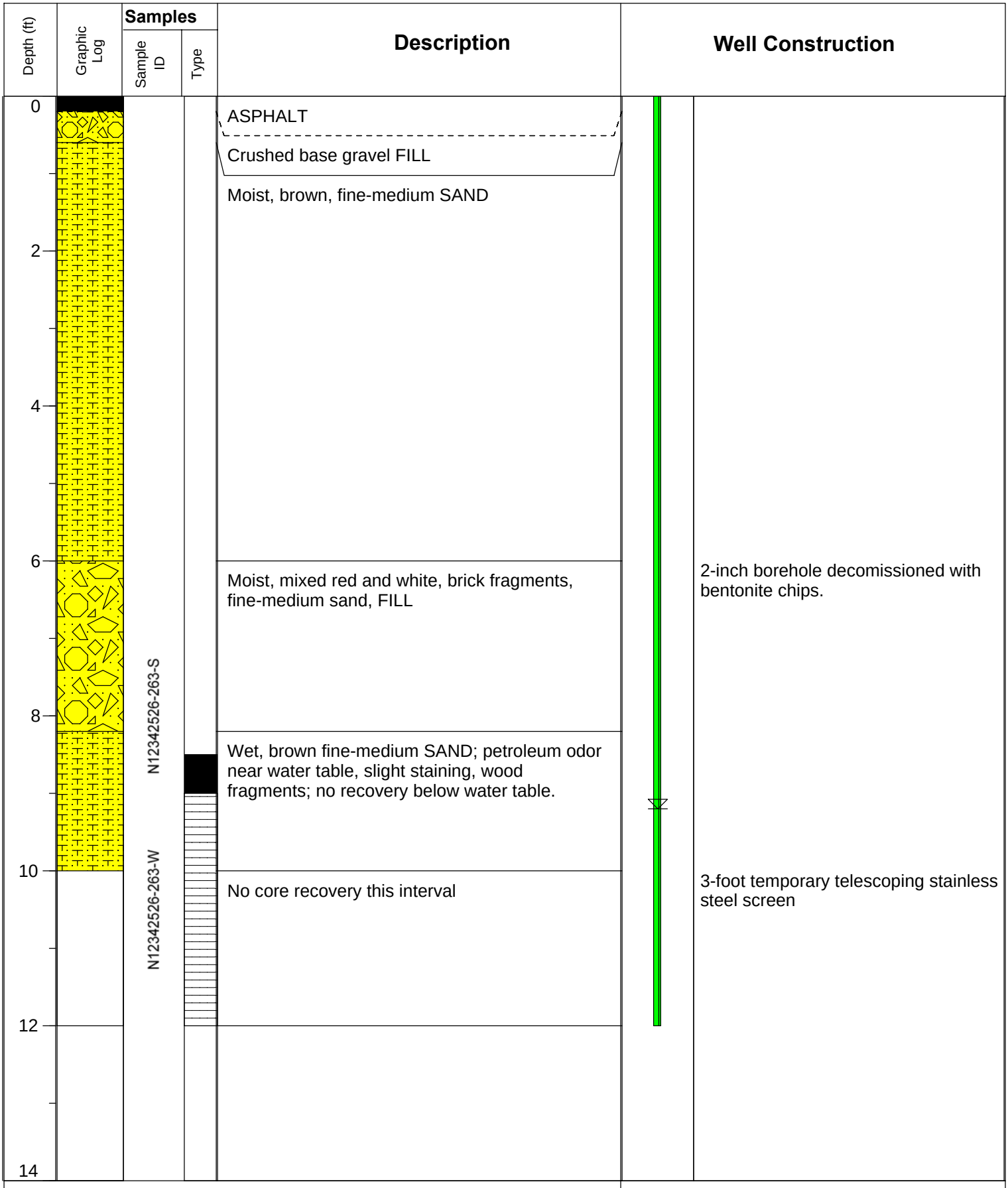
Address: 401 Alexander Avenue
City, State: Tacoma, WA
Tax Parcel ID: 00000-0000
Location (TRS): N/A
Lat/Long: N/A
Consulting Firm: PGG / Crete
Logged by: GSW

Drilling Firm: ESN NW
Drilling Method: Direct Push
Ecology ID: N/A
DTW: ~8.9 ft bgs
MP Elevation: N/A
V. Datum: N/A
Date: 9/23/2014

Figure
Boring Log and As-Built
N12342526-262

Port of Tacoma EBC
Remedial Investigation
JS1208

PGG



Address: 401 Alexander Avenue
City, State: Tacoma, WA
Tax Parcel ID: 00000-0000
Location (TRS): N/A
Lat/Long: N/A
Consulting Firm: PGG / Crete
Logged by: GSW

Drilling Firm: ESN NW
Drilling Method: Direct Push
Ecology ID: N/A
DTW: ~9.2 ft bgs
MP Elevation: N/A
V. Datum: N/A
Date: 9/23/2014

Figure
Boring Log and As-Built
N12342526-263

Port of Tacoma EBC
Remedial Investigation
JS1208

PGG

PROJECT: Earley Business Center

Log of Boring No. N12342526 - 264

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 9/23/14 / DATE FINISHED: 9/23/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 10.5 COMPL. / CASING: NA
SAMPLING METHOD: 4-foot continuous core systems [4' x 2"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					Asphalt and Base Material	
1					POORLY GRADED SAND (SP): light brown, moist, medium sand	
2						
3						
4						
5						
6					WELL GRADED SAND w/ GRAVEL (SW): dark brown, moist, medium to coarse sand with gravel with 8" (@3') of brick debris and lenses of concrete at 7.5' and 10'	
7						
8	N12342526-264-W and -S-WT					
9						Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump
10				2		
11					WELL GRADED SAND w/ GRAVEL (SW): black, oily, sticky, wet, medium to coarse sand with gravel with strong hydrocarbon odor and staining	
12						Bottom of boring at 12 feet

PROJECT: Earley Business Center

Log of Boring No. N12342526 - 265

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 9/23/14 / DATE FINISHED: 9/23/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 10.5 COMPL. / CASING: NA
SAMPLING METHOD: 4-foot continuous core systems [4' x 2"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					Asphalt and Base Material	
1						
2						
3						
4						
5						
6					POORLY GRADED SAND (SP): light brown, moist, medium sand with concrete debris at 1.5', thin lense of asphalt debris at 7' and wood debris at 10'. Becomes wet and gray in color at 10.5	
7						
8	N12342526-265-W and -S-WT					
9						Soil sample collected at water table. Groundwater sample collected using temporary well and peristaltic pump
10						
11						
12						Bottom of boring at 12 feet

Project: Earley Business Center	Project Number:	Client: Port of Tacoma	Boring No. UST-MW-114
Address, City, State 401 Alexander Ave. Tacoma WA		Drilling Contractor: ESN	Drill Rig Type: Truck Mounted 'HSA
Logged By: Jamie Stevens	Date Started: 2/28/2019 10:43	Bit Type: Auger	Sample Diameter: 2 inch
Drill Crew: Cole and Michael	Completed: 2/28/2019 12:14	Hammer Type:	USA Ticket Number: 19055999
Elevation datum Port of Tacoma	Backfilled: Well installed	Hammer Weight: 140 lbs	Hammer Drop: 30
N: 715709.771 E: 1166729.232	Elevation RIM: 18.782 Elevation PVC: 18.29	Groundwater Depth: 6 feet bgs	

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifier color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Recovery %	Odor/Sheen	PID (PPM)
					Surface - asphalt/base course/ overlying sandy gravel	100	No	0
					Well Graded Sand (SW): black, dry, fine to medium		No	
					sand with some silt and organics, shell/rock lens at 3', 4" thick			0.4
5			▽		**Well Graded Sand (SW):** dark gray, wet, fine to	100		68.7
					medium sand damp at 5', water table at 6'		No	
					concrete debris/cobbles/brick fragments			
							No	
					sheen at 9-13.5		Yes	
						100		
10					Heavy sheen/gravels		Yes	
					gravels, brick fragments, shells to 13.5'			42.6
							Yes	56.1
							No	1.2
							No	0.1
15					Boring terminated at 15'			
					Well installed, bottom set at 15'			
20								

Boring Log: Sheet 1 of 1

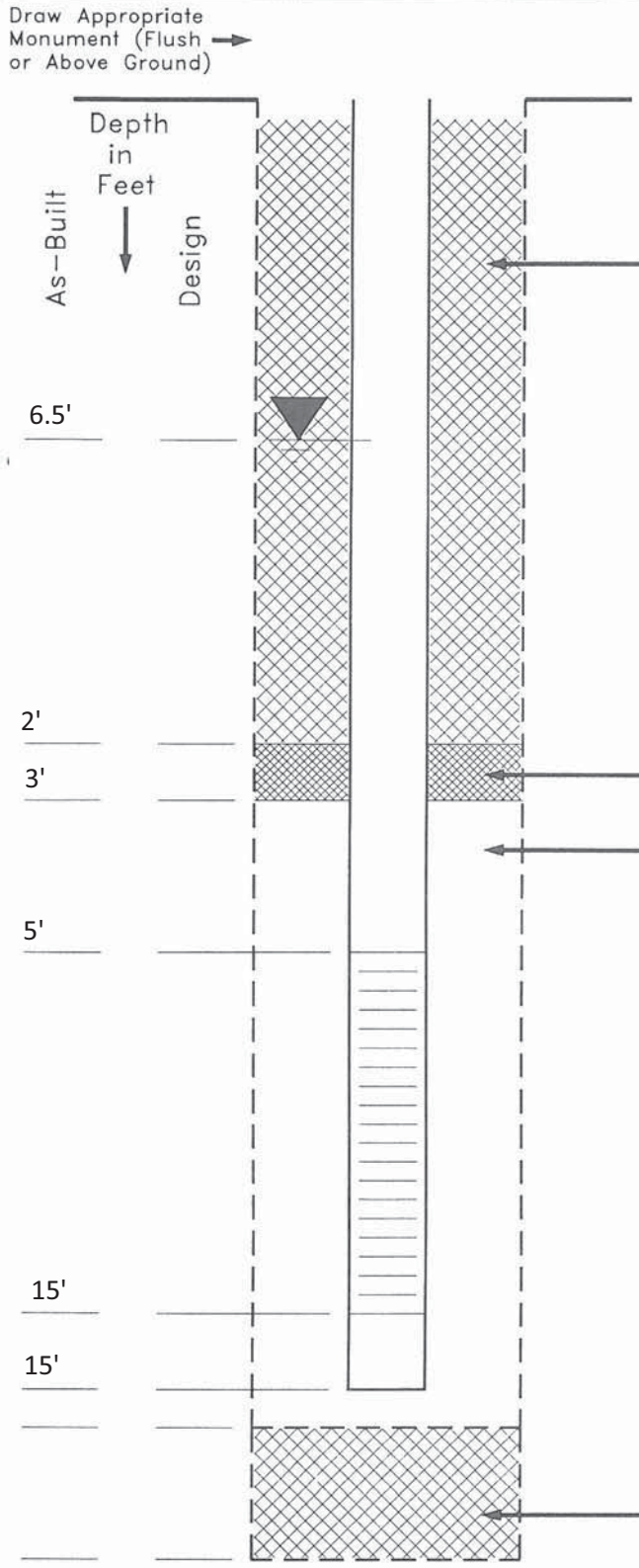
CRETE CONSULTING, INC.

WELL INSTALLATION REPORT

Well No. UST-MW-114 Date 2/28/19

Job Earley Business Center Job No. _____

Observer J.Stevens Drilling Method HSA



Approx. Elevation 18.782 RIM/ 18.290 PVC

Type of Monument Flush

Stickup: Monument _____ Well _____

Seal Material 3/8 bentonite enviro plug

Borehole Diameter 7.5 inch

Water Level Date 2/28/19

Riser Pipe Diameter 2 inch

Riser Pipe Material Schedule 40 PVC Screen

Type of Joints thread

"O"-Ring Seals? Yes X No _____

Seal Material bentonite

Filter Pack Material 10-20 Colorado Silica

Filter Pack Size Annular Sand Pack

Screen Diameter 2 inch

Screen Material Schedule 40 PVC Screen

Screen Slot Size 20 slot

Screen Construction: Milled / Wire Wound

Northing/Easting
715709.771/1166729.232
Port of Tacoma Datum

Bottom Seal Type bentonite

CRETE CONSULTING, INC.

Project: Earley Business Center	Project Number:	Client: Port of Tacoma	Boring No. UST-MW-115
Address, City, State 401 Alexander Ave. Tacoma WA		Drilling Contractor: ESN	Drill Rig Type: Truck Mounted 'HSA
Logged By: Jamie Stevens	Date — Started: 2/28/2019 9:10	Bit Type: Auger	Sample Diameter: 2 inch
Drill Crew: Cole and Michael	Completed: 2/28/2019 10:39	Hammer Type:	USA Ticket Number: 19055999
Elevation datum Port of Tacoma	Backfilled: Well installed	Hammer Weight: 140 lbs	Hammer Drop: 30
N: 715682.048 E: 1166845.672	Elevation RIM: 17.938 Elevation PVC: 17.47	Groundwater Depth: 7 feet bgs	

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifier color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Recovery %	Odor/Sheen	PID (PPM)
					Surface - asphalt/base course/ overlying sandy gravel	100	No	0
					Well Graded Sand (SW): dark gray, fine to		No	0
					medium sand - no TPH odor			
5						100		
							No	0
			▽		damp at 6', water table at 7'			
							No	0
10						100	No	0.2
							No	0.2
15							No	0
					Boring terminated at 15'			
					Well installed, bottom set at 15'			
20								

Boring Log: Sheet 1 of 1

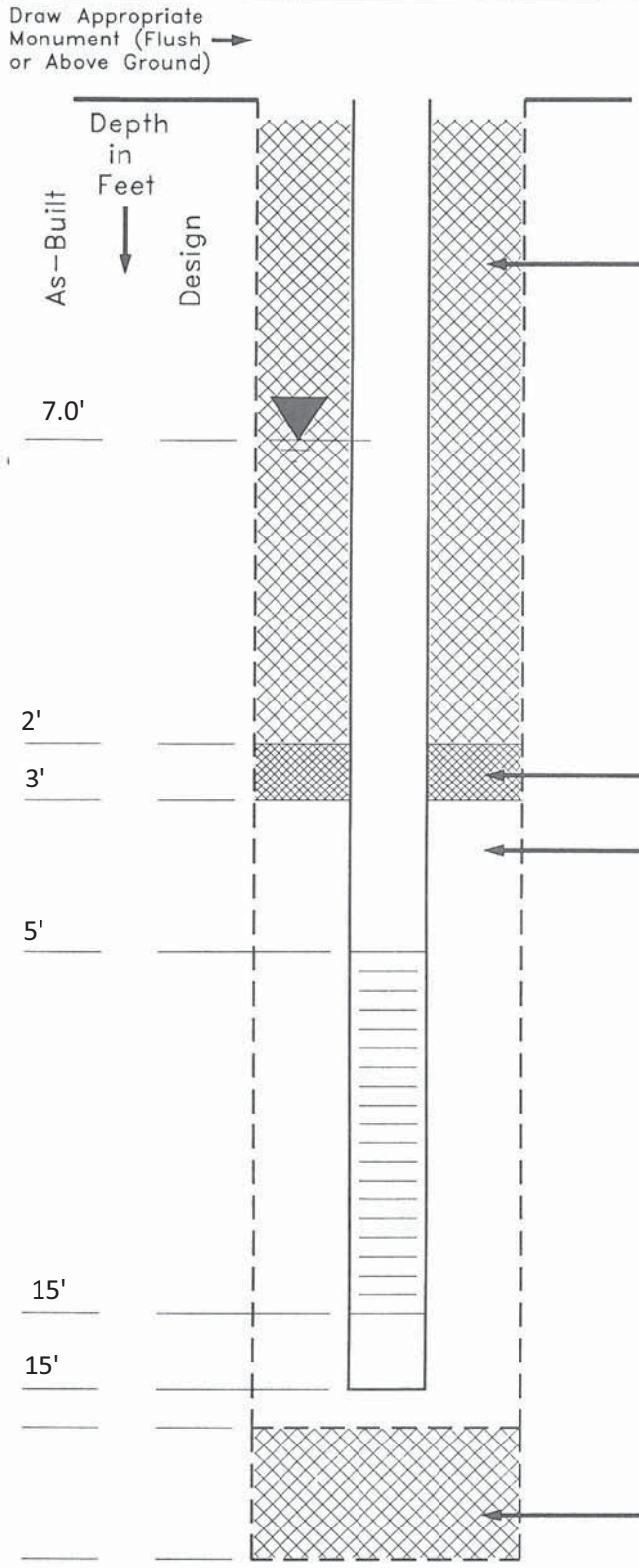
CRETE CONSULTING, INC.

WELL INSTALLATION REPORT

Well No. UST-MW-115 Date 2/28/19

Job Earley Business Center Job No. _____

Observer J.Stevens Drilling Method HSA



Approx. Elevation 17.938 RIM/ 17.470 PVC

Type of Monument Flush

Stickup: Monument _____ Well _____

Seal Material 3/8 bentonite enviro plug

Borehole Diameter 7.5 inch

Water Level Date 2/28/19

Riser Pipe Diameter 2 inch

Riser Pipe Material Schedule 40 PVC Screen

Type of Joints thread

"O"-Ring Seals? Yes X No _____

Seal Material bentonite

Filter Pack Material 10-20 Colorado Silica

Filter Pack Size Annular Sand Pack

Screen Diameter 2 inch

Screen Material Schedule 40 PVC Screen

Screen Slot Size 20 slot

Screen Construction: Milled / Wire Wound

Northing/Easting
715682.048/1166845.672
Port of Tacoma Datum

Bottom Seal Type bentonite

CRETE CONSULTING, INC.

Project: Earley Business Center	Project Number:	Client: Port of Tacoma	Boring No. UST-MW-116
Address, City, State 401 Alexander Ave. Tacoma WA		Drilling Contractor: ESN	Drill Rig Type: Truck Mounted 'HSA
Logged By: Jamie Stevens	Date Started: 2/28/2019 15:25	Bit Type: Auger	Sample Diameter: 2 inch
Drill Crew: Cole and Michael	Date Completed: 2/28/2019 16:15	Hammer Type:	USA Ticket Number: 19055999
Elevation datum Port of Tacoma	Backfilled: Well installed	Hammer Weight: 140 lbs	Hammer Drop: 30
N: 715696.699 E: 1166895.287	Elevation RIM: 18.467 Elevation PVC: 18.055	Groundwater Depth: 7.5 feet bgs	

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifier color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Recovery %	Odor/Sheen	PID (PPM)
					Surface - asphalt/base course/ overlying sandy gravel	100	No	0
					Well Graded Sand (SW): black, dry, fine to medium sand with some silt		No	0
5						100		
			▽				No	0
					Well Graded Sand (SW): dark gray, wet, fine to medium sand, shell fragments at 8' - no TPH odor.		No	0
					water table at 7.5'			
10						100	No	0.2
					solvent like odor		Yes	15.9
					solvent like odor		Yes	15
15					Boring terminated at 15' Well installed, bottom set at 15'			
20								

Boring Log: Sheet 1 of 1

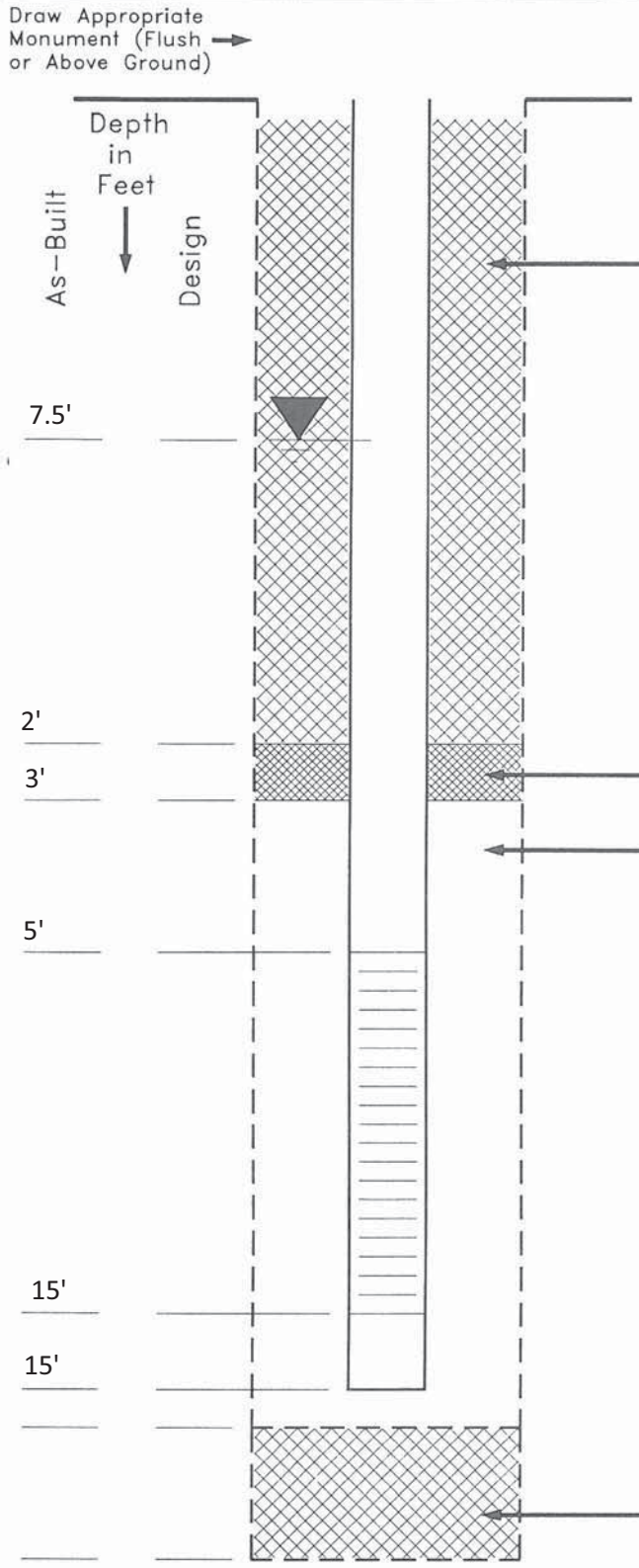
CRETE CONSULTING, INC.

WELL INSTALLATION REPORT

Well No. UST-MW-116 Date 2/28/19

Job Earley Business Center Job No. _____

Observer J.Stevens Drilling Method HSA



Approx. Elevation 18.467 RIM/ 18.055 PVC

Type of Monument Flush

Stickup: Monument _____ Well _____

Seal Material 3/8 bentonite enviro plug

Borehole Diameter 7.5 inch

Water Level Date 2/28/19

Riser Pipe Diameter 2 inch

Riser Pipe Material Schedule 40 PVC Screen

Type of Joints thread

"O"-Ring Seals? Yes X No _____

Seal Material bentonite

Filter Pack Material 10-20 Colorado Silica

Filter Pack Size Annular Sand Pack

Screen Diameter 2 inch

Screen Material Schedule 40 PVC Screen

Screen Slot Size 20 slot

Screen Construction: Milled / Wire Wound

Northing/Easting
715696.699/1166895.287
Port of Tacoma Datum

Bottom Seal Type bentonite

CRETE CONSULTING, INC.

Project: Earley Business Center	Project Number:	Client: Port of Tacoma	Boring No. UST-MW-118
Address, City, State 401 Alexander Ave. Tacoma WA		Drilling Contractor: ESN	Drill Rig Type: Truck Mounted 'HSA
Logged By: Jamie Stevens	Date Started: 2/28/2019 12:35	Bit Type: Auger	Sample Diameter: 2 inch
Drill Crew: Cole and Michael	Completed: 2/28/2019 13:45	Hammer Type:	USA Ticket Number: 19055999
Elevation datum Port of Tacoma	Backfilled: Well installed	Hammer Weight: 140 lbs	Hammer Drop: 30
N: 715764.047 E: 1166679.391	Elevation RIM: 17.5 Elevation PVC: 17.05	Groundwater Depth: 7 feet bgs	

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifier color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Recovery %	Odor/Sheen	PID (PPM)
					Surface - asphalt/base course/ overlying sandy gravel	100	No	0
					Well Graded Sand (SW): black, dry, fine to medium sand with some silt		No	0
5			▽		**Well Graded Sand (SW):** dark gray, fine to medium sand - no TPH odor. water table at 7.0'	100	No No	0 0
10						100	No No	0 0
15					Boring terminated at 15' Well installed, bottom set at 15'		No	0
20								

Boring Log: Sheet 1 of 1

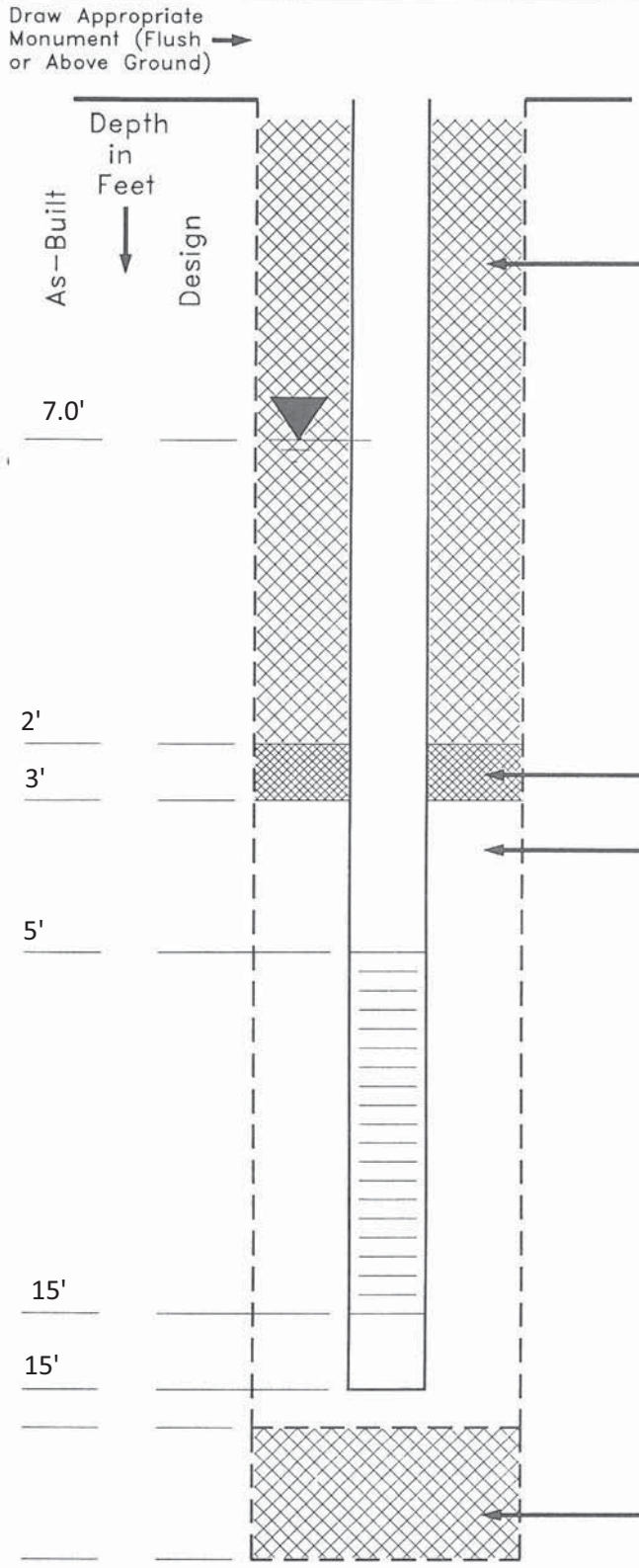
CRETE CONSULTING, INC.

WELL INSTALLATION REPORT

Well No. UST-MW-118 Date 2/28/19

Job Earley Business Center Job No. _____

Observer J.Stevens Drilling Method HSA



Approx. Elevation 17.500 RIM/ 17.050 PVC

Type of Monument Flush

Stickup: Monument _____ Well _____

Seal Material 3/8 bentonite enviro plug

Borehole Diameter 7.5 inch

Water Level Date 2/28/19

Riser Pipe Diameter 2 inch

Riser Pipe Material Schedule 40 PVC Screen

Type of Joints thread

"O"-Ring Seals? Yes X No _____

Seal Material bentonite

Filter Pack Material 10-20 Colorado Silica

Filter Pack Size Annular Sand Pack

Screen Diameter 2 inch

Screen Material Schedule 40 PVC Screen

Screen Slot Size 20 slot

Screen Construction: Milled / Wire Wound

Northing/Easting
715764.047/1166679.391
Port of Tacoma Datum

Bottom Seal Type bentonite

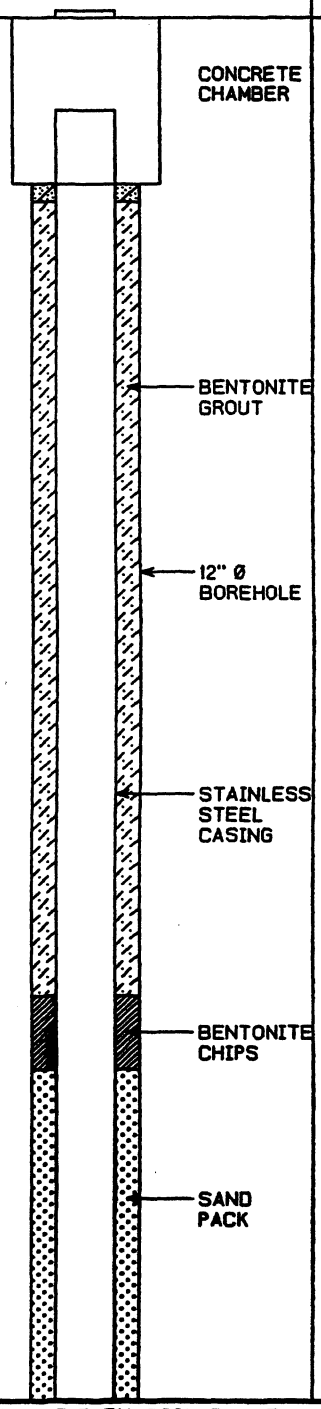
CRETE CONSULTING, INC.

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OXYCHEM - **TACOMA**
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-6
DATE COMPLETED: SEPTEMBER 14, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Well Cover)	*12.8* *9.28*					
20.0	SP/GP-SAND and GRAVEL (FILL), little to some silt, hard, fine to coarse grained, subrounded, tan to black, wet, fuel oil odor	*-7.2* *-7.9*		1SS		14	NM
22.5	SW-SAND, some silt, hard, fine to medium grained, black, wet						
30.0	SW-SAND (NATIVE), trace shells, medium grained, black, wet	*-17.2*		2SS		11	NM
32.5	ML-SILT, some clay, trace shells, medium soft, gray, wet	*-18.7*					



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

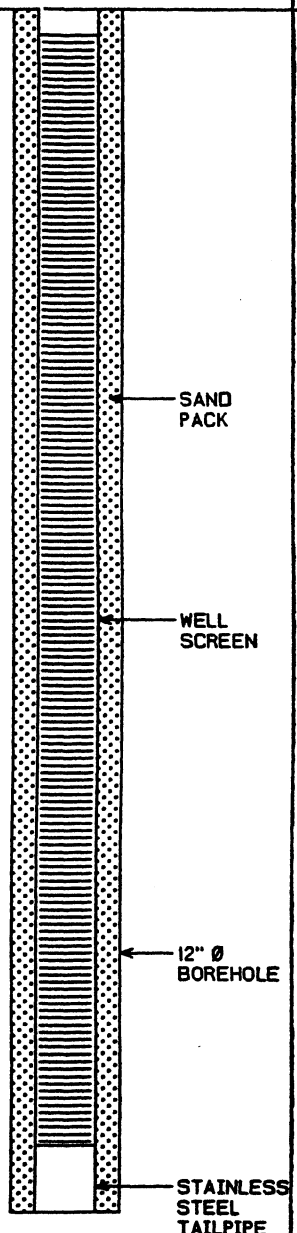
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OXYCHEM - TACOMA
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-6
DATE COMPLETED: SEPTEMBER 14, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS
40.0	SM-SAND, some silt, trace shells, fine grained, black, wet	-27.2
42.5		
45.0		
47.5		
50.0	SW-SAND, trace silt, fine to medium grained, black, wet	-37.2
		-38.4
52.5	SM-SAND, some silt, trace wood, fine grained, black, wet	
55.0		
57.5		
60.0	SW-SAND, little to some silt, fine grained, black, wet	-47.2
62.5		
65.0		
67.5	SM-SAND, some silt, dense, fine grained, dark gray, wet	-55.2
70.0	END OF HOLE @ 70.0ft BGS	-57.2
72.5		

MONITOR INSTALLATION



SAMPLE NUMBER	STATE	'N' VALUE	PID (ppm)
3SS		10	0
4SS		9	0
5SS		11	0
6SS		8	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OXYCHEM - TACOMA
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-6
DATE COMPLETED: SEPTEMBER 14, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
-77.5			SCREEN DETAILS Screened Interval: 38.2 to 68.2ft BGS Length: 30ft Diameter: 6" Slot Size: #10 Material: Stainless Steel Sand Pack: 28.5 to 70.0ft BGS Material: 1/20 Monterey Sand				
-80.0							
-82.5							
-85.0							
-87.5							
-90.0							
-92.5							
-95.0							
-97.5							
-100.0							
-102.5							
-105.0							
-107.5							
-110.0							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: 78-25
DATE COMPLETED: March 28, 2006
DRILLING METHOD: HSA
FIELD PERSONNEL: R. Bayne

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD
	GROUND SURFACE	10.29
	0-20' BGS - See Log from 78-50	
20	SHELBY TUBE SAMPLE (Refer to 78-50 for stratigraphy)	-9.71
22	SP-SAND, trace silt, compact, medium to fine grained, occasional coarse sand, poorly graded, dark brown, trace red and white fine grained sand, moist	-11.71
24	SHELBY TUBE SAMPLE (Refer to 78-50 for stratigraphy)	-13.71
26	END OF BOREHOLE @ 26.0ft BGS	-15.71

MONITORING WELL: CONCRETE; BENTONITE CHIPS; 2"Ø STEEL RISER; CEMENT/BENTONITE GROUT; 8"Ø BOREHOLE; SAND; 2"Ø SS SCREEN; 2"Ø SS SUMP

WELL DETAILS
Screened interval:
-9.71 to -14.71ft NGVD
20.00 to 25.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: Stainless Steel

SAMPLE NUMBER	INTERVAL	REC (ft)	BLOW COUNTS	PID (ppm)
SS1		0.0		
SS2		1.0	18	0.2
SS3		1.0		

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ☐

OVERBURDEN LOG 007843_ORIGINAL.GPJ CRA_CORP.GDT 10/6/09

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: 78-50
DATE COMPLETED: March 28, 2006
DRILLING METHOD: HSA
FIELD PERSONNEL: R. Bayne

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD
	GROUND SURFACE	10.29
0	ASPHALT	9.97
	FILL, sand and gravel, trace silt, occasional stone, compact, medium to coarse grained, well graded, brown, damp	
2	- trace gravel, loose, fine to coarse grained below 3 ft BGS	
4		
6		4.29
	ML-SANDY SILT, stiff, fine grained, very low plasticity, horizontal layering, brown/rusty (reddish and brown), damp	3.89
8	SP-SAND, with silt, loose, medium to fine grained, poorly graded, brown, occasional red and white fine grained sand, moist	
10	- compact, saturated below 8 ft BGS - loose to compact, dark brown, wet to saturated below 10 ft BGS	
12		
	- 0.16' silty sand layer @ 12.8 ft BGS	-2.71
14	SM-SILTY SAND, loose, fine grained, occasional medium grained sand, poorly graded, dark brown, occasional red and white fine grained sand, moist to wet	
16	- compact, saturated below 15 ft BGS	
18	- 0.16' sandy silt seam @ 17.5 ft BGS - loose, wet below 18 ft BGS	
20		-9.71
	SP-SAND, with silt, with shell fragments, loose, medium to fine grained, poorly graded, dark brown, red and white medium to fine grained sand, wet to saturated	
22	- trace silt, compact, occasional coarse grained sand below 23 ft BGS	
24		-14.71
	ML-SANDY SILT	-15.21
26	SP-SAND, with shell fragments, trace silt, compact, medium to fine grained, occasional coarse grained sand, poorly graded, dark brown, red and white medium to fine grained sand, wet to saturated	
28		
30		
32		-22.71
	SM/SP-SAND with SILT, with shell fragments, compact, fine to medium grained, trace coarse grained sand, poorly graded, dark brown, trace	
34		

MONITORING WELL: CONCRETE; 8"Ø BOREHOLE; CEMENT/BENTONITE GROUT; 2"Ø STEEL RISER

SAMPLE NUMBER	INTERVAL	REC (ft)	BLOW COUNTS	PID (ppm)
SS1		0.3	17	0.0
SS2		1.5	8	0.0
SS3		1.5	9	0.0
SS4		1.0	10	0.6
SS5		2.3	9	1.3
SS6		1.0	8	0.3
SS7		2.3	9	0.1
SS8		0.5	5	0.1
SS9		1.5	7	0.3
SS10		0.5	12	0.3
SS11		1.1	21	0.4
SS12		1.0	25	0.4
SS13		0.8	20	1.0
SS14		1.0	15	0.4

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

OVERBURDEN LOG 007843_ORIGINAL.GPJ CRA_CORP.GDT 10/6/09

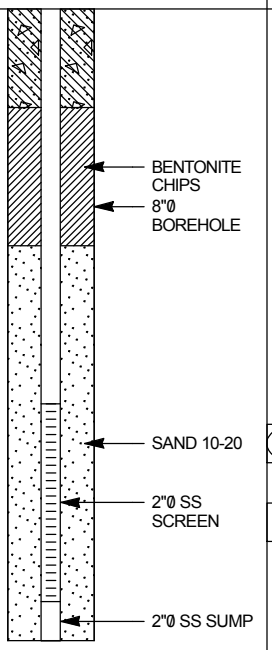
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: 78-50
DATE COMPLETED: March 28, 2006
DRILLING METHOD: HSA
FIELD PERSONNEL: R. Bayne

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD
36	red and white fine grained sand, wet	
38		
40		-29.71
42	SM/ML-SAND and SILT, compact/stiff, poorly graded, very low plasticity, very fine grained, sand and silt layering throughout, brown/gray, moist, occasional woody layers intermixed	
44		
46		-34.71
48	SHELBY TUBE SAMPLE	-36.71
50	SP-SAND, trace silt, compact, fine grained, poorly graded, dark brown, occasional red and white fine sand grains, wet	
52	- 0.02' wood and shell fragment layer @ 50.8 ft BGS	-40.71
54	END OF BOREHOLE @ 51.0ft BGS	
56		
58		
60		
62		
64		
66		
68		

MONITORING WELL



WELL DETAILS
Screened interval:
-34.71 to -39.71ft NGVD
45.00 to 50.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: Stainless Steel

SAMPLE NUMBER	INTERVAL	REC (ft)	BLOW COUNTS	PID (ppm)
SS15		0.8	23	0.8
SS16		1.0	13	0.2
SS17		1.5	13	0.1
SS18		0.5	9	0.2
SS19		1.8		
SS20		0.5	23	0.1
SS21		0.8	21	0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

OVERBURDEN LOG 007843_ORIGINAL.GPJ CRA_CORP.GDT 10/6/09

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE TOP OF RISER	11.48 10.92						
	ASPHALT	10.88						
	SP-SAND (FILL), with fine and coarse grained subangular to subrounded gravel, trace silt, loose, fine to medium grained, well sorted, brown, with yellow grains and red grains, damp	9.68						0.0
2	SM-SILTY SAND (FILL), loose, fine grained, well sorted, brown and gray, moist - 2" sandy silt at 2.1ft BGS	8.98						
4	SM-SILTY SAND (FILL), loose, fine grained, well sorted, brown and gray, wet, wood debris up to 1-1/2x2" throughout - 1-1/2" sandy silt at 3.0ft BGS - wet wood debris at 3.3ft BGS - gray, very moist to wet, rotting/decaying type odor at 4.0ft BGS - 3/4" sandy silt at 4.4ft BGS							0.0
6	- piece of wood debris 2-1/2"x2.1' long (tree bark) at 5.0ft BGS			1RS		10.0		0.0
8	- wet at 7.5ft BGS		BENTONITE GRAVEL					0.0
10								0.0
12	- 3" sandy clayey silt at 11.8ft BGS - 1'x1" wood debris (tree bark) at 12.2ft BGS - 2-1/2" sandy silt at 12.5ft BGS - 1-1/2" silty clay at 13.3ft BGS							0.0
14				2RS		10.0		0.0
16	- 1" silty clay at 16.2ft BGS - 1" silty clay at 16.6ft BGS		6" BOREHOLE					0.0
18			SAND PACK					
	ML-SANDY SILT (FILL), trace clay, compact, slight plasticity, gray, moist, wood debris up to 1-1/2x1-1/2"	-6.92						0.0
	- 0.3" silty clay at 18.6ft BGS	-7.32	PORT 1 SCREEN 1 PORT 1					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 007843WIN.GPJ CRA_CORP.GDT 9/24/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SM-SILTY SAND (FILL), loose, fine grained, well sorted, gray, wet, wood pieces up to 1/2x1/2" throughout, rotting/decaying type odor - 3/4" sandy silt at 19.6ft BGS	-9.02	SCREEN 2 PORT 1 SCREEN 3					0.0
22	SP-SAND, trace silt, loose, fine to medium grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - very loose at 23.5ft BGS		TRANSDUCER 1 PORT 1 SCREEN 4 PORT 1 SCREEN 5					0.0
24	SM-SAND, with silt, very loose, fine to medium grained, well sorted, gray, with red grains and white grains, wet, shell fragments throughout - 2-1/2" sandy clayey silt at 24.9ft BGS	-12.52	PORT 1 SCREEN 6					
26	SM/ML-SAND AND SILT, very loose, fine grained sand, no plasticity, gray, wet, rapid dilatancy, shell fragments throughout	-14.32 -15.12						0.0
28	ML-SANDY SILT, few clay, loose, slight plasticity, gray to greenish gray, wet, rapid dilatancy, peat/sliver size wood fibers throughout	-16.52						
	SM-SILTY SAND, loose, fine to medium grained sand, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - 2" sand, trace silt at 29.9ft BGS	-18.62		3RS		20.0		0.0
30	ML-SANDY SILT, trace clay, loose, very fine grained sand, slight plasticity, gray, with red grains and white grains, wet, rapid dilatancy, shell fragments throughout	-20.02						1.0
32	CL-SILTY CLAY, very soft, low plasticity, gray, wet	-20.72						
	ML-SANDY SILT, loose, very fine grained sand, no plasticity, gray, wet, rapid dilatancy, shell fragments throughout	-21.12 -21.42						
34	ML-SANDY CLAYEY SILT, loose, slight plasticity, gray, wet, rapid dilatancy, shell fragments throughout		COATED BENTONITE PELLETS					1.6
	SM-SILTY SAND, trace clay, very loose, very fine grained sand, slight plasticity, gray, with red grains and white grains, wet, rapid dilatancy, shell fragments and wood pieces sliver size to 1/2x1/4" throughout - 1x1" piece of wood at 34.0ft BGS - 2-1/2" very soft silty clay, mottled gray and olive gray, with sliver size wood pieces at 34.2ft BGS	-23.52 -24.02 -24.52						
36								2.0
38	CL-SILTY CLAY, trace sand, soft, low plasticity, gray, wet, moderate dilatancy							
	SM-SILTY SAND, compact, very fine grained, well sorted, gray, with red grains and white grains, wet, shell fragments throughout	-27.42						7.0
	SP-SAND, trace silt, loose, fine to medium							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - loose, fine grained at 37.5ft BGS - 1" sandy silt at 38.8ft BGS							2.0
42	SM-SILTY SAND, loose, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout, scattered wood pieces up to 1x1/2" - silty sand, trace clay, no wood present at 40.0ft BGS - silty sand, no wood present at 40.5ft BGS	-30.92	SAND PACK PORT 2 SCREEN 1					0.0
44	ML-SANDY SILT, loose, very fine grained, no plasticity, gray, with red grains and white grains, wet, rapid dilatancy, shell fragments throughout, scattered sliver size wood pieces - several silty clay laminations at 43.0ft BGS	-32.82 -33.62	PORT 2 SCREEN 2					
46	SM-SILTY SAND, loose, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout		PORT 2 SCREEN 3 TRANSDUCER 2 PORT 2 SCREEN 4					0.0
48	SP-SAND, trace silt, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - 1/2" sandy silt at 47.2ft BGS - sand, with silt, very fine grained at 47.6ft BGS		PORT 2 SCREEN 5 PORT 2 SCREEN 6					0.0
50	SC-CLAYEY SILTY SAND, loose, fine grained sand, slight plasticity, gray, with red grains and white grains, wet, shell fragments throughout - 1" silty clay at 49.8ft BGS - 1/2" silty clay at 50.0ft BGS	-38.02 -38.72		4RS		20.0		0.0
52	SM-SILTY SAND/SAND WITH SILT, compact, very fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - few sandy silt laminations/lenses up to 1/2" throughout at 51.0ft BGS	-40.72						0.0
54	SP-SAND, trace silt, compact, very fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - laminated silt at 53.5ft BGS - laminated silt at 55.0ft BGS	-43.62						0.0
56	SM-SILTY SAND, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout, scattered sliver size wood pieces - few silt laminations throughout at 56.0ft BGS							0.0
58			COATED BENTONITE PELLETS					0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	ML-SANDY SILT, few clay, loose, very fine grained sand, slight plasticity, gray, with red grains and white grains, wet, rapid to moderate dilatancy, shell fragments throughout, several silty clay laminations/lenses up to 0.3" thick	-48.52						0.0
62								
64								0.0
	SM-SILTY SAND, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - few silt laminations throughout at 64.5ft BGS	-52.52						
	ML-SANDY SILT, trace clay, loose, very fine grained sand, slight plasticity, gray, wet, rapid dilatancy	-54.02						
66								0.0
68			SAND PACK					
			PORT 3 SCREEN 1					0.0
70			PORT 3 SCREEN 2	5RS		20.0		
			PORT 3 SCREEN 3					0.0
72			TRANSDUCER 4 PORT 3 SCREEN 4					
			PORT 3 SCREEN 5					
74			PORT 3 SCREEN 6					0.0
	- 1" sandy silty clay, several twig size wood pieces at 74.3ft BGS							
	SM-SILTY SAND, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet, silt laminations, shell fragments throughout	-63.52						
76								0.0
78								
	- sand, with silt, very fine grained at 78.5ft BGS							0.0
	SP-SAND, trace silt, compact, very fine	-68.02						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout	-68.82						
	ML-SANDY SILT, few clay, compact, very fine grained sand, slight plasticity, gray, with red grains and white grains, wet, rapid dilatancy, shell fragments throughout	-70.32						8.9
82	- 2-1/2" silty sand at 81.6ft BGS							
	CL-SILTY CLAY, few sand, firm, low plasticity, gray, wet, slow to moderate dilatancy	-71.52						
	SM-SILTY SAND, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet	-71.92						2.0
84			COATED BENTONITE PELLETS					
	ML/CL-CLAYEY SANDY SILT/SILTY SANDY CLAY, firm, low plasticity, gray, wet, moderate dilatancy	-74.02						
86	- 1" silty clay at 85.0ft BGS							2.8
	SC-SILTY CLAYEY SAND, compact, fine grained, dark gray, with red grains and white grains, wet, several silty clay laminations and lenses up to 0.3" thick	-75.52						
	SM-SILTY SAND, trace clay, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet	-76.02						
88	ML-SILT, few sand, few clay, compact, slight plasticity, gray, very moist, moderate dilatancy							1.5
90	ML-SANDY SILT, compact, very fine grained sand, no plasticity, gray, wet, rapid dilatancy	-78.32		6RS		20.0		
	ML-SILT, few clay, few sand, compact, slight plasticity, gray, wet, moderate to rapid dilatancy, several sand laminations and silty clay laminations	-79.22						2.3
92								
	ML/CL-SILTY CLAY/CLAYEY SILT, trace sand, firm, low plasticity, gray, wet, moderate dilatancy, shell fragments throughout	-81.22						
94			SAND PACK					1.7
			PORT 4 SCREEN 1					
	ML-SANDY SILT, few clay, several silty clay laminations, compact, slight plasticity, gray, wet, rapid dilatancy	-83.82	PORT 4 SCREEN 2					
96		-84.72						10.5
	SM-SILTY SAND, trace clay, compact, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout		PORT 4 SCREEN 3					
		-86.02	PORT 4 SCREEN 4					
98	ML-SILT, few sand, few clay, compact, slight to low plasticity, gray, wet, moderate dilatancy, silty clay laminations, shell fragments throughout		PORT 4 SCREEN 5					0.4
			PORT 4					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	ML-SANDY SILT, compact, very fine grained sand, gray, with red grains and white grains, wet, rapid dilatancy, shell fragments throughout	-88.52	SCREEN 6					0.0
102	- trace clay, reduced sand content at 102.0ft BGS - silt, few sand, few clay at 102.5ft BGS							
104								0.0
	- sandy silt, trace clay at 105.0ft BGS							
106								0.0
	ML/CL-CLAYEY SILT/SILTY CLAY, trace sand, firm, low plasticity, gray, wet, moderate dilatancy, clay laminations and lenses up to 0.3", shell fragments throughout	-95.02						
108	- 3" silty clay at 106.8ft BGS							0.0
110	CL-SILTY CLAY, with clayey silt layers, few sand, laminated sand lenses, firm, low plasticity, gray, with light gray laminations/layers, wet, moderate dilatancy, shell fragments throughout	-98.52		7RS		20.0		0.0
112								
114								0.0
116								0.0
118								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
120	CL-SILTY CLAY, firm, low plasticity, light gray with gray laminations (varved), very moist, slow dilatancy, homogeneous, shell fragments throughout	-108.52	COATED BENTONITE PELLETS					0.0
122								0.0
124								0.0
126								0.0
128								0.0
130				8RS		20.0		0.0
132								0.0
134								0.0
136								0.0
138								0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	SM-SAND, with silt, very loose, fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout	-128.52	SAND PACK PORT 5 SCREEN 1					
	SP-SAND, trace silt, very loose, very fine grained, well sorted, dark gray, with red grains and white grains, wet, shell fragments throughout - loose, very fine grained, occasional silt laminations and clay laminations at 142.0ft BGS	-129.52	TRANSDUCER 3 TRANSDUCER 5 PORT 5 SCREEN 2 PORT 5 SCREEN 3 PORT 5 SCREEN 4 PORT 5 SCREEN 5 PORT 5 SCREEN 6					0.0
142								
144								0.0
146								0.0
	CL-SILTY CLAY, stiff, low plasticity, gray, moist, shell fragments throughout	-135.52						
148								0.0
	- trace fine grained subrounded gravel (pebble size) at 149.5ft BGS - piece of angular gravel 2x1-1/2"x1/2" at 149.7ft BGS			9RS		20.0		
150								
	- increase in pebble content and shell fragment content at 149.8ft BGS - fine grained, gravel up to 1/2", several dark gray laminations at 149.9ft BGS	-139.22						0.0
152	- 1x2" piece of gravel, several green pebbles at 150.2ft BGS - 1/4" layer of shell fragments in greenish matrix (at least 80% shell fragment content) at 150.6ft BGS	-140.82						
	GC-SILTY CLAYEY GRAVEL, trace sand, loose, fine to coarse grained subangular to subrounded gravel, pebble size up to 1-1/2x2.8", minimum 2% visible shell fragments throughout, greenish gray, wet							0.0
154			COATED BENTONITE PELLETS					
	GC-SILTY CLAYEY GRAVEL, trace sand, loose, fine to coarse subangular to subrounded pebble size to 1x2" gravel, gray, wet, no shell fragments - increase in gravel content at 155.0ft BGS - dark brown at 155.5ft BGS - gray at 156.0ft BGS							0.0
156		-146.02						
	GM-SANDY SILTY GRAVEL, trace clay, compact, fine to medium grained sand, fine to coarse grained subangular to subrounded gravel pebble size up to 2x1-1/2", poorly sorted, gray, wet							0.0
158								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
162	GW-SANDY GRAVEL, trace silt, compact, fine to coarse grained sand, fine to coarse grained subangular to subrounded gravel, pebble size to 1-1/2x2", poorly sorted, grayish brown, wet	-149.52	SAND PACK PORT 6 SCREEN 1					0.0
164			PORT 6 SCREEN 2					0.0
			PORT 6 SCREEN 3					
166			TRANSDUCER 6 PORT 6 SCREEN 4					0.0
		-155.52	PORT 6 SCREEN 5					
168	GM-SANDY GRAVEL, with silt, compact, fine to coarse grained sand, fine and coarse grained subangular to subrounded gravel, pebble size to 1x2", poorly sorted, grayish brown, wet	-156.02	PORT 6 SCREEN 6					0.0
170	GW-SANDY GRAVEL, trace silt, compact, fine to coarse grained sand, fine and coarse grained subangular to subrounded gravel, poorly sorted, pebble size up to 1-1/2x2", grayish brown, wet			10RS		20.0		
		-159.52						0.0
172	GM/GC-GRAVEL, with silt and clay, trace sand, compact, fine to coarse grained subrounded to subangular gravel, pebble size up to 1-1/2", poorly sorted, light gray, wet	-160.72	COATED BENTONITE PELLETS					
	GM-SILTY SANDY GRAVEL, compact, fine to medium grained sand, fine to coarse grained subangular to subrounded gravel, pebble size up to 1x1/2", poorly sorted, yellowish brown, wet	-161.32						
174	SM-SILTY SAND, trace clay, trace fine to coarse grained subangular gravel up to 1/2x1", compact, fine to medium grained angular sand, poorly sorted, yellowish brown, wet							0.0
176			CMT ANCHOR					0.0
178		-168.32						0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GM-GRAVEL, with silt, trace sand, compact, fine to coarse grained subangular to subrounded gravel, pebble size up to 1/2x1", poorly sorted, gray, wet	-168.52						
	END OF BOREHOLE @ 180.0ft BGS							
182	NOTE:							
	GLACIAL CONTACT ASSUMED AT 152.3FT BGS							
184	PORT 1 SAND PACK 17.5 TO 25.1FT BGS (-6.02 TO -13.62 NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 19.05, 20.05, 21.05, 22.05, 23.05 AND 24.05FT BGS (-7.57, -8.57, -9.57, -10.57, -11.57 AND -12.57FT NGVD) TRANSDUCER (# 1200805) 21.55FT BGS (-10.07FT NGVD)							
186								
188	COATED BENTONITE PELLETS 25.1 TO 42.7FT BGS (-13.62 TO -31.22FT NGVD)							
190	PORT 2 SAND PACK 42.7 TO 50.0FT BGS (-31.22 TO -38.52FT NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 44.02, 45.02, 46.02, 47.02, 48.02 AND 49.02FT BGS (-42.54, -43.54, -44.54, -45.54, -46.54 AND -47.54FT NGVD)							
192	TRANSDUCER (# 1203026) 46.52FT BGS (-45.04FT NGVD)							
194	COATED BENTONITE PELLETS 50.0 TO 67.8FT BGS (-38.52 TO -56.32FT NGVD)							
196	PORT 3 SAND PACK 67.8 TO 75.0FT BGS (-56.32 TO -63.52FT NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 69.01, 70.01, 71.01, 72.01, 73.01 AND 74.01FT BGS (-57.53, -58.53, -59.53, -60.53, -61.53 AND -62.53FT NGVD)							
198								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (ppm)
	TRANSDUCER (# 1141749) 71.51FT BGS (-60.03FT NGVD)							
	COATED BENTONITE PELLETS 75.0 TO 92.9FT BGS (-63.52 TO -81.42FT NGVD)							
202								
	PORT 4 SAND PACK 92.9 TO 100.5FT BGS (-81.42 TO -89.02FT NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 94.91, 95.91, 96.91, 97.91, 98.91 AND 99.91FT BGS (-83.43, -84.43, -85.43, -86.43, -87.43 AND -88.43FT NGVD)							
204								
	TRANSDUCER (# 1203041) 97.41FT BGS (-85.93FT NGVD)							
	COATED BENTONITE PELLETS 100.5 TO 139.8FT BGS (-89.02 TO -128.32FT NGVD)							
206								
208								
	PORT 5 SAND PACK 139.8 TO 147.1FT BGS (-128.32 TO -135.62FT NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 140.84, 141.84, 142.84, 143.84, 144.84 AND 145.84FT BGS (-129.36, -130.36, -131.36, -132.36, -133.36 AND -134.36FT NGVD)							
210								
	TRANSDUCER (# 1204319) 141.34FT BGS (-129.86FT NGVD)							
212								
	COATED BENTONITE PELLETS 147.1 TO 162.8FT BGS (-136.52 TO -158.72FT NGVD)							
214								
	PORT 6 SAND PACK 162.8 TO 170.2FT BGS (-151.32 TO -158.72FT NGVD) INDIVIDUAL 3-INCH SCREEN BOTTOMS 163.28, 164.28, 165.28, 166.28, 167.28 AND 168.28FT BGS (-151.8, -152.8, -153.8, -154.8, -155.8 AND -156.8FT NGVD)							
216								
	TRANSDUCER (# 1204311) 165.78FT BGS (-154.3FT NGVD)							
218								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: COMPREHENSIVE SUPPLEMENTAL INVEST.
PROJECT NUMBER: 007843
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: ALEXANDER AVENUE SITE

HOLE DESIGNATION: 78C
DATE COMPLETED: May 29, 2012
DRILLING METHOD: SONIC
FIELD PERSONNEL: D. DEITNER

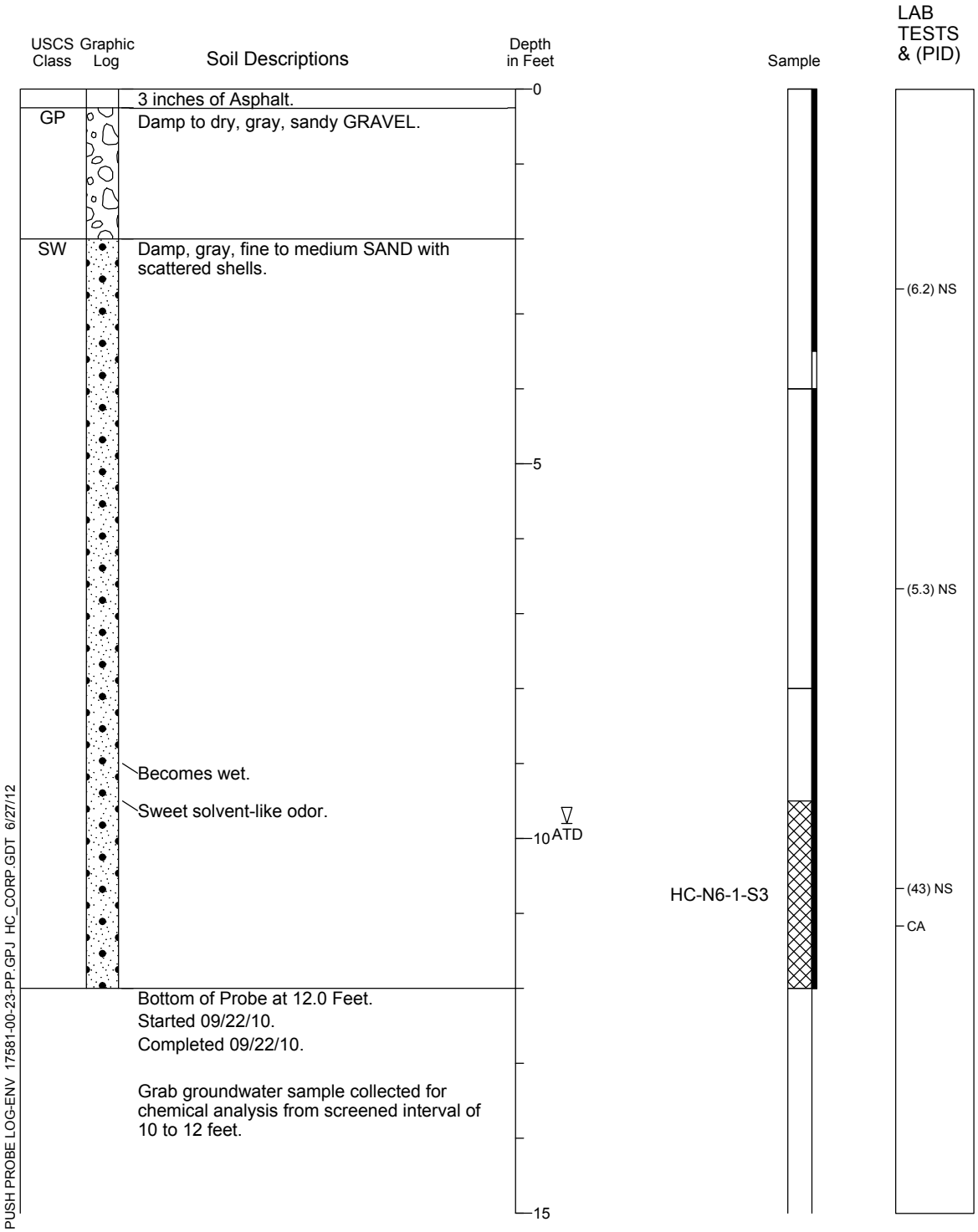
DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (ppm)
	COATED BENTONITE PELLETS 170.2 TO 180FT BGS (-158.72 TO -168.52FT NGVD)							
222	CMT ANCHOR 175FT BGS (-163.52NGVD)							
224								
226								
228								
230								
232								
234								
236								
238								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

Push Probe Log HC-N6-1

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

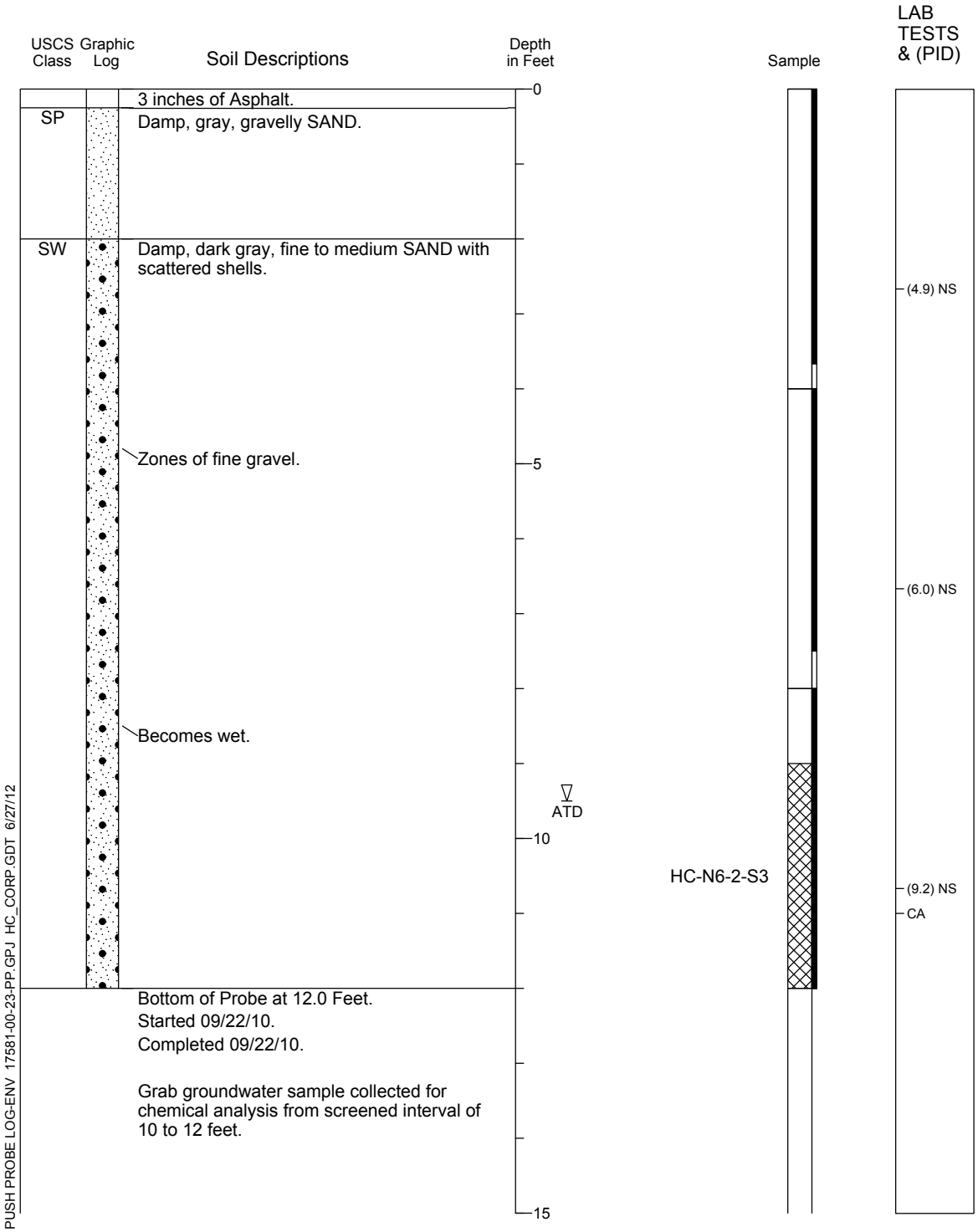
17581-00 *9/10*

Figure B-2

Push Probe Log HC-N6-2

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

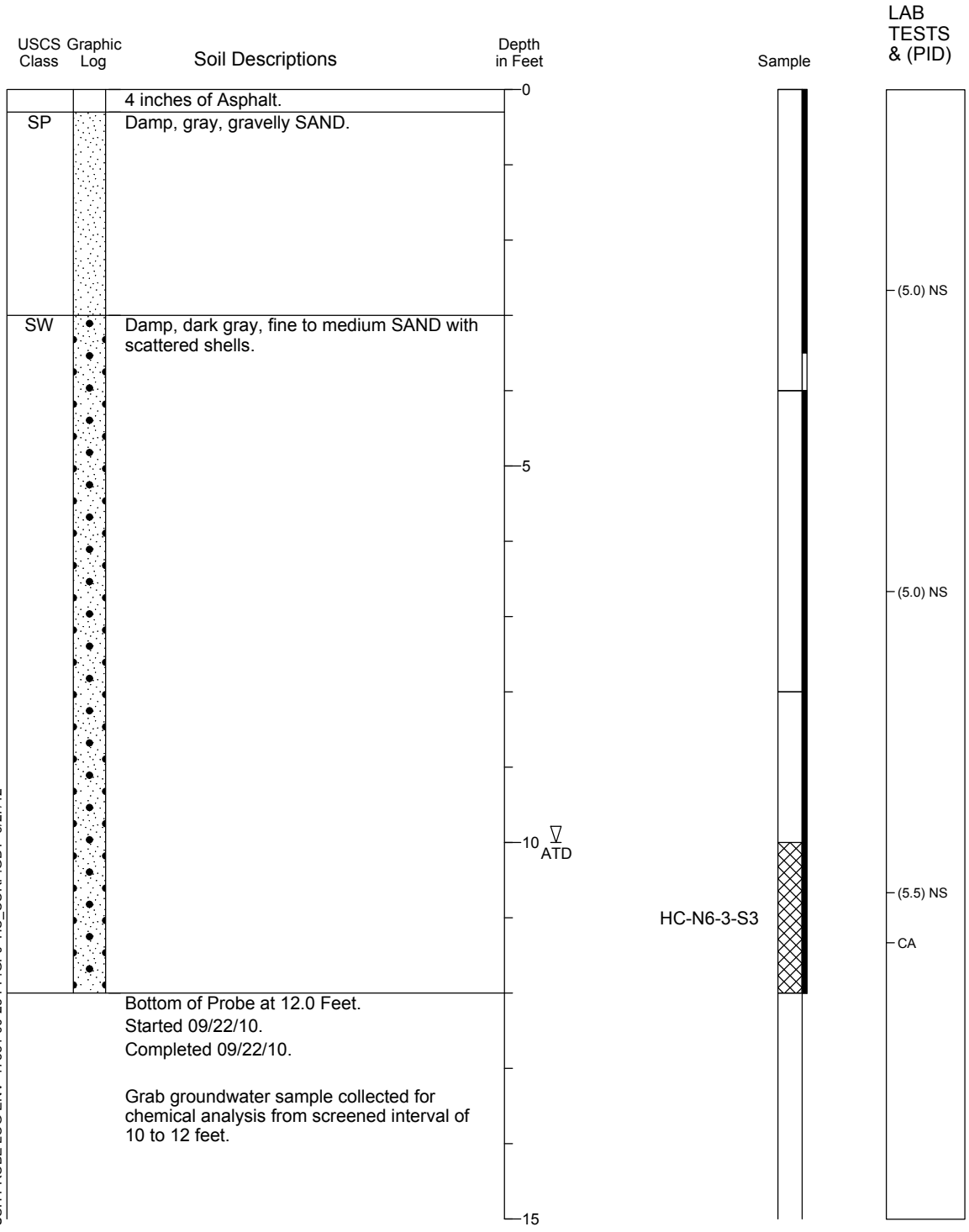
17581-00 *9/10*

Figure B-3

Push Probe Log HC-N6-3

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 17581-00-23-PP.GPJ HC_CORP.GDT 6/27/12

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

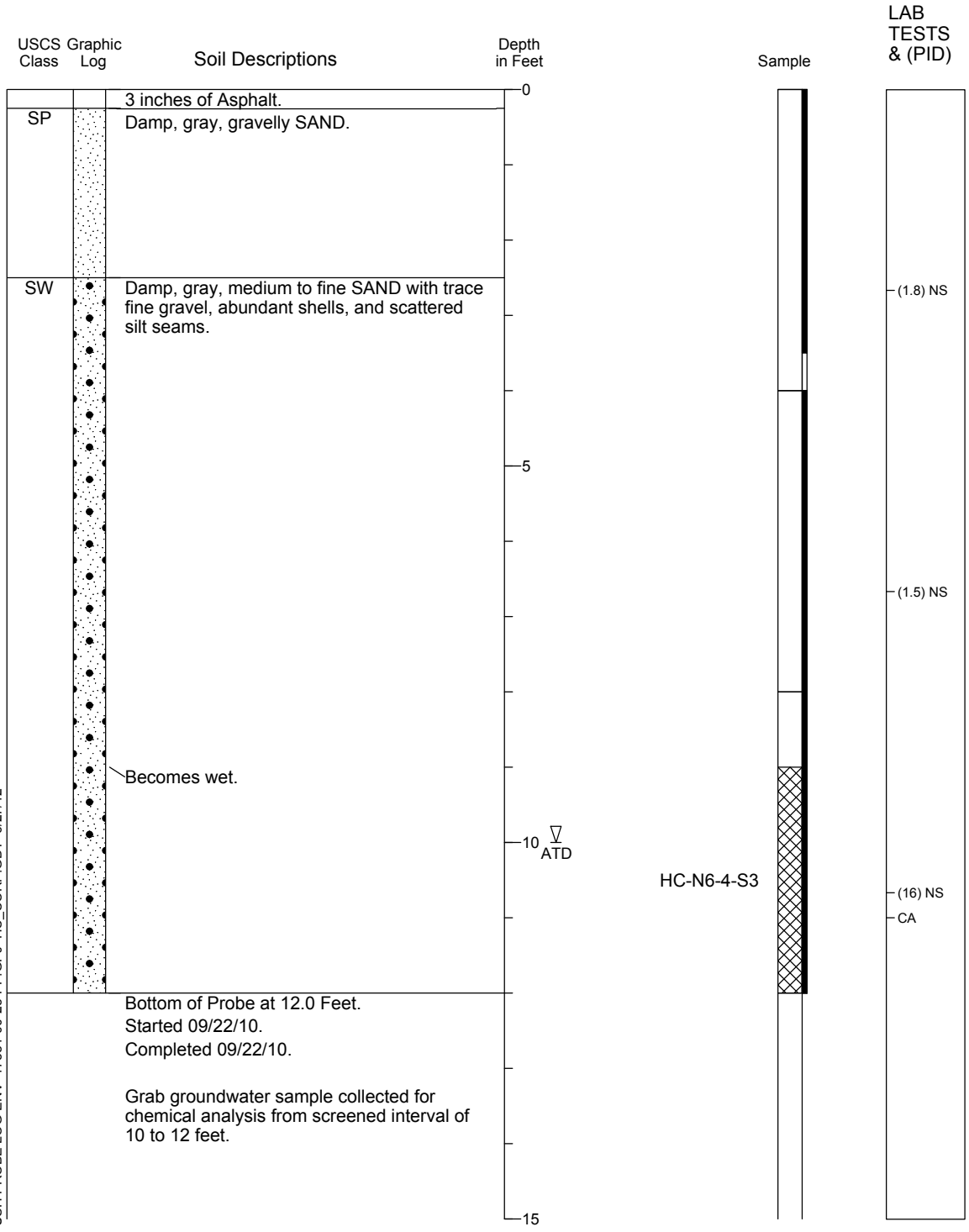
17581-00 *9/10*

Figure B-4

Push Probe Log HC-N6-4

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

17581-00 *9/10*

Figure B-5

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: WMUA-29
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: D. Rivers

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	GROUND SURFACE	11.60					
	ASPHALT	11.30					
	SM-SILTY SAND, fine to coarse grained gravel, compact, fine to coarse grained sand, poorly graded, light brown, moist						
2	SP-SAND, trace silt, trace gravel, trace shell fragments, compact, fine to coarse grained sand, fine grained gravel, poorly graded, dark brown, moist	9.60					
			SS1		6.0		0.8
4			001				
6	- very moist below 6 ft BGS		002				0.7
	- saturated below 7 ft BGS ▽						
8							
			SS2		6.0		42.9
10							
12							
14			SS3		5.0		431
			003				
16	SM-SAND with SILT, compact, fine grained, poorly graded, gray, saturated	-4.40					
18	SP-SAND, trace silt, trace gravel, trace shell fragments, compact, fine grained sand, trace coarse grained sand, fine grained gravel, poorly graded, dark brown, red and white grains, moist	-6.40					
			SS4		5.0		73.7
20							
22							
			004				
24			SS5		5.0		107
26							
28							
			SS6		5.0		83.7
30							
32			005				
	- 10" SM-SILTY SAND seam, compact, fine grained, poorly graded, gray, saturated @ 33 ft BGS						
34			SS7		5.0		89.4

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 007843_ORIGINAL.GPJ CRA_CORP.GDT 10/6/09

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: WMUA-29
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: D. Rivers

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	- 6" SM-SAND with SILT seam, compact, fine grained, poorly graded, gray, saturated @ 35 ft BGS - 8" SM-SAND with SILT seam, compact, fine grained, poorly graded, gray, saturated @ 36 ft BGS						
38							
40			SS8		5.0		196
42							
44			006 SS9		5.0		201
46							
48							
50			SS10		5.0		121
52							
54	ML-SILT, trace sand, trace wood fragments, compact, fine grained, non-plastic, dark gray-brown, saturated	-42.40	007 SS11		5.0		161
56	SM-SAND with SILT, trace shell fragments, compact, fine grained, poorly graded, dark brown, saturated	-43.40					
58	SP-SAND, trace silt, trace gravel, trace shell fragments, compact, fine grained sand, trace coarse grained sand, fine grained gravel, poorly graded, dark brown, red and white grains, moist	-45.40	SS12		5.0		87
60	ML/SM-SANDY SILT, trace wood fragments, compact, fine sand, poorly graded, non-plastic, dark brown, saturated	-48.40					
62			008/009				
64			SS13		5.0		104
66							
68			SS14		5.0		26.3

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: WMUA-29
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: D. Rivers

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
72							
74			010 SS15		5.0		28.9
76							
78							
	ML-SANDY SILT, compact, fine grained, non-plastic, dark gray-brown, saturated	-66.40					
80			SS16		5.0		8.5
82							
84			011 SS17		5.0		1.0
86							
88							
90			SS18		5.0		0.9
92							
94			012 SS19		5.0		1.2
96							
	ML-SILT, trace sand, trace clay, compact, fine grained, very low plasticity, dark gray-brown, very moist to saturated, sulfur-like odor	-84.40					
98							
100			SS20		5.0		0.8
102							
104			013 SS21		5.0		0.6

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 007843_ORIGINAL.GPJ CRA_CORP.GDT 10/6/09

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
HOLE DESIGNATION: WMUA-29

PROJECT NUMBER: 07843
DATE COMPLETED: July 19, 2006

CLIENT: Occidental Chemical Corporation
DRILLING METHOD: Rotosonic

LOCATION: Alexander Avenue Site
FIELD PERSONNEL: D. Rivers

Tacoma, Washington

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
106							
108							
110			SS22		5.0		1.4
112							
114	SM-SAND with SILT, compact, fine grained, poorly graded, dark brown-gray, saturated, sulfur-like odor	-101.40	014 SS23		5.0		1.3
116							
118							
120	ML-SILT, trace sand, trace clay, compact, fine grained, very low plasticity, dark gray-brown, very moist to saturated, sulfur-like odor	-107.40	SS24		5.0		0.8
122							
124			SS25		5.0		0.5
126							
128							
130			SS26		5.0		0.4
132							
134			SS27		5.0		0.6
136							
138			SS28		5.0		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Groundwater and Sediment Remediation
PROJECT NUMBER: 07843
CLIENT: Occidental Chemical Corporation
LOCATION: Alexander Avenue Site
Tacoma, Washington

HOLE DESIGNATION: WMUA-29
DATE COMPLETED: July 19, 2006
DRILLING METHOD: Rotosonic
FIELD PERSONNEL: D. Rivers

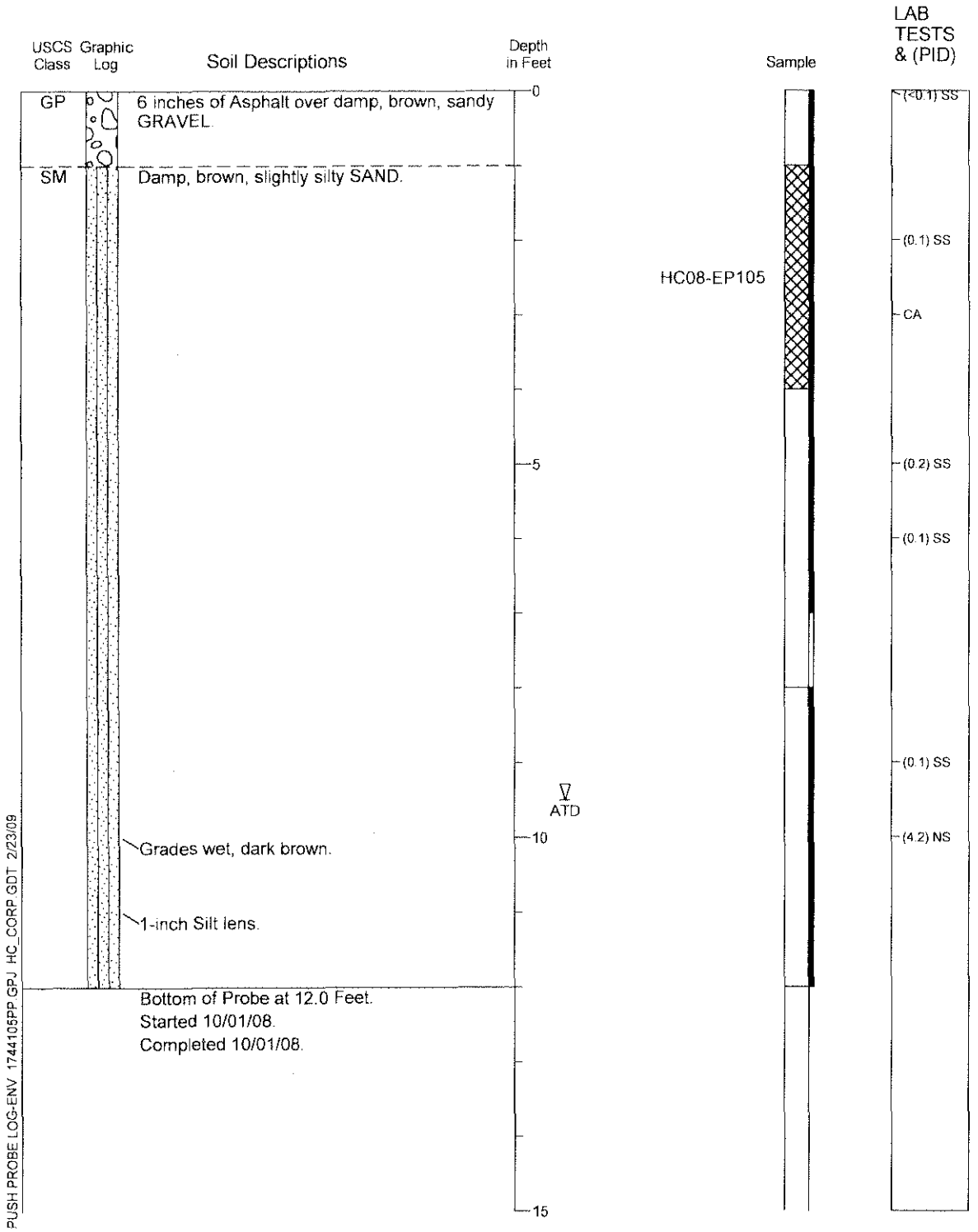
DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft NGVD	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
142							
144							
	- clay, trace fine sand, no sulfur-like odor below 145 ft BGS		SS29		5.0		0.0
146							
148							
150			SS30		5.0		0.0
152							
154			SS31		5.0		0.0
156							
158							
160	CL-SILTY CLAY, trace sand, trace gravel, fine to coarse grained sand, fine grained gravel, low plasticity, green-gray, moist	-148.40					
162	SP/GP-SAND and GRAVEL, trace silt, trace clay, compact, fine to coarse grained sand, fine to coarse grained gravel, poorly graded, green-gray, saturated	-150.40					
164							
166							
168							
170							
172							
	END OF BOREHOLE @ 173.0ft BGS	-161.40					
174	Ground surface elevation is estimated.						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽
CHEMICAL ANALYSIS ⬭

Push Probe Log HC08-EP105

Location: N 715898.96 E 1166918.71
Approximate Ground Surface Elevation: 17.57 Feet
Horizontal Datum: NAD 83/07
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: A. Goodwin/K. Reinauer Reviewed By: G. Both



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. HS = High Sheen; MS = Moderate Sheen; SS = Slight Sheen; NS = No Sheen

HARTCROWSER

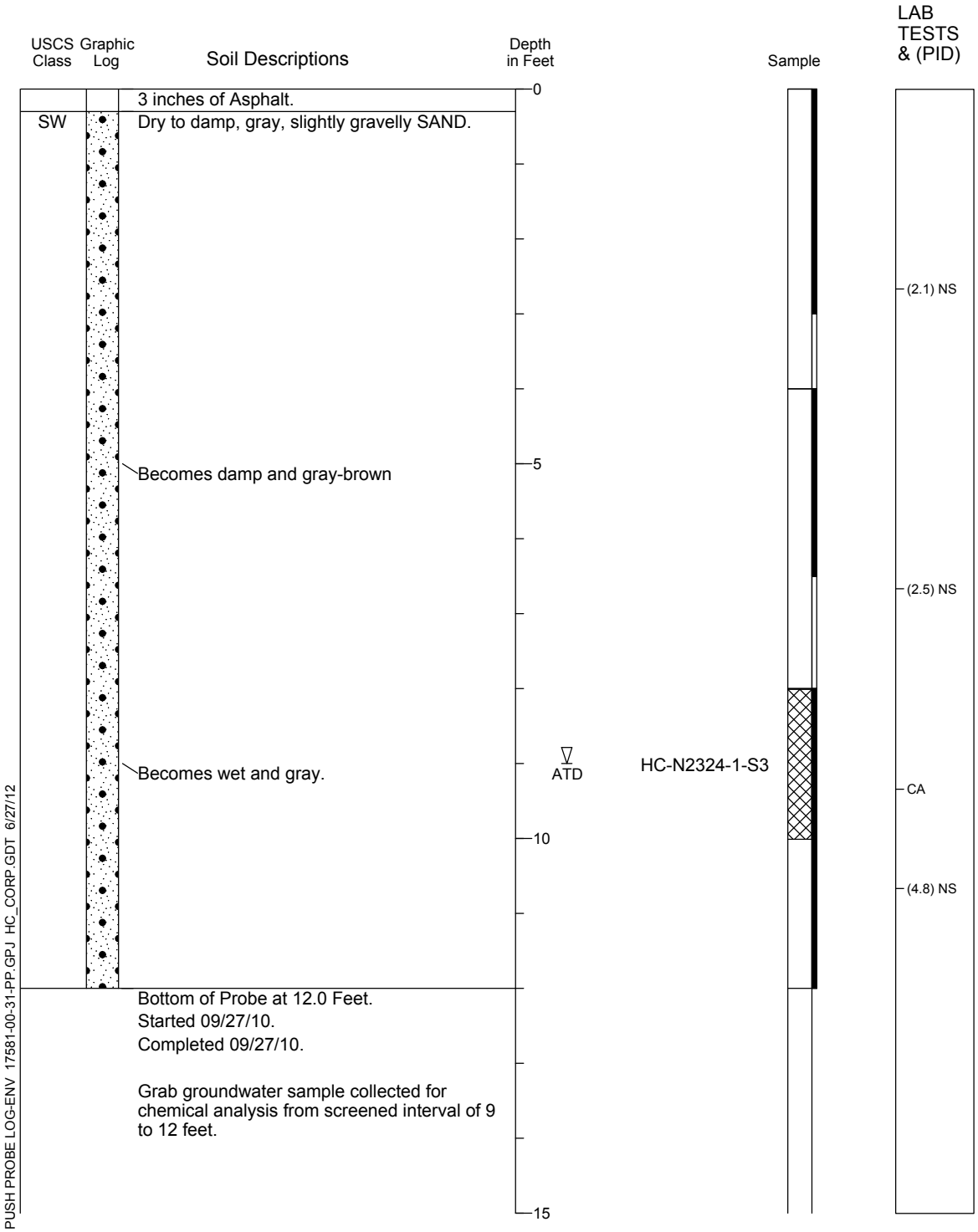
17441-05 10/08

Figure A-6

Push Probe Log HC-N2324-1

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: C. Rust Reviewed By: P. Cordell



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

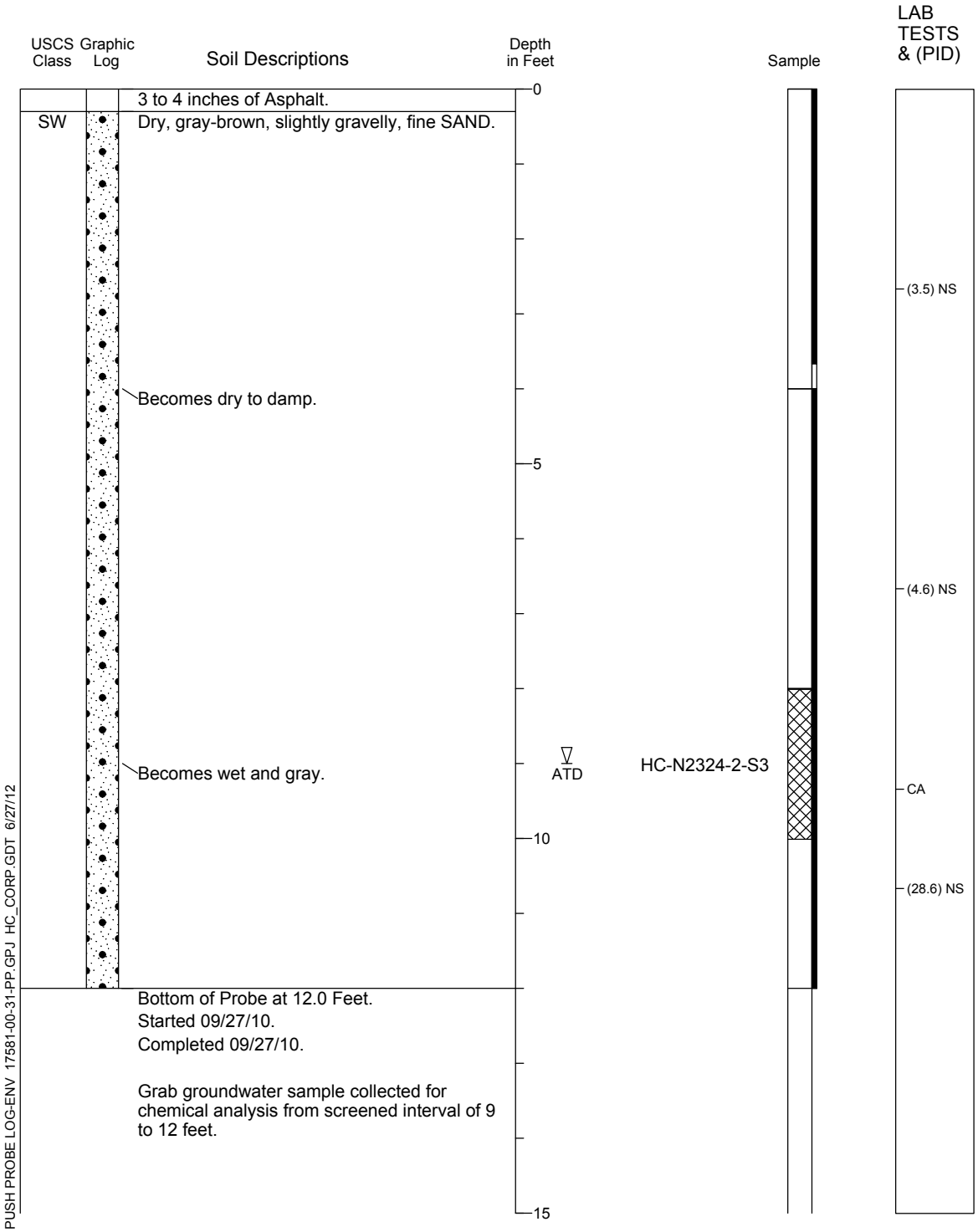
17581-00 *9/10*

Figure B-2

Push Probe Log HC-N2324-2

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: C. Rust Reviewed By: P. Cordell



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

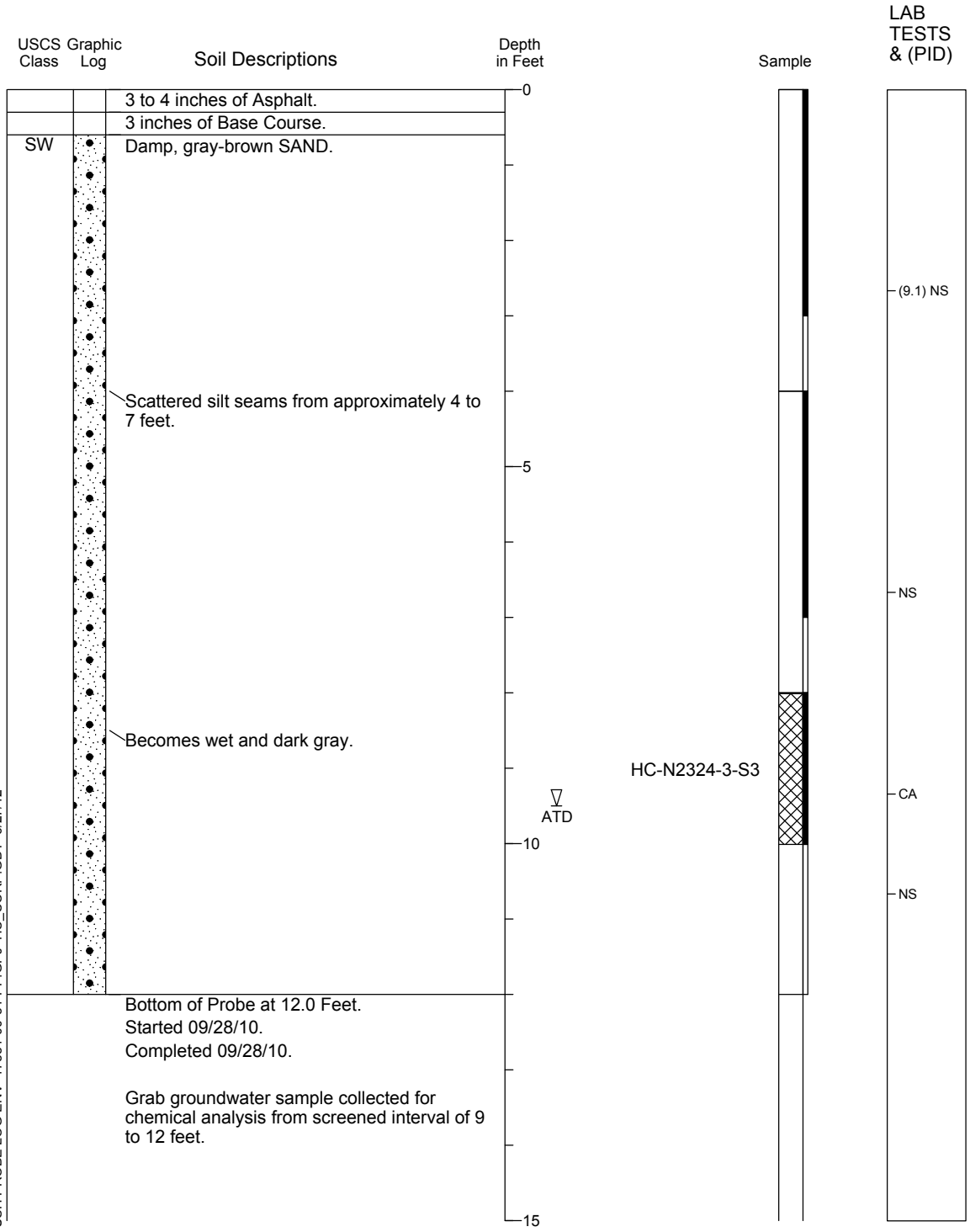
17581-00 *9/10*

Figure B-3

Push Probe Log HC-N2324-3

Location: See Figure 3.
Approximate Ground Surface Elevation: 17 Feet
Horizontal Datum: NA
Vertical Datum: MLLW

Drill Equipment: Push Probe
Sample Type: Acetate Liner
Hole Diameter: 2 inches
Logged By: P. Cordell Reviewed By: C. Rust



PUSH PROBE LOG-ENV 17581-00-31-PP.GPJ HC_CORP.GDT 6/27/12

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. NS = No Sheen

HARTCROWSER

17581-00 *9/10*

Figure B-4

PROJECT: Earley Business Center

Log of Boring No. N2324 - 215

BORING LOCATION:	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: ESN NW	DATE STARTED: 2/13/14 / DATE FINISHED: 2/13/14
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 14 / SCREEN INTERVAL (ft.): NA
DRILLING EQUIPMENT:	DEPTH TO WATER: FIRST: 6 / COMPL. / CASING: NA
SAMPLING METHOD: 5-foot continuous core systems [5' x 3"]	LOGGED BY: Geoff Saunders
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: Grant Hainsworth / REG. NO. xxxx

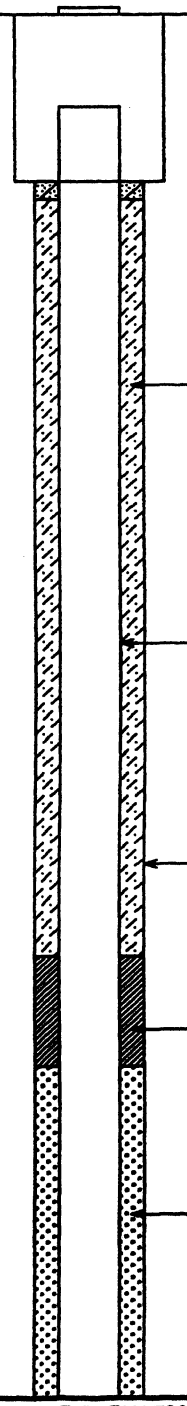
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	REMARKS
0					Asphalt and Gravel	
1					SILTY SAND (SM): moist, brown, fine silty sand with sub-rounded gravel.	
2						
3					WELL GRADED SAND (SW): moist, light gray fine to medium grained sand with trace gravel and trace organics.	
4						
5						
6	N2324-215-S-WT and N2324-215-W-WT					
7						
8					WELL GRADED SAND (SW): moist, brown fine to medium grained sand.	
9						
10						
11						
12					WELL GRADED SAND (SW): wet, gray fine to medium grained sand.	
13						
14						Bottom of boring at 14 feet

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OXYCHEM - TACOMA
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-4
DATE COMPLETED: SEPTEMBER 20, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Well Cover)	*11.0* *7.34*					
-20.0	SM-SAND (NATIVE), some silt, little shells, soft, fine to medium grained, dark gray, wet	*-9.0*		1SS		8	
-30.0	SW-SAND, little silt and shells, fine to medium grained, black, wet	*-19.0*		2SS		14	



NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OXYCHEM - TACOMA
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-4
DATE COMPLETED: SEPTEMBER 20, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
40.0	- fine grained			3SS		8	
42.5			SAND PACK				
45.0							
47.5							
50.0	SM-SAND, some silt, fine grained, dark gray, wet	-39.0	WELL SCREEN	4SS		8	
52.5							
55.0							
57.5							
60.0	SW-SAND, little silt, trace shells, fine grained, black, wet	-49.0	12" Ø BOREHOLE	5SS		8	
62.5							
65.0							
67.5	- trace silt			6SS		10	
70.0	END OF HOLE @ 70.0ft BGS	-59.0	STAINLESS STEEL TAILPIPE				
72.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

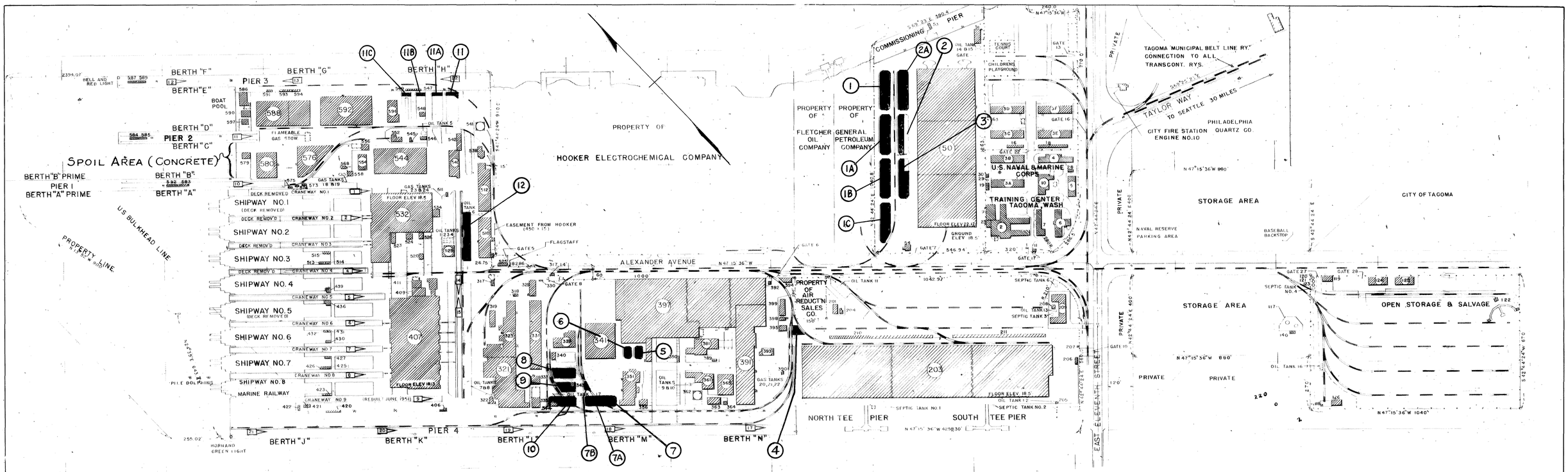
PROJECT NAME: OXYCHEM - TACOMA
PROJECT NUMBER: 1002-15
CLIENT: OCCIDENTAL CHEMICAL CORPORATION
LOCATION: AS PER PLAN

HOLE DESIGNATION: A-4
DATE COMPLETED: SEPTEMBER 20, 1995
DRILLING METHOD: 12" AIR ROTARY
CRA SUPERVISOR: J. WILLIAMS

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. BGS	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
77.5			**SCREEN DETAILS** Screened Interval: 38.5 to 68.5ft BGS Length: 30ft Diameter: 6" Slot Size: #10 Material: Stainless Steel Sand Pack: 28.5 to 70.0ft BGS Material: 1/20 Monterey Sand				
80.0							
82.5							
85.0							
87.5							
90.0							
92.5							
95.0							
97.5							
100.0							
102.5							
105.0							
107.5							
110.0							

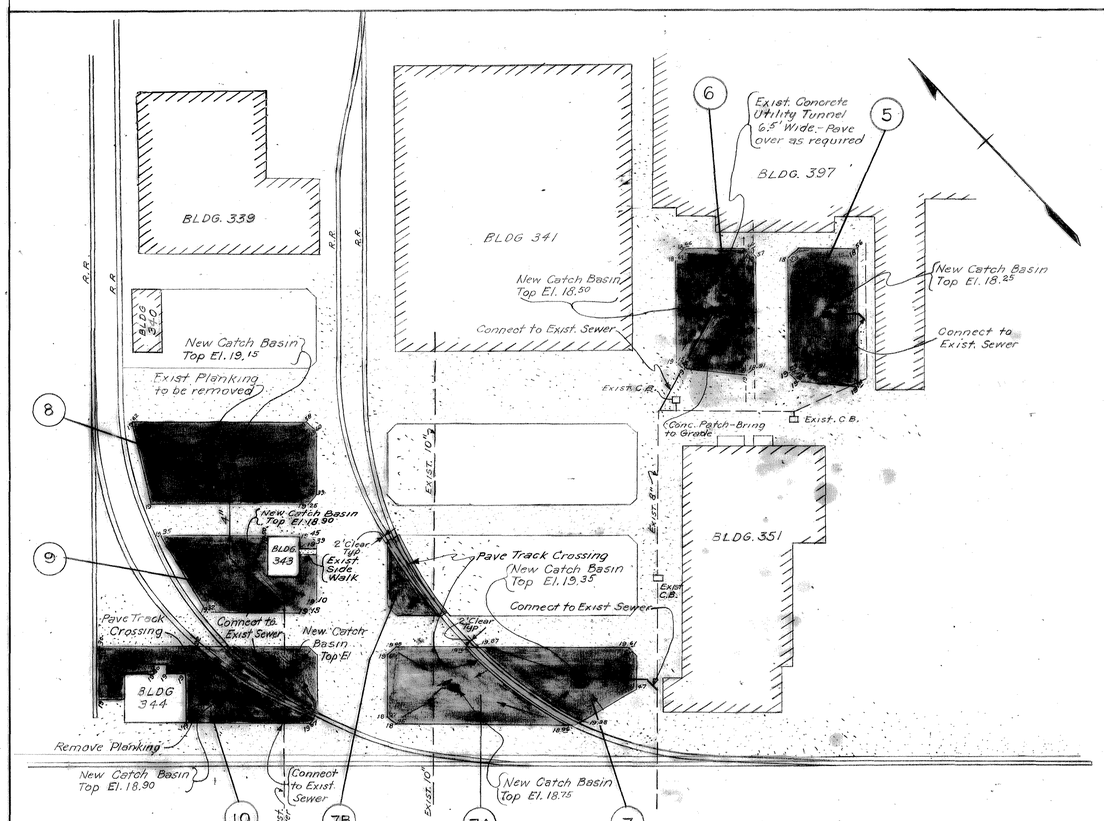
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

Appendix B



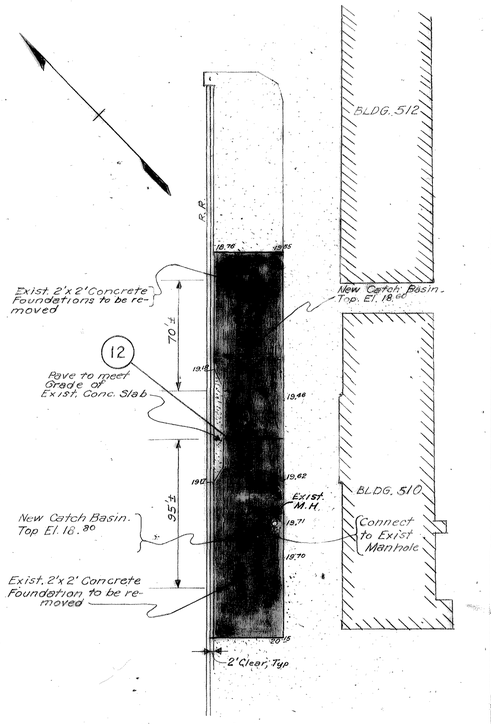
LOCATION OF AREAS TO BE PAVED AND DISPOSAL AREA

SCALE: 1"=200'



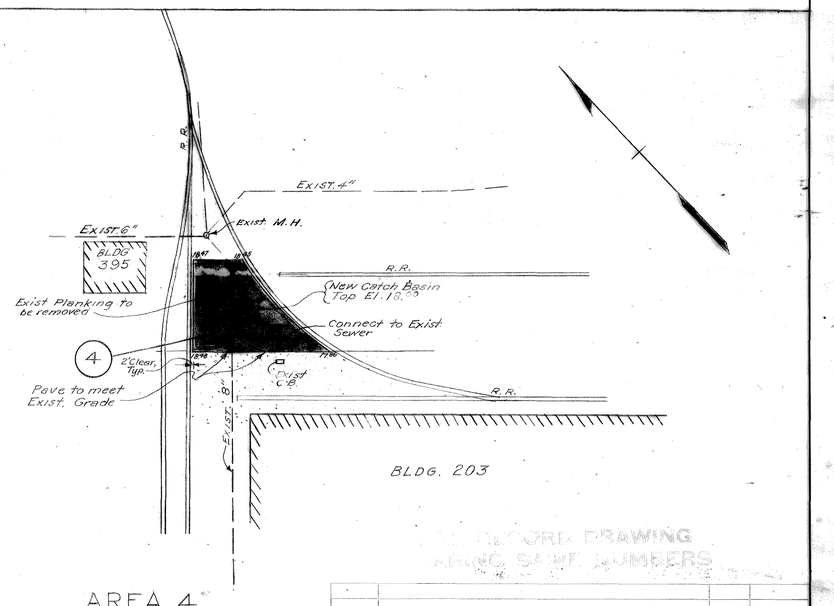
AREAS 5, 6, 7, 7A, 7B, 8, 9 & 10

SCALE 1"= 40'



AREA 12

SCALE 1"=40'



AREA 4

SCALE: 1"=40'

RECORD DRAWING AS-BUILT NUMBERS

SYMBOL	DESCRIPTION	DATE	APPROVAL

REVISIONS

LEGEND
- New Paving.
- Exist. Paving.
- Exist. Catch Basin.
- New Catch Basin.
- New Storm Sewer.
- Exist. Sewer Line
- Slope of New Paving
- Exist. Manhole

Note: New Paving to meet Grades of all Existing adjoining Pavements.

GRAPHIC SCALES
1" = 200' 0 100 200 300 400 500
1" = 40' 0 20 40 60 80 100

ISSUE NO.	TO	DATE
26	Def Rev	5/11/62

DPWO DRAWING NO. 52-81

DEPARTMENT OF THE NAVY — BUREAU OF YARDS AND DOCKS

DISTRICT PUBLIC WORKS OFFICE

THIRTEENTH NAVAL DISTRICT SEATTLE, WASHINGTON

DRAWN GLOCKE
TRACED GLOCKE
CHECKED MOSER
SENIOR ENGR MOSER
DIRECTOR Peterson
ASST COORDINATOR Pendy

U. S. NAVAL STATION
TACOMA, WASH.

PAVE STORAGE AREAS & ROAD ALONG PIER No.3

PLANS & DETAILS 9251

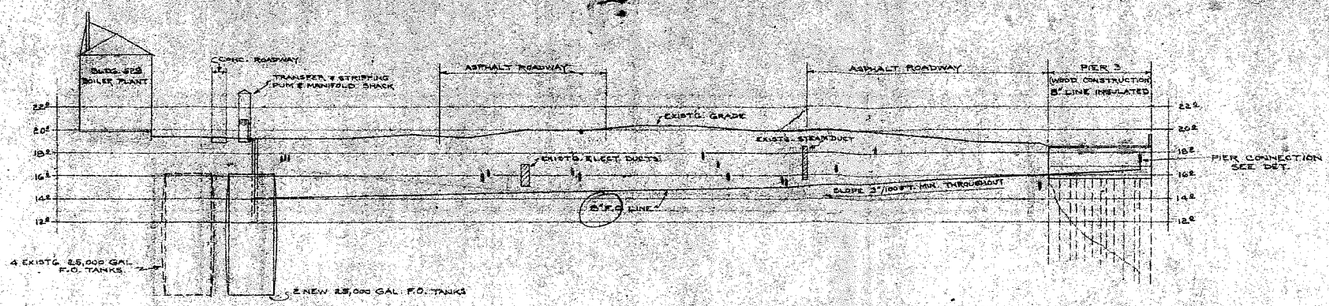
APPROVED [signature] DATE 2/7/62
FOR DPWO FOR CHIEF OF BUREAU

SCALE AS SHOWN SPEC 30 371

SHEET 1 OF 2 SHEETS NOV 28721

Y & D DRAWING NO. 508,402

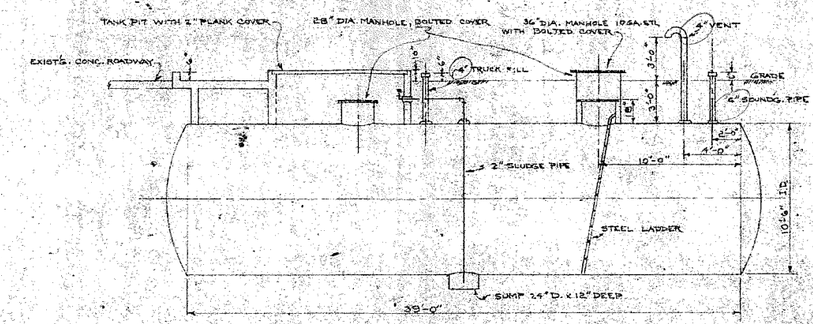
FP-6058-12.0001A 14-15-535

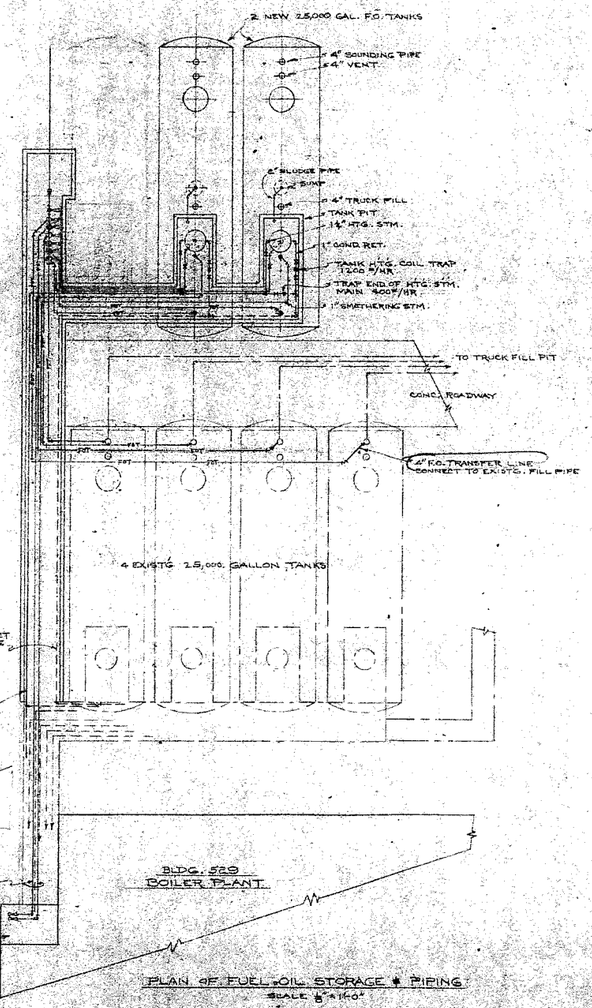


PROFILE OF FUEL OIL LINE

SCALES 1" = 50' HORIZ. 1" = 5' VERT.

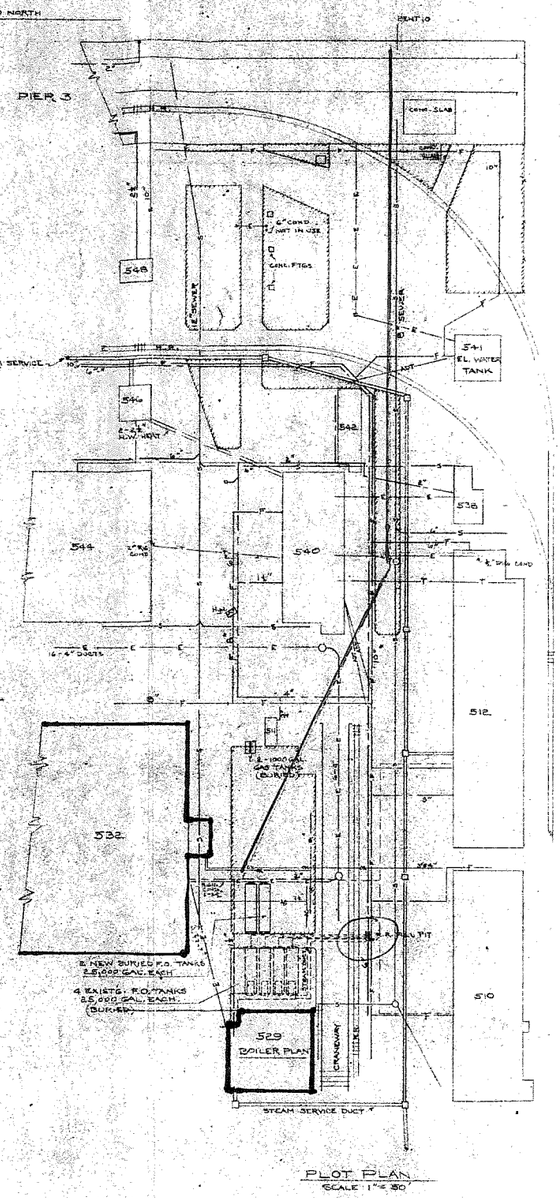
NOTE: DISTANCES & ELEVATIONS ARE APPROXIMATE & MUST BE CHECKED IN FIELD BEFORE STARTING CONSTRUCTION.





PLAN OF FUEL OIL STORAGE & PIPING

SCALE 1" = 16'-0"



PLOT PLAN

SCALE 1" = 80'

LEGEND

F — FIREMAIN
DOMESTIC WATER
AIR
S — SEWER
T — TELEPHONE
E — ELECTRICAL
STEAM SERVICE IN DUCT
(NUMBER) BUILDINGS
OPEN AREA (NOT PAVED)
OXYGEN
ACETYLENE
ASBT. ALARM SYSTEM

UTILITIES SERVICES INDICATED ABOVE ARE LOCATED UNDERGROUND.

Naval Station Tacoma
Underground Utilities Plans
9800

FP-6146-12.00002

14-19-592

HYLEBOS WATERWAY

PORT INDUSTRIAL WATERWAY

COMMENCEMENT BAY

PIER 1

PIER 3

PIER 4

CONTINUATION OF PIER ONE

BENT 65

BENT 133

BENT 110

BENT 99

BENT 72

BENT 37

BENT 25

GARBAGE SHED STEAM OUTLET

4" STEAM 100 lbs gg. 2" CONDENSATE

2" STEAM & 1 1/4" RETURN FOR FIRE MAIN CIRCULATING SYSTEM

REINF. CONCRETE DUCT 6" HP STEAM 100 lbs gg 3" CONDENSATE RETURN 2" HP DRIP

12" TILE DUCT 1 1/2" HP STEAM 1" RETURN 1/2" HP DRIP

REINFORCED CONCRETE DUCT 4" H.P. STEAM 100 lbs gg. 2" CONDENSATE RETURN

2" STEAM & 1 1/4" RET. FIRE MAIN CIRC. SYS.

OPERATIONS

ADMINISTRATION

CENTRAL HEATING PLANT
THREE BOILERS, CAPACITY 300 H.P. EACH

FUEL OIL TRANSFER PUMP HOUSE

6-25,000 GAL FUEL TANKS

CONCRETE UTILITY TUNNEL

NAVY PROPERTY BOUNDARY LINE

MATCH LINE

GRANEWAY 1
SHIPWAY 1
GRANEWAY 2
SHIPWAY 2
GRANEWAY 3
SHIPWAY 3
GRANEWAY 4
SHIPWAY 4
GRANEWAY 5
SHIPWAY 5
GRANEWAY 6
SHIPWAY 6
GRANEWAY 7
SHIPWAY 7
GRANEWAY 8
SHIPWAY 8
GRANEWAY 9 (REBUILT 1951)

SHIPWAYS AND GRANEWAYS HAVE BEEN DEMOLISHED

DISCONNECTED

HEATING PLANT ONE

CONVERTER HEATING SURFACE 362 Sq Feet		
BLDG 588, 592, 596, 552	4" RETURN	15 HP PUMP
BLDG 554, 558, 580, 576	4" RETURN	5 HP PUMP
BLDG 544	4" RETURN	5 HP PUMP
BLDG 540	2½ RETURN	3 HP PUMP

HEATING PLANT TWO

CONVERTER HEATING SURFACE 315 Sq Ft		
6" HOT WATER SUPPLY - SEPARATE RETURNS		
BLDG 321, 335	2½" RETURN	2 H.P. PUMP
BLDG 323, 319	4" RETURN	7½ H.P. PUMP
BLDG 331, 329, 318	3" RETURN	3 H.P. PUMP
BLDG 333, 321	4" RETURN	3 H.P. PUMP

HEATING PLANT THREE

CONVERTER HEATING SURFACE 451 Sq. Ft.		
TWO 6" HOT WATER SUPPLIES NORTH & SOUTH		
BLDG 339, 340, 341	2½" RETURN	5 H.P. PUMP
BLDG 343, 351	2½" RETURN	3 H.P. PUMP
BLDG 361	3" RETURN	3 H.P. PUMP
BLDG 391 W. END	2½" RETURN	5 H.P. PUMP
BLDG 391 E. END	4" RETURN	7½ H.P. PUMP
BLDG 397 N. END	2½" RETURN	5 H.P. PUMP
BLDG 393, 395, 397 S		
398, 399	2" RETURN	5 H.P. PUMP

HEATING PLANT FOUR

CONVERTER HEATING SURFACE 181 Sq Feet
CIRCULATING PUMP 5 HP
BLDG 512, 538 3" RETURN
BLDG 510 2" RETURN
CAPPED SYSTEM

LEGEND

EXISTING BUILDING OR STRUCTURE

PROPOSED OR FUTURE STRUCTURE

SYMBOLS

FO — FUEL OIL LINE

H.P. STEAM 100 PSI

M.P. STEAM 35 PSI

CONDENSATE DRIP

M.P. STEAM RETURN

HOT WATER HEATING MAINS SUPPLY & RETURN

MANHOLE

R or RAD = RADIATOR — RADIATION IN BLDGS IN
U.H. = UNIT HEATER — SQUARE FEET EQUIV. DIR. RADIATION

HW 596 — HOT WATER CONTROL VALVES FOR BLDG 596

HWL 301 — HOT WATER LINE VALVE IN ZONE THREE

NOTE ALL HEATED BUILDINGS ARE HEATED BY HOT WATER EXCEPT BUILDINGS 344, 381, 586, 597 & 362 WHICH ARE HEATED BY 35 PSI STEAM.

GRAPHIC SCALE 1"=100'

100 50 0 100 200 300 400 500 600 700 800

EP-6041-12_00016

SYMBOL	DESCRIPTION	DATE	APPOVAL
REVISION			

APPROVED FOR SHORE STATION DEVELOPMENT BOARD

APPROVED FOR BUREAU OF YARDS & DOCKS

APPROVED FOR SPONSOR'S OFFICE

APPROVED FOR LOCAL SHORE STATION DEVELOPMENT BOARD, THIRTEENTH NAVAL DISTRICT
30 March 1954 DATE
D. T. Miller

DEPARTMENT OF THE NAVY BUREAU YARDS AND DOCKS
U. S. NAVAL STATION
TACOMA, WASHINGTON

DES
DRAWN FOISIE
CHK Tovey
LDR
SUPVR Stromwer
APPROVED
P.W. OFFICER

MASTER SHORE STATION DEVELOPMENT PLAN
PART IV SECTION 6
AREA DEVELOPMENT PLAN
AREAS 12 & 7 UTILITIES
STEAM, HOT WATER & FUEL OIL SYSTEM

APPROVED 3-1-54 DATE
COMMANDING OFFICER

SUBMITTED 3-1-54 DATE
N. L. Dueling SR MBR
STATION DEVELOPMENT BOARD

SCALE 1" = 100'
SHEET 16 OF 17
Y&D DWG NO. 631,658

Appendix D

Table D-1: Evaluation of Potential ARARs for IA Design and Implementation

Type	Law/Regulation/Requirement	Brief Synopsis of Law/Regulation/Requirement	Chemical	Location	Action	ARAR?	Comment for IA Implementation
Cleanup and Waste Management	State Model Toxics Control Act (Chapter 70A.305 RCW, Chapter 173-340 WAC)	Processes and standards are used to identify, investigate, and cleanup sites where hazardous substances are located.	✓		✓	Yes	MTCA regulations are the primary requirement for IA implementation. The IAWP was developed and the IA will be designed and implemented to address applicable MTCA regulations. For simplicity, ARARs used to develop MTCA cleanup levels (e.g., surface water protection ARARs) are not included in this table.
	Federal Resource Conservation and Recovery Act (42 USC 6901 et seq., 40 CFR 257-268)	The characterization, generation, transportation, treatment, storage, and disposal of hazardous solid wastes are regulated (Subtitle C), and minimum national guidelines exist for management of non-hazardous solid wastes (Subtitle D).	✓		✓	Yes	The characterization, generation, transportation, treatment, storage, and disposal of any solid waste generated during IA implementation will be conducted in accordance with applicable federal, state, and local waste management regulations. Solid waste generated during the IA will be disposed of at an off-site facility permitted to receive the waste.
	State Hazardous Waste Management (Chapter 70.105 RCW, Chapter 173-303 WAC)	The state's regulation for the characterization, generation, transportation, treatment, storage, and disposal of hazardous solid wastes defined in Resource Conservation and Recovery Act Subtitle C and additional dangerous solid wastes defined in Chapter 173-303 WAC.	✓		✓	Yes	
	State Solid Waste Management (Chapter 70.95 RCW, Chapter 173-350 WAC, Chapter 173-304 WAC)	The state's regulation for the management of non-hazardous and non-dangerous solid waste.			✓	Yes	
	Federal Hazardous Materials Transportation (49 USC 5101 et seq., 49 CFR Parts 171-180)	Requirements exist (e.g., packaging, labeling, placarding, communications, emergency response) for the transportation of hazardous materials, including hazardous waste.	✓		✓	Yes	The transportation of any hazardous materials generated during IA implementation will comply with these regulations.
	State Sediment Management Standards (Chapter 70.105D RCW, Chapter 90.48 RCW, various other RCW chapters, Chapter 173-204 WAC)	Processes and standards are used to serve as the basis for making decisions about pollutant discharges that affect surface sediments and the cleanup of contaminated surface sediments.	✓		✓	No	These are not ARARs because this IA does not involve contaminated surface sediment or open water disposal of dredged material.
	State Dredge Materials Management (various RCW chapters, Chapter 332-30-166 WAC)	Requirements exist for open water disposal of dredged material obtained from marine or fresh waters.			✓	No	
USTs	Federal UST Program (42 USC 82 Subchapter IX, 40 CFR 280, 40 CFR 281)	Requirements exist for UST owners and operators regarding the installation, operation and maintenance, release detection, release reporting, cleanup, and closure of regulated UST systems as well as the delegation of state UST programs.			✓	Yes	N-6 UST and the Rectangular UST are regulated USTs per the Ecology UST database, while the N-23,24 USTs were previously closed according to the Ecology UST database. All USTs will be decommissioned by completing the applicable actions in WAC 173-360A-0810(2)(a), applicable portions of the codes of practice in WAC 173-360A-0810(2)(b)(ii), and applicable portions of TPCHD UST regulations. UST decommissioning activities will be conducted by, or under the direction of, a certified service provider in accordance with WAC 173-360A Part 9.
	State UST Program (Chapter 70A.355 RCW, Chapter 173-360A WAC)	Requirements exist for UST owners and operators regarding the installation, operation and maintenance, release detection, release reporting, cleanup, and closure of regulated UST systems.			✓	Yes	
	Local UST Regulations (TPCHD Environmental Health Code Chapter 4, UST Regulations)	Requirements exist for UST owners and operators regarding the removal and decommissioning of USTs and the release of hazardous materials into the environment from USTs.			✓	Yes	
Worker Health and Safety	Federal Occupational Safety and Health Standards (various laws, 29 CFR 1910)	Development and enforcement of national safety standards are used to establish safe and healthful working conditions for workers, including hazardous waste operations and emergency response workers in 29 CFR 1910.120.	✓		✓	Yes	IA implementation will be conducted in accordance with applicable federal and state safety and health regulations. For instance, the selected remediation contractor will be required to prepare and submit a project-specific health and safety plan for Port review.
	Federal Construction Safety and Heath (Contract Work Hours and Safety Standards Act, 29 CFR 1926)	Development and enforcement of national safety standards are used to establish safe and healthful working conditions for construction workers.			✓	Yes	
	State Industrial Safety and Health Act (Chapter 49.17 RCW, various Chapter 296 WACs)	Development and enforcement of state safety standards are used to establish safe and healthful working conditions for workers, including hazardous waste operations workers (Chapter 296-843 WAC) and construction workers (Chapter 296-155 WAC).	✓		✓	Yes	
	Arsenic Workplace Exposure Rules (Chapter 49.17 RCW, Chapter 296-848 WAC)	Requirements exist to measure and minimize employee exposure to inorganic arsenic.	✓			Yes	

Table D-1: Evaluation of Potential ARARs for IA Design and Implementation

Type	Law/Regulation/Requirement	Brief Synopsis of Law/Regulation/Requirement	Chemical	Location	Action	ARAR?	Comment for IA Implementation
Biological Resources	Federal Endangered Species Act (16 USC 1531 et seq., 50 CFR 17, 50 CFR 402)	The taking of any listed endangered species is prohibited. In addition, federal agencies are required to ensure that any federally funded or permitted project is not likely to jeopardize the continued existence or adversely effect critical habitat for a listed endangered species.		✓		No	These are not ARARs because there is no reason to believe IA implementation activities could result in the taking of an endangered species, migratory bird species, bald eagle, or golden eagle given the nature and location of the IA implementation activities.
	Federal Migratory Bird Treaty Act (16 USC 703 et seq., 50 CFR 10.13)	The taking of a migratory bird species is prohibited without a permit.		✓		No	
	Federal Bald and Golden Eagle Protection Act (16 USC 668 et seq., 50 CFR 22)	The taking (e.g., pursuing, killing, capturing, collecting, disturbing) of a bald or golden eagle, including their parts, nests, or eggs, is prohibited without a permit.		✓		No	
	State Bald Eagle Protection Rules (Chapter 77.12.655 RCW, Chapter 220-610-100 WAC)	Requirements exist to protect bald eagle habitat by promoting cooperative land management efforts that incorporate eagle habitat needs.		✓		No	
	Federal Fish and Wildlife Coordination Act (16 USC. 661 et seq., 33 CFR 320-330)	Coordination with federal and state fish and wildlife agencies is required to ensure adequate protection of fish and wildlife resources for any federally funded or permitted project that proposes to modify a water body.		✓	✓	No	These are not ARARs because no water bodies will be modified during any of the IA implementation activities.
	State Hydraulic Project Approval (Chapter 77.55 RCW, Chapter 220-660 WAC)	Requirements (e.g., obtaining a permit from the Washington Department of Fish and Wildlife) exist for using, diverting, obstructing, or changing the natural flow or bed of a water of the state to ensure that fish and their aquatic habitats are protected.		✓	✓	No	
	City Critical Areas Preservation for Stream Corridors and Fish and Wildlife Habitat Conservation Areas (Chapters 13.11.400-13.11.560 TMC)	Establishes requirements to classify, protect, and preserve the City's stream corridors and fish and wildlife habitat conservation areas. Other critical areas (i.e., wetlands, flood hazard areas, geologically hazardous areas, and critical aquifer recharge areas) were evaluated as separate requirements.		✓	✓	No	
Cultural Resources	Federal Historic Preservation Act (54 USC 300101 et seq., 36 CFR Part 800)	Federal agencies are required to take into account the effect of an action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally 50 years old or older).		✓		Yes	Given the nature of IA implementation activities (e.g., UST removal, soil removal proximate to previously removed USTs) and the fact these activities will predominantly disturb fill material, the potential for encountering cultural resources (e.g., human remains, tribal artifacts, historical resources, archaeological resources) during the IA is low. Nonetheless, an IDP is included in the IAWP, and will be implemented in the unlikely event that a cultural resource is inadvertently discovered during IA implementation activities.
	State Executive Order 21-02	Consultation with DAHP and any affected tribes and implementation of measures to avoid, minimize, or mitigate adverse effects to archeological and historic archaeological sites, historic buildings/structures, traditional cultural places, sacred sites or other cultural resources are required for state-funded construction or acquisition projects.		✓		Yes	
	Federal Archaeological and Historic Preservation Act (54 USC 312501 et seq., 43 CFR 7)	Requirements exist to evaluate and preserve historical and archaeological data.		✓		Yes	
	Archaeological Sites and Resources (Chapter 27.53 RCW, Chapter 25-46 WAC, Chapter 25-48 WAC)	Requirements exist to conserve, preserve, and protect archaeological sites and resources, including procedures for (1) registering previously unreported historic archaeological resources discovered on state-owned aquatic lands, (2) issuing archaeological excavation and removal permits, and (3) issuing civil penalties.		✓		Yes	
	Indian Graves and Records (Chapter 27.44 RCW, Chapter 25-48 WAC)	Requirements exist to protect Indian burial sites, cairns, glyptic markings, and historic graves, including procedures for (1) notifying affected Indian tribes which may consider the site to be of historic or cultural significance, (2) issuing archaeological excavation and removal permits, and (3) issuing civil penalties.		✓		Yes	
	Protection of Historic Graves (RCW 68.60.050)	Requirements exist to protect historic graves, including (1) issuing a felony for anyone who knowingly damages a historic grave, and (2) working under DAHP supervision for inadvertent discovery of a historic grave during construction.		✓		Yes	
	City Landmarks and Historic Districts (Chapter 13.07 TMC)	Requirements exist to protect, enhance, and use landmarks, districts, and elements of historic, cultural, architectural, archeological, engineering, and geographic significance located within the City.		✓		Yes	

Table D-1: Evaluation of Potential ARARs for IA Design and Implementation

Type	Law/Regulation/Requirement	Brief Synopsis of Law/Regulation/Requirement	Chemical	Location	Action	ARAR?	Comment for IA Implementation
Water and Shorelines	Federal Clean Water Act (33 USC 1251 et seq., 40 CFR 122-136)	Requirements (e.g., obtaining a NPDES permit) exist for wastewater and stormwater discharges to avoid adversely affecting water quality.	✓		✓	Yes	The IA will conform to these ARARs regarding how construction stormwater is managed. The IA design and IA implementation will prevent stormwater from contacting contaminated IA media (e.g., excavated soil), and there will be no contaminated contact stormwater discharge.
	State NPDES Permit Program (Chapter 90.48 RCW, Chapter 173-220 WAC)	A state program exists to regulate the discharge of pollutants, wastes, and materials to surface waters of the state via Clean Water Act NPDES permits.	✓		✓	Yes	
	State Waste Discharge Permit Program (Chapter 90.48 RCW, WAC 173-216)	A state program exists to regulate the discharge of waste materials from industrial, commercial, and municipal operations into municipal sewerage systems and waters of the state via non-NPDES individual permits.	✓		✓	No	These are not ARARs because wastes will not be discharged to (1) municipal sewerage systems (e.g., publicly owned treatment works), (2) the City storm drainage system, or (3) the waters of the state via a non-NPDES general or individual permit.
	State Waste Discharge General Permit Program (Chapter 90.48 RCW, Chapter 173-226 WAC)	A state program exists to regulate the discharge of pollutants, wastes, and other materials to municipal sewerage systems and waters of the state via non-NPDES general permits.	✓		✓	No	
	City Wastewater and Surface Water Management (Chapter 12.08 TMC)	Requirements exist for users of the publicly owned treatment works and the City storm drainage system.	✓		✓	No	
	Federal Clean Water Act Permits for Dredge or Fill Materials (33 USC 1344, 33 CFR 323)	Unless exempted, the discharge of dredge or fill material into waters of the United States, including wetlands, requires a permit.		✓	✓	No	This is not an ARAR since IA implementation does not involve discharge of dredge or fill material into a water of the United States.
	Federal Floodplain Management (Executive Order 11988)	Federal agencies shall take actions in order to avoid, to the extent possible, the adverse effects associated with modifications of floodplains and direct or indirect support of floodplain development whenever there is a practicable alternative.		✓	✓	No	These are not ARARs since IA implementation does not involve modification of a floodplain or wetland.
	State Floodplain Management (Chapter 86.16 RCW, Chapter 173-158 WAC)	Establishes standards to be administered by local governments, and provides assistance to local governments. In addition, local governments are encouraged to avoid the adverse impacts associated with the destruction or modification of wetlands.		✓	✓	No	
	Federal Protection of Wetlands (Executive Order 11990)	Federal agencies shall take actions in order to avoid, to the extent possible, the adverse effects associated with modifications of wetlands and direct or indirect support of new construction in wetlands whenever there is a practicable alternative.		✓	✓	No	
	City Critical Areas Preservation for Flood Hazard Areas and Wetlands (Chapters 13.11.300-13.11.360, 13.11.600-13.11.640 TMC)	Regulations exist to classify, protect, and preserve the City's flood hazard areas and wetlands. Other critical areas (i.e., stream corridors, fish and wildlife habitat conservation areas, geologically hazardous areas, and critical aquifer recharge areas) were evaluated as a separate requirement.		✓	✓	No	
	State Shoreline Management Act (Chapter 90.58 RCW; Chapter 173-26 WAC)	Requirements exist for substantial development occurring within 200 feet of a state shoreline to prevent harm from uncoordinated and piecemeal development of shorelines.		✓	✓	No	These are not ARARs since IA implementation activities will not occur within 200 feet of the ordinary high water mark of the Blair Waterway, Hylebos Waterway, or Commencement Bay.
	City Shoreline Master Program (Chapter 19 TMC)	Implements the state Shoreline Management Act by providing goals, policies, and regulations for shoreline use and protection, and establishing a permit system for substantial development occurring within 200 feet of a City shoreline. Specific requirements for the Port Industrial Area are included in TMC 19.12.		✓	✓	No	
	Federal UIC Program (42 USC 300f et seq., 42 USC 6901 et seq., 40 CFR 144 through 147)	Establishes requirements, technical criteria, and standards for the UIC program, specifies procedures for approving state UIC programs, and establishes applicable UIC program elements for each state.			✓	No	These are not ARARs since IA implementation does not involve discharge of fluids to UIC wells.
	State UIC Program (Chapter 90.48 RCW, Chapter 173-218 WAC)	Protects groundwater quality and prevents groundwater contamination by regulating the discharge of fluids into UIC wells.			✓	No	
	State Well Construction Standards (Chapter 18.104 RCW, Chapter 173-160 WAC)	Establishes standards for construction, maintenance, and decommissioning of water supply wells and resource protection wells (e.g., monitoring wells).			✓	Yes	MWs within the IA excavation areas (i.e., MW-114) will be decommissioned per WAC 173-160-460 or via IA excavation activities.
	Federal Drinking Water Standards (Safe Drinking Water Act, 40 CFR 141)	Establishes maximum contaminant levels and other chemical standards for public drinking water systems.	✓			No	These are not ARARs because no current drinking water supplies are located in or downgradient of the Site, groundwater in and downgradient of the Site is not potable, and surface water downgradient of the Site is not potable.
	State Drinking Water Standards (RCW 70A.125, WAC 246-290-310)	Establishes maximum contaminant levels and other chemical standards for public drinking water systems.	✓			No	
	State Water Quality Standards for Groundwater (Chapters 90.48 RCW, Chapter 90.54 RCW, Chapter 173-200 WAC)	Establishes groundwater quality standards to provide for protection of existing and future use of groundwater.	✓		✓	No	This is not an ARAR since cleanup actions approved by Ecology under MTCA are exempt pursuant to WAC 173-200-010(3)(c).

Table D-1: Evaluation of Potential ARARs for IA Design and Implementation

Type	Law/Regulation/Requirement	Brief Synopsis of Law/Regulation/Requirement	Chemical	Location	Action	ARAR?	Comment for IA Implementation
Air	Federal Clean Air Act (42 USC 7401 et seq., 40 CFR 50)	Air emissions from stationary and mobile sources are regulated by directing states to develop state implementation plans to achieve National Ambient Air Quality Standards.	✓		✓	No	These are not ARARs since IA implementation does not involve regulated air emissions.
	State General Regulations for Air Pollution Sources (Chapter 70A.15 RCW, Chapter 173-400 WAC)	Establishes standards and rules generally applicable to the control and/or prevention of the emission of air contaminants from stationary sources. Dust control requirements were evaluated as a separate requirement.	✓		✓	No	
	State Controls for New Sources of Toxic Air Pollutants (Chapter 70A.15 RCW, Chapter 173-460 WAC)	Establishes controls for new or modified sources emitting toxic air pollutants by requiring best available control technologies, toxic air pollutant emission quantifications, and human health and safety protection demonstrations.	✓		✓	No	
	State Ambient Air Quality Standards (Chapter 70A.15 RCW, Chapter 173-476 WAC)	Adopts National Ambient Air Quality Standards for particulate matter, lead, sulfur dioxide, nitrogen dioxide, ozone, and carbon monoxide.	✓		✓	No	
	PSCAA Regulation I	Establishes regulations to control the emission of air contaminants from sources (e.g., new sources, outdoor burning, solid fuel burning) in Pierce, King, Snohomish, and Kitsap Counties. Dust control requirements were evaluated as a separate requirement.	✓		✓	No	
	PSCAA Regulation III	Adopts state and federal requirements for regulation of toxic air contaminants in in Pierce, King, Snohomish, and Kitsap Counties.	✓		✓	No	
	Dust control requirements (WAC 173-400-040(9). PSCAA Regulation I Article 9.15)	Requirements exist to implement reasonable precautions to prevent or minimize visible emissions of fugitive dust during activities such as construction.			✓	Yes	Dust control measures (e.g., watering/misting exposed surfaces, covering stockpiles not in use with heavy duty plastic sheeting and securing with ropes and sandbags, covering haul trucks, inspecting haul trucks before they enter public roads and removing any excess dirt on the truck) will be incorporated as necessary into the IA design to prevent and minimize visible emissions of fugitive dust during IA implementation.
Other	State Environmental Policy Act (Chapter 43.21C RCW, Chapter 197-11 WAC)	Requires all government agencies to consider and assess the environmental impacts of a proposed action within the state before making a decision. The SEPA procedural requirements are fulfilled via the MTCA remedy selection process pursuant to WAC 197-11-250 through 197-11-268.			✓	Yes	It is expected that Port and/or Ecology (the lead agency) will prepare a SEPA checklist as part of the IAWP public participation package.
	City Site Development Code (Chapter 2.19 TMC)	Requirements (e.g., obtaining a Site Development Permit) exist for the development and maintenance of building and building sites to minimize negative impacts to the environment.			✓	Yes	Prior to IA implementation, The Port will obtain any applicable City permits required for IA activities.
	City Critical Area Preservation for Geologically Hazardous Areas and Critical Aquifer Recharge Areas (Chapters 13.11.700 - 13.11.820 TMC)	Establishes requirements to classify, protect, and preserve the City's geologically hazardous areas and critical aquifer recharge areas. Other critical areas (i.e., wetlands, stream corridors, fish and wildlife habitat conservation areas, and flood hazard areas) were evaluated as separate requirements.		✓	✓	No	This is not an ARAR since the Site is not located within a geologically hazardous or critical aquifer recharge area, and any nearby geologically hazardous or critical aquifer recharge areas would not be affected by IA implementation activities.
	State Noise Control Act (Chapter 70A.20 RCW, Chapter 173-60 WAC)	Establishes maximum noise levels at specified times for specified durations, with some exemptions such as temporary construction activity in 173-60-050(3)(a).			✓	Yes	IA implementation activities will be designed to comply with applicable noise requirements (e.g., limiting construction activities to the working hours specified in TMC 8.122.070).
	City Noise Enforcement (Chapter 8.122 TMC)	Requirements exist to mitigate the adverse impact of noise while recognizing the economic value of construction and industry. Construction-specific requirements are included in TMC 8.122.070.			✓	Yes	
	City Right-of-Way Development (Chapter 2.22 TMC)	Requirements (e.g., obtaining a Right-of-Way Construction Permit or Right-of-Way Use Permit) exist for activities such as installing sidewalks, installing utilities, installing driveways, repairing streets, and activities that temporarily impede the normal flow of vehicular traffic or pedestrian traffic.		✓	✓	No	This is not an ARAR since IA implementation activities do not include construction within, or cause temporary impediment for, a City right-of-way.
	City Electrical Code (Chapter 12.06A TMC)	Requirements (e.g., obtaining an electrical permit) exist to safeguard people and property from electrical hazards arising from the use of electricity, including temporary power connections and wiring used for remediation systems.			✓	No	This is not an ARAR since IA implementation activities do not include temporary power connections or wiring for remediation systems.

Notes:

ARAR: Applicable or relevant and appropriate; City: City of Tacoma; CFR: Code of Federal Regulations; DAHP: Department of Archaeology and Historic Preservation; FEMA: Federal Emergency Management Agency; HASP: Health and Safety Plan; IDP: Inadvertent Discovery Plan; JARPA: Joint Aquatic Resources Permit Application; MTCA: Model Toxics Control Act; NPDES: National Pollutant Discharge Elimination System; PSCAA: Puget Sound Clean Air Agency; RCW: Revised Code of Washington; SEPA: State Environmental Policy Act; TMC: Tacoma Municipal Code; TPCHD: Tacoma-Pierce County Health Department; UIC: Underground Injection Control; USC: United States Code; UST: Underground Storage Tank; WAC: Washington Administrative Code

Appendix E

Memo

PIONEER TECHNOLOGIES CORPORATION
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To: Sandy Smith, PE, LHG (Washington State Department of Ecology [Ecology])

From: Troy Bussey, PE, LG, LHG and Hannah Morse, PE (PIONEER Technologies Corporation [PIONEER])

Cc: Dave Myers, Melisa Bod, and Rob Healy (Port of Tacoma [Port])

Date: March 28, 2025

Subject: Confirmation Monitoring SAP for LNAPL Source and UST Removals
Earley Business Center (Parcel 1B), Agreed Order No. DE 9553
401 East Alexander Avenue, Tacoma, Washington 98421

The purpose of this Sampling and Analysis Plan (SAP) for the Earley Business Center (EBC) Site (Site) at 401 East Alexander Avenue, Tacoma, Washington, is to present the plan for conducting confirmation monitoring (e.g., excavation sidewall and bottom soil samples) for the interim action (IA) of the light non-aqueous phase liquid (LNAPL) source and underground storage tank (UST) removals. This work is to be completed during IA implementation, which will include (1) excavating the LNAPL source and (2) removing UST N-6, USTs N-23,24, and the Rectangular UST. This SAP presents the investigation design, field investigation procedures, and laboratory analyses that will be used to conduct confirmation monitoring activities. Since this SAP is a subcomponent of the larger IAWP, typical background components of a stand-alone SAP are not repeated if included elsewhere in the IAWP. Specific Site features relevant to this SAP are shown on Figure 1.

This SAP is supported by the updated and standalone Site-Wide Plans document (PIONEER 2025) that includes (1) Site-Wide Screening Level (SL) Calculations, (2) the Site-Wide Quality Assurance Project Plan (QAPP), (3) the PIONEER Site-Specific Health and Safety Plan (HASP), and (4) the Site-Wide Inadvertent Discovery Plan (IDP). This SAP and the Site-Wide QAPP were prepared in accordance with Washington Administrative Code (WAC) 173-340-820, WAC 173-340-830, and applicable components of Ecology guidance (Ecology 1995, 2016b). The PIONEER HASP and IDP will be utilized during field activities outlined in this SAP.

Investigation Design

The investigation design for confirmation monitoring activities is presented in Table 1. The investigation design (Table 1) includes the following details for the investigation activity in each IA area: anticipated number of samples, key sampling details, objective, and associated laboratory analyses. The three confirmation monitoring objectives are included in Table 1.

General Field Procedures

Collecting Soil Samples from Excavations and Stockpiles

Soil samples will be collected from the N-6 UST, the N-23,24 USTs, and Rectangular UST excavations. Grab sidewall and bottom samples will be collected from worst-case locations within each excavation based on any suspected UST release locations, visual and olfactory observations, and depth to groundwater and supported by photoionization detector (PID) field screening, if necessary. These excavation sidewall and bottom samples will be obtained with the excavator bucket,

and then retrieved from the excavator bucket using a clean stainless-steel trowel or spoon. PIONEER will log PID field readings and soil sampling activities on the Subsurface Field Log in Attachment 1.

If potentially clean overburden soil is encountered in the LNAPL source excavation, N-6 UST excavation, the N-23,24 USTs excavation, and/or Rectangular UST excavation, the potentially clean overburden soil from a given excavation may be segregated, stockpiled, and sampled for potential on-site reuse. The number of stockpile samples collected from stockpile(s) generated from a given excavation will be in accordance with Table 6.9 in Ecology's Guidance for Remediation of Petroleum Contaminated Sites (e.g., 3 samples for a stockpile up to 100 cubic yards; Ecology 2016a). Each potentially clean overburden stockpile will be divided into sections based on the number of samples to be collected from the stockpile. Each stockpile sample will be a discrete grab collected 6 to 12 inches beneath the surface of the stockpile using a clean stainless-steel trowel or spoon (Ecology 2016a).

PID Field Screening Procedures

The PID will be equipped with a 10.6 eV lamp and will be calibrated prior to use. Representative soil for PID field screening will be immediately placed in a small, resealable plastic bag until the bag is approximately one-third full and then the bag will be sealed. The bag will be gently shaken for a few seconds, then placed in the same location as other baggies (e.g., on the tailgate in the sun or in a vehicle if the ambient temperature is less than 40 degrees Fahrenheit) for approximately 10 minutes, and then gently shaken again before obtaining the PID measurement. A small portion of the bag seal will be opened to allow the PID to enter the headspace of the bag (without touching any soil), and the maximum PID measurement within the first 30 seconds of readings will be recorded. PID measurements will be recorded on the Subsurface Sampling Field Log in Attachment 1.

MW Related Tasks (If Necessary)

MW Installation

A Washington licensed driller will install monitoring wells (MWs) in accordance with WAC 173-160 Part II at to be determined locations. It is expected that a hollow-stem auger rig will be used to install all MWs. Two-inch diameter MWs will be installed, and MW screens will not cross multiple lithologic units. It is expected that (1) MW screen lengths will be 10 feet or 5 feet, (2) 10-slot MW screens will be used, and (3) sand filter packs appropriate for use with a 10-slot screen will be used (not pre-packed screens). Each MW will be sealed in accordance with WAC 173-160-450. In general, this MW sealing entails installing a bentonite plug above the top of the filter pack, filling the borehole annulus from the bentonite plug to near the land surface with bentonite or cement, and then installing a concrete surface seal. Flush-mount surface completions are anticipated. PIONEER will record MW construction details using the MW Installation Form in Attachment 1.

MW Development

All newly installed MWs will be developed and select existing MWs mentioned in Table 1 will be redeveloped. At a given new MW, development will occur at least 48 hours after the completion of the MW installation. Development will be conducted by over-pumping the MW with a submersible pump and/or a surge block and check valve (i.e., foot pump) until the turbidity in the development water is less than 5 nephelometric turbidity units (NTU). If it is clearly not practical to continue development to reach the 5 NTU goal, then a development goal of 50 NTU will be used instead. A calibrated

field turbidity meter will be used to measure the turbidity. PIONEER will record MW development activities and data using the MW Installation Form in Attachment 1.

MW Surveying

A Washington licensed surveyor will determine the vertical and horizontal location of the MW reference point (notch or mark, or north side of the top of casing if no notch or mark) and the ground surface for all new MWs and any associated existing MWs. The vertical elevation of each location will be surveyed to an accuracy of 0.01 feet relative to the North American Vertical Datum of 1988. Vertical elevations in Mean Lower Low Water will also be provided to the nearest 0.01 feet to meet Port expectations. The horizontal accuracy will be within one foot and be reported relative to Washington State Plane Coordinate System, South Zone, North American Datum 1983/1991.

GW Sampling from Permanent MWs

The following low-flow purging standard operating procedures will be used to purge water from each MW prior to sampling. A peristaltic pump, equipped with dedicated polyethylene tubing, will be used to purge water from the MW. The tubing intake will be positioned near the center of screened interval, or the center of the saturated portion of the screened interval. A variable-frequency drive controller on the pump will be used to limit the purging flow rate to less than 0.5 liters per minute. During purging, relative water levels will be monitored with an interface probe or electronic water level indicator, and water quality parameters (i.e., pH, specific conductivity, turbidity, dissolved oxygen, temperature, and oxidation/reduction potential) will be measured with a calibrated water quality meter in a flow-through cell to verify stabilization. Acceptable stabilization criteria are listed on the GWM Form included in Attachment 1. If water quality parameters do not stabilize, purging will be considered complete after 60 minutes of continuous purging.[1] GW samples will be collected immediately following purging without turning off the pumping system. If a MW is pumped dry before the sample can be collected, a GW sample will be collected as soon as GW in the MW recharges. PIONEER will record field water quality parameter results and purging and sampling information using the GWM Form in Attachment 1.

Equipment Decontamination Procedures

All non-dedicated equipment that contacts potentially contaminated media (e.g., soil, groundwater) will be decontaminated before use at each sampling location. The driller will use a high-pressure steam cleaner to remove visible soil and grease from all downhole equipment on drill rigs (e.g., augers, rods, samplers, drill bits) prior to arriving at the Site. Drilling tools (e.g., augers, rods, samplers, drill bits) will be (1) pressure washed or (2) scrubbed and washed with potable water containing diluted detergent (e.g., Liquinox) and sufficiently rinsed with potable water between each drilling location based on the type of drill rig and tools used. In addition, drilling samplers (e.g., split-spoon sampler) will be scrubbed and washed with potable water containing diluted detergent (e.g., Liquinox) and sufficiently rinsed with potable water between each sampling run at a given drilling location. A cleaning area will be setup and maintained on Site during drilling operations that will allow all cleaning water to be contained and collected. The affected portions of non-drilling equipment (e.g., stainless steel bowls and spoons, submersible pumps, electronic interface probes, water

[1] Final values for field water quality parameters will be recorded, even if purging stability cannot be achieved.

quality meters) will be scrubbed and washed with potable water containing diluted detergent (e.g., Liquinox), sufficiently rinsed with potable water, and wiped clean before each use. All water (and soil) generated during decontamination will be managed as investigation-derived waste (IDW).

Sample Labeling

Sample labels will clearly indicate the site location, sample number identification, date, time, sampler's initials, parameters to be analyzed, and added preservative (if any). Each sample will be individually labeled. Each sample identification will be unique and will adhere to the PIONEER sample number scheme included in Attachment 2.

Chain-of-Custody Documentation

Chain-of-Custody procedures will be followed to maintain and document sample possession. A sample is considered under a person's custody if it is in that person's physical possession, within visual sight of that person after taking physical possession, secured by that person so that the sample cannot be tampered with, or secured by that person in an area that is restricted to unauthorized personnel.

The originator (i.e., the sampler) will complete the requested information on the custody record, including signature and date. Original signed custody records listing the samples in the cooler will accompany sample shipments.[2] The originator of the custody record will retain a copy of the custody record.

Sample Shipment

Sample packaging and shipping procedures are based on United States Environmental Protection Agency specifications and United States Department of Transportation regulations as specified in 49 Code of Federal Regulations (CFR) 173.6 and 49 CFR 173.24. Soil and water samples will be packed in coolers with bubble wrap, bags, and ice in a manner that achieves preservation requirements while also preventing breakage of sample containers and leakage of melting ice. If shipping is required, samples will be shipped as environmental samples and not hazardous material. Samples will be hand delivered or shipped express delivery to the laboratories. Custody seals will be used when shipping samples via courier service or commercial carriers. The chain of custody record will accompany each shipment. The method of shipment, courier name(s), and other pertinent information will be entered in the chain of custody record.

GPS Coordinates

PIONEER will collect the coordinates for all confirmation soil samples and excavation footprints with a Trimble GeoXH or similar global positioning system (GPS) unit. The GPS accuracy will be within +/- one meter.

Investigation-Derived Waste

For all activities identified in this SAP, the following types of IDW will be generated during sampling activities and will be handled as follows:

- Cuttings from soil borings will be placed in sealed and labeled drums or bins, and temporarily stored in a secure area of the Site.

[2] More than one custody form may be needed per cooler to list all the samples contained in the cooler.

- Development water, purge water, and decontamination water will be placed in sealed and labeled drums or totes, and temporarily stored in a secure area of the Site.
- Personal protective equipment (e.g., nitrile gloves) and other disposable sampling equipment will be disposed of as solid waste in the standard municipal solid waste stream.

All IDW will be characterized and then removed by a licensed waste transporter for off-Site treatment and/or disposal at a facility permitted to accept the waste.

Field Recordkeeping

PIONEER will complete the following forms to document applicable investigation activities (see Attachment 1):

- Field Checklist, which is used to assist with planning and coordination prior to a field event and to document completion of field activities.
- Daily Field Report, which is used to document miscellaneous field activities daily (e.g., miscellaneous field notes, miscellaneous sampling notes).
- Subsurface Sampling Field Log, which is used to record drilling, lithologic (e.g., color, grain size, moisture, detail), and associated sampling details.
- MW Installation Form, which is used to record MW construction details and MW development data.
- Groundwater Monitoring Form, which is used to record current MW conditions, static water level measurements, LNAPL thickness measurements, purging data, sampling information, and IDW details.

In addition, PIONEER will take representative photographs of investigation activities as necessary. At a minimum, PIONEER will take photos that capture the excavation dimensions and the locations of excavation sidewall and bottom samples.

SAP Implementation

This section summarizes specific key activities and information needed to implement the investigation activities identified in this SAP.

Investigation Roles and Responsibilities

The project team for implementing this SAP includes representatives from Ecology, Port, the Remediation Contractor, PIONEER, other various subcontractors (e.g., licensed driller, laboratories). The specific roles and responsibilities that are anticipated for key personnel involved in this investigation are summarized in Section 5.6 of the IAWP.

Pre-Mobilization Tasks

In accordance with the Agreed Order Amendment, PIONEER or the Port will provide Ecology notice for IA implementation at least 7 calendar days before Remediation Contractor mobilization.

Prior to the implementation of applicable confirmation monitoring activities, PIONEER will ensure the following pre-mobilization coordination and preparation tasks are completed:

- Coordinate with the PIONEER Project Manager about each investigation activity.

- Subcontract field subcontractors as necessary.
- Coordinate the scope of work and the anticipated field schedule with field subcontractors and field personnel.
- Coordinate with field subcontractors regarding health and safety details specific to this project (e.g., field team organization and communication, potential hazards and associated controls, work zones, decontamination, personal protective equipment).
- Ensure necessary health and safety equipment (e.g., sanitation equipment, site control equipment, personal protective equipment) will be at the Site for the duration of field activities.
- Obtain necessary health and safety paperwork from field personnel (e.g., training records).
- Coordinate access with the Port.
- Perform utility locates to clear underground utilities for each drilling location by (1) calling the Washington Call Before You Dig phone number (i.e., 811), and (2) conduct a private utility locate to identify existing subsurface utilities and UST locations.
- If necessary, core through concrete prior to drilling to facilitate subsequent drilling activities.
- Ensure the licensed driller submits the necessary notices of intent and associated fees to the Ecology Water Resources Program for proposed drilling locations.
- Coordinate with the project laboratory on key elements of the SAP/quality assurance project plan (e.g., sample preservation, analytical methods and analytes, field quality control samples).
- Obtain sample containers from the project laboratory.
- Obtain the necessary sample equipment and supplies.

Reporting

Confirmation monitoring results will be documented in the IA Report (see IAWP Section 5.7). All applicable confirmation monitoring results will be submitted electronically to Ecology's Environmental Information Management (EIM) database.

References

Ecology. 1995. Guidance on Sampling and Data Analysis Methods. January.

Ecology. 2016a. Guidance for Remediation of Petroleum Contaminated Sites, Publication No. 10-09-057. June.

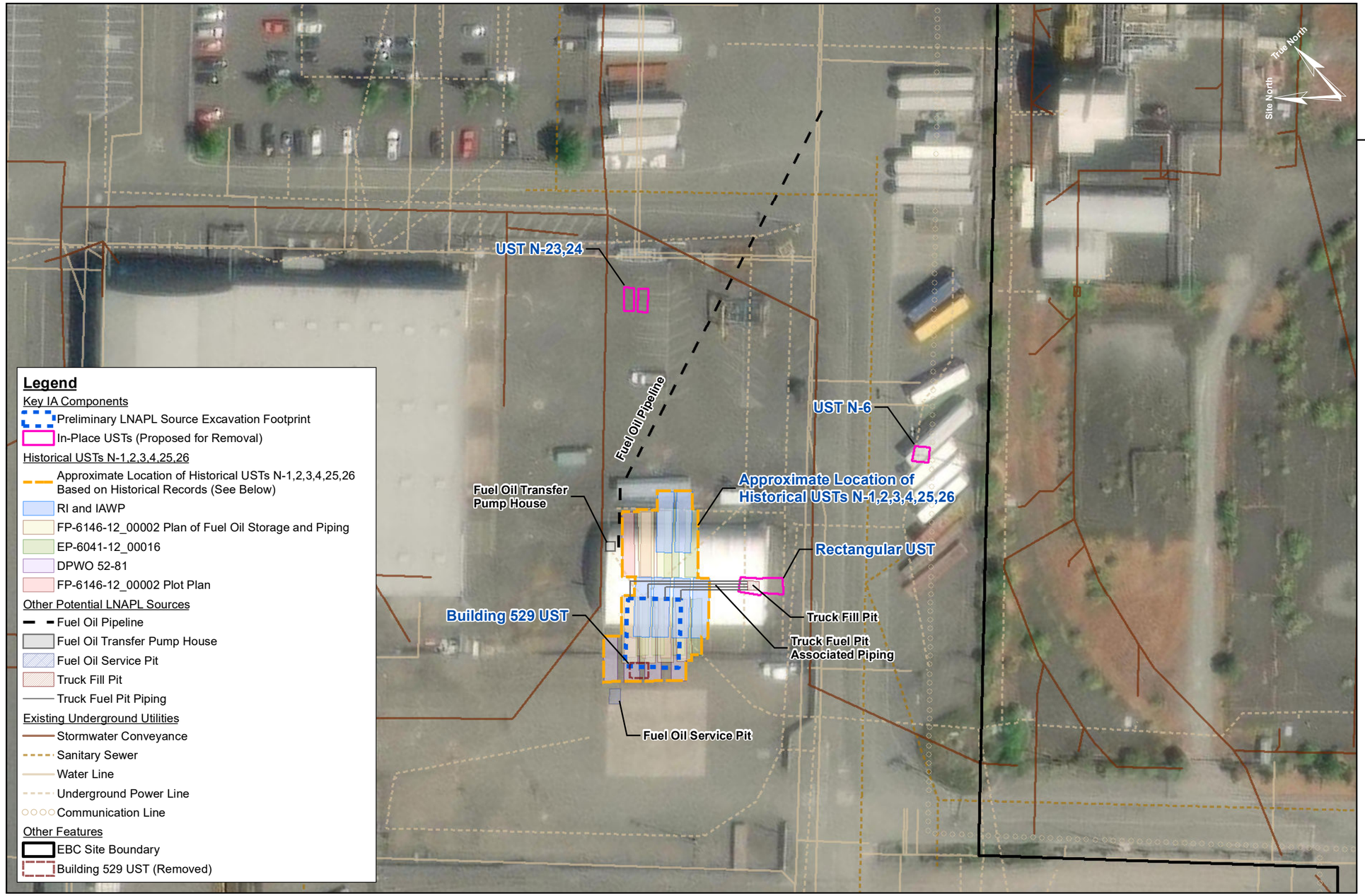
Ecology. 2016b. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, Publication No. 04-03-030. December.

PIONEER. 2025. Site-Wide Plans: SL Calculations, QAPP, HASP, IDP, Early Business Center Site. March 13.

TPCHD. 2015. Tacoma-Pierce County Health Department Environmental Health Code Chapter 4, Underground Storage Tanks Regulations. April 1.

Enclosures

Figure 1	Confirmation Monitoring-Related Site Features
Table 1	Confirmation Monitoring Design for LNAPL Source and UST Removals
Attachment 1	PIONEER Field Forms
Attachment 2	PIONEER Sample Number Schema



Legend

Key IA Components
- Preliminary LNAPL Source Excavation Footprint
- In-Place USTs (Proposed for Removal)

Historical USTs N-1,2,3,4,25,26
- Approximate Location of Historical USTs N-1,2,3,4,25,26 Based on Historical Records (See Below)
- RI and IAWP
- FP-6146-12_00002 Plan of Fuel Oil Storage and Piping
- EP-6041-12_00016
- DPWO 52-81
- FP-6146-12_00002 Plot Plan

Other Potential LNAPL Sources
- Fuel Oil Pipeline
- Fuel Oil Transfer Pump House
- Fuel Oil Service Pit
- Truck Fill Pit
- Truck Fuel Pit Piping

Existing Underground Utilities
- Stormwater Conveyance
- Sanitary Sewer
- Water Line
- Underground Power Line
- Communication Line

Other Features
- EBC Site Boundary
- Building 529 UST (Removed)

Notes:
- The exact location of the historical USTs N-1,2,3,4,25,26 varies slightly between different historical documents. The different representations of the UST locations are presented on this figure to demonstrate the uncertainties with the historical documentation. Despite these uncertainities, the historical records demonstrate a high degree of confidence of the general location of the historical six 25,000 gallon USTs.
- Geospatial data were provided by other consultants or georeferenced from reports prepared by other consultants. All locations are approximate.

0 25 50 100 Feet

PIONEER TECHNOLOGIES CORPORATION

Confirmation Monitoring-Related Site Features
Confirmation Monitoring SAP for LNAPL Source and UST Removals
Earley Business Center Site

Figure 1

Document Path: G:\Projects\Port_of_Tacoma\EBC\Maps\UST_Interim Action WP\App G_Conf Monitoring Plan\Fig 1_Site Features.mxd; Author: VN; Date Saved: 3/13/2025

Table 1: Confirmation Monitoring Design for LNAPL Source and UST Removals

IA Area	Activity Title	Anticipated # of Samples[1,2]	Key Sampling Details[3]	Objective[4,5]	Analytes[5,6]													
					Table 830-1 Waste/Unknown Oils							Additional Soil Reuse COIs						
					GRO		HO											
					NWTPH-Gx	Gas Analytes	NWTPH-Dx (w/o SGC)	NWTPH-Dx (w/ SGC)[7]	PAHs	PCBs	Halogenated VOCs	VOCs	1,4-Dioxane	SVOCs	PCBs	Metals	Cyanide
N-6	Confirmation Soil Sampling	5	Collect soil samples to satisfy TPCHD UST regulations for this small UST (i.e., one bottom sample beneath the UST, one north sidewall sample, one south sidewall sample, one east sidewall sample, and one west sidewall sample) and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents. Bias sample locations towards worst-case impacts.	1	P[8]	P[8]	X	H	X	X	P[8]						
		TBD	If applicable, collect additional soil samples from piping runs, vapor return lines, dispensers, and/or fill ports (if encountered) to satisfy TPCHD UST regulations and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents.		P[8]	P[8]	X	H	X	X	P[8]						
		TBD	If applicable, collect additional soil sidewall and bottom samples if excavation is expanded beyond original limits.		P[8]	P[8]	X	H	X	X	P[8]						
	Characterize Potential Overburden	TBD	If applicable, collect soil stockpile samples and analyze for analytes identified in Table 12.1 of Ecology guidance (Ecology 2016a) and the additional COIs required by Ecology.	2	X	X	X	H	X	X	X	X	X	X	X	X	X
	Contingent GW Monitoring	TBD	If applicable, utilize existing MWs and/or install and develop new MW(s) to evaluate GW impacts associated with this UST.	3	P[8]	P[8]	X	H	X	X	P[8]						
N-23,24	Confirmation Soil Sampling	8	Collect soil samples to satisfy TPCHD UST regulations for these two USTs (i.e., one bottom sample beneath each UST, one north sidewall sample, one south sidewall sample, two east sidewall samples [near end of each UST], and two west sidewall samples [near end of each UST]) and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents. Bias sample locations towards worst-case impacts.	1	X	X	X	H	X	X	X						
		TBD	If applicable, collect additional soil samples from piping runs, vapor return lines, dispensers, and/or fill ports (if encountered) to satisfy TPCHD UST regulations and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents.		X	X	X	H	X	X	X						
		TBD	If applicable, collect additional soil sidewall and bottom samples if excavation is expanded beyond original limits.		X	X	X	H	X	X	X						
	Characterize Potential Overburden	TBD	If applicable, collect soil stockpile samples and analyze for analytes identified in Table 12.1 of Ecology guidance (Ecology 2016a) and the additional COIs required by Ecology.	2	X	X	X	H	X	X	X	X	X	X	X	X	X
	Contingent GW Monitoring	TBD	If applicable, utilize existing MWs and/or install and develop new MW(s) to evaluate GW impacts associated with this UST.	3	X	X	X	H	X	X	X						
Rectangular UST	Confirmation Soil Sampling	5	Collect soil samples to satisfy TPCHD UST regulations for this small UST (i.e., one bottom sample beneath the UST, one north sidewall sample, one south sidewall sample, one east sidewall sample, and one west sidewall sample) and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents. Bias sample locations towards worst-case impacts.	1	X[8]	X[8]	X[8]	H[8]	X[8]	X[8]	X[8]						
		TBD	If applicable, collect additional soil samples from piping runs, vapor return lines, dispensers, and/or fill ports (if encountered) to satisfy TPCHD UST regulations and analyze samples for applicable MTCA Table 830-1 analytes based on the UST contents.		X[8]	X[8]	X[8]	H[8]	X[8]	X[8]	X[8]						
		TBD	If applicable, collect additional soil sidewall and bottom samples if excavation is expanded beyond original limits.		X[8]	X[8]	X[8]	H[8]	X[8]	X[8]	X[8]						
	Characterize Potential Overburden	TBD	If applicable, collect soil stockpile samples and analyze for analytes identified in Table 12.1 of Ecology guidance (Ecology 2016a) and the additional COIs required by Ecology.	2	X	X	X	H	X	X	X	X	X	X	X	X	X
	Contingent GW Monitoring	TBD	If applicable, utilize existing MWs and/or install and develop new MW(s) to evaluate GW impacts associated with this UST.	3	X[8]	X[8]	X[8]	H[8]	X[8]	X[8]	X[8]						
LNAPL Source	Characterize Potential Overburden	TBD	If applicable, collect soil stockpile samples and analyze for analytes identified in Table 12.1 of Ecology guidance (Ecology 2016a) and the additional COIs required by Ecology.	2	X	X	X	H	X	X	X	X	X	X	X	X	X
	LNAPL Removal Confirmation	TBD	Install and develop a new post-excavation MW (MW-119) at a worst-case TBD location within or adjacent to the IA excavation, and monitor for LNAPL over time in MW-119 to confirm that the IA objective of LNAPL removal is met.	4													
	GW Monitoring	TBD	As necessary, collect GW samples from MW-119 to evaluate GW impacts associated with the LNAPL source area.	3	P[9]	P[9]	X	H	X	X	P[9]						

Notes:

--: not applicable; COIs: constituents of interest; GRO: gasoline range organics; GW: groundwater; H: analytes put on hold for potential future analysis based on other results; HO: heavy oils; IA: interim action; LNAPL: light non-aqueous phase liquid; mg/kg: milligrams per kilogram; MTCA: Model Toxics Control Act; MW: monitoring well; P: analysis pending based on other results; PAHs: polycyclic aromatic hydrocarbons; PCBs: polychlorinated biphenyls; RDI: Remedial Design Investigation; SGC: silica gel cleanup; SVOC: semi-volatile organic compound; TPCHD: Tacoma-Pierce County Health Department; TPH: total petroleum hydrocarbons; UST: underground storage tank; VOCs: volatile organic compounds; X: analytes to be analyzed

A gray X indicates the analyte is a duplicate analysis pursuant to meet another confirmation monitoring objective.

[1] The number and location of soil confirmation samples was based on TPCHD UST regulations (TPCHD 2015). In addition, provisions are included in the investigation design for additional sampling and analysis if the excavations are expanded based on field observations and/or analytical results or associated UST infrastructure (e.g., piping runs, vapor return lines, dispensers, and/or fill ports).

[2] TBD (to be determined) indicates the number of samples will be determined in the field at the time of IA implementation.

[3] The exact location of the excavation sidewall and bottom soil samples will be determined in the field based on the final excavation footprint and field observations (e.g., visual and olfactory observations, PID readings, depth to GW).

[4] The objective of the confirmation sampling, and associated sampling activities required to achieve the objective, are listed below:

#1. Collect confirmation soil samples (e.g., excavation sidewall and bottom samples) to satisfy Chapter 173-360A WAC and TPCHD UST regulations and analyze for applicable MTCA Table 830-1 analytes based on the UST contents.

#2. If potentially clean overburden is encountered in the excavation, segregated, and stockpiled, then collect and analyze soil stockpile samples to evaluate suitability for on-site reuse in accordance with Table 12.1 and 12.2 in Ecology's Guidance for Remediation of Petroleum Contaminated Sites (Ecology 2016a).

#3. If soil screening levels are not achieved in the excavation bottom and sidewall samples and UST-related groundwater contamination is strongly suspected or confirmed (e.g., the UST is located within groundwater and there is evidence of groundwater contamination associated with the UST), then MWs will be installed and developed as necessary and GW samples will be collected from existing and/or new MWs in consultation with TPCHD and Ecology. If necessary, MW installation and development activities may be completed at the same time as supplemental RI activities following the completion of the IA implementation.

#4. Confirm LNAPL has been removed from the LNAPL source area.

[5] The analytes associated with the Metals, Gas Analytes, and Halogenated VOCs categories are listed below:

Metals: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Selenium, and Zinc

Gas Analytes: Benzene, Toluene, Ethylbenzene, Xylenes (Total), Naphthalene, 1,2-Dibromoethane, 1,2-Dichloroethane, Methyl Tertiary-Butyl Ether, and Total Lead

Halogenated VOCs: Tetrachloroethylene, Trichloroethylene, Cis-1,2-Dichloroethylene, Vinyl Chloride, 1,2-Dibromoethane, 1,2-Dichloroethane, Carbon Tetrachloride, Chloroform, Methylene Chloride, 1,1,1-Trichloroethane

[6] Applicable laboratory methods are included in the Quality Assurance Project Plan (PIONEER 2025). The PAHs to be analyzed are benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)fluoranthracene, indeno(1,2,3-cd)pyrene, acenaphthene, acenaphthylene, anthracene, benzo(ghi)perylene, fluoranthene, fluorene, phenanthrene, pyrene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. These PAHs are included within the SVOC analysis.

[7] This analysis will be run if the TPH-D+TPH-HO concentration is greater than 2,000 mg/kg. The purpose of this analysis would be to compare results with previous SGC data.

[8] Analyses pending based on the results of the RDI for the LNAPL Source and UST Removals.

[9] Analyses pending based on February 2025 MW-114 sample results.

Attachment 1

PIONEER TECHNOLOGIES CORPORATION (PTC)
FIELD CHECKLIST

Project/Task Name: _____ Site Location: _____

Requested By / Date: _____ Work Deadline: _____

SERVICES REQUESTED	COMPLETED
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO
_____	☐ YES ☐ NO

ADDITIONAL STANDARD INSTRUCTIONS	COMPLETED		COMPLETED
☐ Review Docs: _____	☐ YES ☐ NO	☐ Health & Safety Meeting	☐ YES ☐ NO
☐ Agency NOI / Utility Locate / Concrete Coring	☐ YES ☐ NO	☐ Call PM from Site	☐ YES ☐ NO
☐ Coordinate Access: _____	☐ YES ☐ NO	☐ Draw Site Map _____	☐ YES ☐ NO
☐ Coordinate Sub / Equip: _____	☐ YES ☐ NO	☐ Cuttings / Purge Water Characterization & Disposal	
☐ Purchase / Rent Equip: _____	☐ YES ☐ NO	☐ Potential HW _____	☐ YES ☐ NO
☐ Client/Agency Coordination: _____	☐ YES ☐ NO	☐ Non-Haz _____	☐ YES ☐ NO
☐ Calibrate Equipment: _____	☐ YES ☐ NO	☐ Background _____	☐ YES ☐ NO

_____

_____

SAMPLING REQUIREMENTS

☐ Field Testing: _____

☐ Lab Testing: _____ Laboratory: _____

☐ Lab Testing: _____ Laboratory: _____

☐ Lab Testing: _____ Laboratory: _____

FIELD SUPPLIES NEEDED

☐ Site Map ☐ Camera ☐ Survey Equip / GPS ☐ Vehicle

☐ Std Field Equip (keys, forms, SAP, HASP, PPE, decon, tools)

☐ Drilling Equip (PID, references, knife, baggies, tape)

☐ Soil Equip (SS bowls, spoon/shovel, hand auger, pick, sieves)

☐ GWM (pump, tubing, gen., compres., bailers, rope/string, PDB)

☐ Pump / Slug Test Equip (GWM Equip, slug, stopwatch)

☐ Water Level Indicator / Interface Probe

☐ Water Quality Meter _____ ☐ Field Test Kits _____

☐ Sample Kit / Cooler / COC / Ice _____

☐ IDW: ☐ Drums _____ ☐ 5-gal buckets _____

☐ Other: _____

☐ Other: _____

PIONEER TECHNOLOGIES CORPORATION (PTC)
DAILY FIELD REPORT

Date:_____ Site Location: _____ Site Arrival Time: _____ Site Departure Time :_____

WEATHER
TEMPERATURE
WIND

Clear Sun	Overcast	Drizzle	Rain	Snow
To 32	32-50	50-70	70-85	85 Up
Calm	Med.	Strong	Severe	

PEOPLE PRESENT ON-SITE

NAME	ASSOCIATION	TIME ON-SITE AND OFF-SITE

NOTES ON WORK COMPLETED

SIGNATURE:_____ DATE:_____

PIONEER TECHNOLOGIES CORPORATION

Project No.: _____
Project Name: _____
Location: _____

Subsurface Sampling Field Log

(applicable for direct-push Geoprobes, hand augers, and test pits)

Drilling Date(s): _____ Client: _____
Drilling Company: _____ Field rep: _____
Sampling Method/Equipment: ____ Geoprobe Rig No. _____ Driller(s): _Casey_____

Sampling Location ID: _____

Soil Collection and Recovery

Sampler No.	Tool Length (ft.)	Actual Advanced Interval (ft. - ft.)	Recovery (in.)
1			
2			
3			
4			
5			
6			

SOIL Analytical Sample(s)

Sample Interval	Basic Soil Type	Time	Weight for Meth (g)	Dup #

PID Screening

Depth (ft.)	Result (ppm)
1	
3	
5	
7	
9	
11	
13	
15	

Soil Profile/Lithology (include thickness of surfacing material)

Interval (ft. - ft.)	Description (draw horizontal line breaks between units!) (Indicate all depths in feet, e.g. instead of 11 inches, write 0.92 ft.) (For fill, qualify the description with the prefix "FILL-")	Symbol (e.g. SP, CL, SM, etc)	Remarks (include specific depth of observation; note staining, odors, etc. in this column)

END OF BORING DEPTH: _____
GROUNDWATER DEPTH DURING DRILLING:_____ AFTER:_____

GROUNDWATER Analytical Sample(s)

Screen Interval (ft. - ft.)	Time	Dup #	Remarks (e.g. odors, sheen, silty, filtered metals/PAHs, etc)

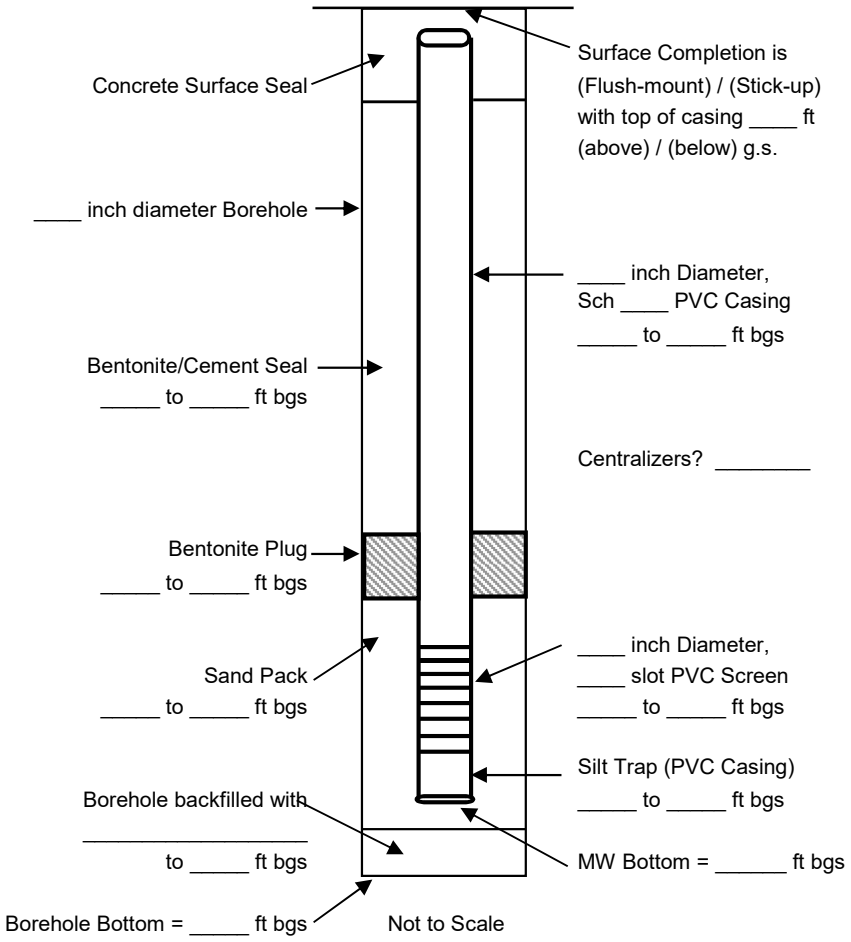
Borehole Backfill:

General Notes: (e.g. notes about location, site conditions, etc):

PIONEER TECHNOLOGIES CORPORATION (PIONEER)
MW INSTALLATION FORM

MW ID _____ Installation Start Date/Time _____ Installation Stop Date/Time _____

CONSTRUCTION DETAILS



MATERIALS USED

_____ Sacks of _____ Sand
_____ Sacks of _____ Cement
_____ Sacks of Bentonite Pellets
_____ Sacks of Powdered Bentonite
_____ Sacks of Grout
_____ Feet of _____ -inch dia PVC Casing
_____ Feet of _____ -inch dia PVC Screen

WELL PROTECTION AND IDENTIFICATION

☐ Well Cap
☐ Locking Steel Cover (Stick-up)
☐ Bollards (Stick-up)
☐ Lock
☐ Agency Well Tag No. _____
☐ Top of Casing Ref Pt. = _____

WELL DEVELOPMENT

	Following Well Construction	Following Well Development
Depth To Water (ft below TOC)		
Total Well Depth (ft below TOC)		

Development Start Date/Time _____ Development Stop Date/Time _____
Development Method _____ Development Water Discharged to _____

Elapsed Time (min)	pH	Flowrate (gpm)	Sp. Cond. (mS/cm)	Turb (NTU)	D.O. (mg/L)	Temp (oC)	Comments on TSS/Color

Total Gallons Removed _____
Additional Remarks

PIONEER TECHNOLOGIES CORPORATION (PIONEER)
GROUNDWATER MONITORING FORM

<u>Stabilization:</u>

SWL < 0.33 ft	Turb ± 10%
pH ± 0.1	DO ± 0.3 mg/L
SC, Temp ± 3%	ORP ± 10 mV

SITE NAME: ________________ **FIELD TECHNICIAN(S):** ________________ **DATE:** ________________

WELL INFO				DTW				PURGING											SAMPLE COLLECTION		PURGE WATER	
										Stabilization												
Well ID	Total Depth (ft)	Screen Interval (ft)	Current Condition (e.g., seal, cover, cap, casing, lock)	Time	Depth to NAPL (ft)	Depth to Water (ft)	NAPL Thick. (ft)	Pump Type	Intake Depth (ft)	Elaps. Time (min)	Flow Rate (L/min)	SWL (ft)	pH	Spec. Cond. (mS/cm)	Turb (NTU)	D.O. (mg/L)	Temp (°C)	ORP (mV)	Time	Field Kit Results / General Comments	Vol (gal)	Disposal / Storage Comments

Attachment 2

Memo

PIONEER TECHNOLOGIES CORPORATION
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com

To: File

From: PIONEER

Date: July 13, 2016

Subject: PIONEER Technologies Corporation Sample Number Schema

All:

The following sample number schema should be used on all PIONEER Technologies Corporation (PTC) projects:

MediaCode-SiteID-DateCode-TopDepth-BotDepth-(PTCTypeCode) – Be sure to use Dashes and Not Underscores

- Media Code = 2 Letter Code for Media Sampled At Location (see Table 1)
- Site ID = 1 to 10 Letter/Number Code for Site ID (with Dash between Site ID and Site ID # (e.g., MW-01)
- DateCode = 6 Number Code for Date (no slashes between monthdayyear)
- TopDepth = Optional but must have 1 decimal point max.
- BotDepth = Optional but must have 1 decimal point max.
- PTCSampTypeCode = Optional (see below)
    - (01) – For Field Duplicate/Replicate #1/Test Case #1
    - (02) – Replicate #2 or Test Case #2
    - (03) – Replicate #3 or Test Case #3
    - (04) – Replicate #4 or Test Case #4
    - (05) – Replicate #5 or Test Case #5
    - (06) – Replicate #6 or Test Case #6
    - (07) – Replicate #7 or Test Case #7
    - (08) – Replicate #8 or Test Case #8
    - (09) – Replicate #9 or Test Case #9
    - (10) – Leachate Sample
    - (20) – Dissolved Sample (i.e., filtered in the field or by the lab)

Note: PTCSampTypeCodes can be combined. For example, a PTCSampTypeCode of "(11)" indicates that the sample is a field duplicate of a leachate sample and a PTCSampTypeCode of "(21)" indicates that the sample is a field duplicate of a dissolved/filtered sample.

Examples:

- EF-EF-01-100112 – No Depth Interval
- EF-EF-01-100112-(01) – No Depth Interval & Field Duplicate Sample of EF-EF01-100112
- GW-MW-01-100112-10.5-20.5 – With Depth Intervals (10.5 to 20.5 feet)

- SO-SS-01-100112-0-0.5 – With Depth Intervals (0 to 0.5 feet)

Note: Examples of leachate and dissolved samples that require field duplicates or replicates:

- SO-SS-01-100112-0-0.5-(11) – Field Duplicate of Leachate sample with depth Intervals (0 to 0.5 feet).
- SO-SS-01-100112-0-0.5-(14) – Replicate #4 of Leachate sample with depth Intervals (0 to 0.5 feet).
- GW-MW-01-100112-10.5-20.5-(21) – Field Duplicate of Dissolved/Filtered groundwater sample with depth intervals (10.5 to 20.5 feet)
- GW-MW-01-100112-10.5-20.5-(23) – Replicate #3 Triplicate of Dissolved/Filtered groundwater sample with depth Intervals (10.5 to 20.5 feet).

Table 1 – PTC Media Codes for Sample Numbers

Media	Media Code for Sample Number	Description
Ambient Air	AA	Ambient Air
Asphalt	AS	Asphalt
Bituminous Coating	BC	Bituminous Coating
Brick	BR	Brick
Concrete	CO	Concrete
Dust	DT	Dust
Equipment Blank	EB	Equipment Blank
Effluent	EF	Effluent
Field Blank	FB	Field Blank
Field Spike	FS	Field Spike Sample
Groundwater	GW	Groundwater
Indoor Air	IA	Indoor Air
Influent	IN	Influent
Midpoint Between IN and EF	MD	Midpoint Between Influent and Effluent Samples
Other Liquid	OL	Non-specified Liquid
Other Solid	OS	Non-specified Solid
Performance Evaluation	PE	Performance Evaluation Sample
Perched Water	PP	Perched Water
Paint	PT	Paint, Paint Chips, Paint Flakes
Pore Water	PW	Sediment Pore Water
Sierra-Crete	SC	Sierra-Crete
Sediment	SD	Sediment
Stack Sample (Emissions)	SE	Stack Sample (Emissions)
Soil Gas	SG	Soil Gas, Soil Vapors, Sub-Slab Soil Gas
Sludge	SL	Sludge
Soil	SO	Soil
Seep Water	SP	Seep Water from Bank Samples
Surfacewater	SW	Surfacewater

Table 1 – PTC Media Codes for Sample Numbers		
Media	**Media Code for Sample Number**	**Description**
Trip Blank	TB	Trip Blank
Tap Water	TW	Tap Water, Drinking Water
Wood	WD	Wood Debris, Wood Waste
Waste Solid	WS	Investigation Derived Waste Solid
Waste Water	WW	Investigation Derived Waste Liquid
Treated Water	XW	Treated Water from Pilot Test, Treatability Study

Sincerely,

Chris Waldron

Appendix F

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Reply to
Attn. of: WCM-127

January 28, 1997

MEMORANDUM

SUBJECT: Oxychem Tacoma Site Listed Waste Determination
EPA I.D. No. WAD009242314

FROM: Catherine Massimino
Senior RCRA/Superfund
Technical Specialist

To: File

This waste characterization review was performed to determine (1) whether the contaminated groundwater plume from the OxyChem Tacoma site contains listed wastes under the Resource Conservation and Recovery Act (RCRA) 40 CFR Part 261 Subpart D-Lists of Hazardous Waste, and (2) whether the lime sludges generated at the OxyChem Tacoma site and disposed at on-site and off-site locations in the Tacoma Flats area are listed waste under RCRA 40 CFR Part 261 Subpart D-Lists of Hazardous Waste. This review did not extend to determining whether these waste streams are characteristic hazardous waste under RCRA 40 CFR Part 261 Subpart C-Characteristics of Hazardous Waste.

This review included an evaluation of the following documents:

1. Background Document Resource Conservation and Recovery Act, Subtitle C - Identification and Listing of Hazardous Waste Sections 261.31 and 261.32 - Listing of Hazardous Waste, U.S. Environmental Protection Agency, Office of Solid Waste, Volume IX, Chlorinated Hydrocarbon Waste From The Purification Step of the Diaphragm Cell Process Using Graphite Anodes in Chlorine Production, pages 64-77. (Attachment A)

2. Background Document Resource Conservation and Recovery Act, Subtitle C - Identification and Listing of Hazardous Waste Sections 261.31 and 261.32 - Listing of Hazardous Waste, U.S. Environmental Protection Agency, Office of Solid Waste, Volume VI, Trichloroethylene and Perchloroethylene Production Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene, pages 475-497. (Attachment B)

3. RCRA Part B Permit Application Volume 1, and Volume 3. excerpts, revised as of 4/87, Volume 1-Tables 2-1 and 3-9, Volume 3-Tacoma Plant Site Report on Continuing Releases (Attachment C) and Appendix A, Tacoma Plant History and Process Description (Attachment D).

4. OSWER Directives 9444.1986(26), 9444.1986(27) (Attachment E).

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5. February 9, 1991 correspondence from Lyle Feller, Technical Assistant-Production, Hooker Electrochemical, to Mr. Frank Monahan, Washington Department of Ecology, concerning characterization of certain wastes disposed off-site by the Hooker Electrochemical Tacoma Plant. (Attachment F)

6. February 21, 1979 memorandum from Dennis F. Stefani, Toxics Engineer, USEPA Region 10 to Lloyd A. Reed, Director, Enforcement Division, USEPA Region 10, concerning Hooker Chemicals and Plastics Corp, Tacoma, Washington. (Attachment G)

7. July 3, 1979 memorandum from Region 10 S&A Inspection Team, to Gary L. O'Neal Director, Surveillance & Analysis Division, USEPA Region 10, concerning Inspection Hooker Plant and Waste Disposal Operations, Tacoma, Washington. (Attachment H)

8. February 26, 1996, PRI Source Identification Program Report, Oxychem submitted to EPA Region 10.

A review of the above documents has identified the following sources of contamination at the OxyChem Tacoma Plant, which are very likely the major sources of organic contamination of groundwater at the OxyChem Tacoma Plant.

A. Process wastes from the trichlorethylene (TCE) process, and;
B. Process wastes from the perchloroethylene (PCE) process.

Based on a review of Documents 3, 5, 6 and 7 (see above), Oxychem Tacoma Plant manufacturing process for TCE was based on calcium carbide reacted with water to form acetylene, and the production of PCE was based on reacting chlorine with TCE (See Attachment D. for a more detailed breakdown of the production processes). The following wastes from the TCE/PCE production processes were sent to the lime ponds on-site, discharged to Hylebos Waterway via Oxychem's discharge permit, disposed by barge (See figure 1 of Attachment D) into Commencement Bay and sent to off-site disposal sites.

TCE Process:
- excess lime from acetylene generator,
- calcium chloride solution from hydrolyzers/strippers, and -
- chlorinated organic residue from the reboiler process

PCE Process:
- calcium chloride solution from the hydrolyzer/stripper, and
- chlorinated organic residue from the reboiler

Chemicals contained in these TCE and PCE production wastes included:

Calcium carbide
Chlorine
Trichloroethylene
Hexachlorobutadiene
1,1,2,2,-Tetrachloroethane
Hexachloroethane
Hexachlorobenzene
Lime
Acetylene
Carbon Tetrachloride
Chloroform
Chlorinated ethanes
Tetrachloroethanes
Tetrachloroethylene
Solvent stabilizers
Pentachloroethane
Calcium chloride
Chlorinated butanes

Some of the major organic contaminants identified in the groundwater at the Oxychem Tacoma plant include:

1, 2-transdichloroethylene
1,1,2,2-tetrachloroethane
carbon tetrachloride
chloroform
vinyl chloride
acetone
hexachloroethane
1,2-dichloroethane
trichloroethylene
tetrachloroethylene
1,1-dichloroethylene
1,1,2-trichloroethane
methylene chloride
hexachlorobutadiene
1,1,-dichloroethane

A review of EPA hazardous waste code listings was performed which identified K030 as a potential waste listing for the Oxychem Tacoma Plant TCE and PCE production wastes. Consequently, a detailed review of the listing K030 was performed. This listing addresses column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene. The listing's manufacturing process produces PCE and TCE by a single-stage oxychlorination process from ethylene dichloride and chlorine. The column bottoms or heavy ends from the manufacturing process covered by this listing typically include ethylene dichloride, perchloroethylene, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, pentachloroethane, hexachlorobutadiene, hexachlorobenzene and hexachloroethane. This listing as promulgated does not cover the process utlilzed by Oxychem Tacoma plant for production of TCE and PCE. The Oxychem Tacoma Plant process, as described above, is not based on co-production and is not based on chlorination or oxychlorination of ethylene chloride. The wastes generated from the Oxychem Tacoma Plant TCE and PCE production processes are not EPA listed hazardous wastes.

The listed wastes managed at the Oxychem Tacoma Plant include K073 and F002 (spent solvent or solvent contaminated soil) and various F and U code listings from laboratory wastes when discarded. A review of Oxychem Tacoma Plant waste management practices based on the above documents indicates that K073 listed wastes were either discharged to Hylebos Waterway via their discharge permit or sent off-site for incineration, and the F002 and laboratory wastes were sent off-site for disposal. There is no documentation that these listed wastes have been spilled on-site and not adequately cleaned up resulting in groundwater contamination. Pursuant to 40 CFR §261.4 Exclusions, industrial discharges that are point source discharges subject to the regulation under section 402 of the Clean Water Act are not solid wastes and are not hazardous waste. Consequently, the K073 hazardous waste listing would not be transferred to the water way or residual removed from the waterway (i.e., sediments, dredge spoils, etc.).

In summary, based on review of the above documents, the contaminated groundwater from Oxychem Tacoma site does not contain EPA listed hazardous waste under 40 CFR Part 261 Subpart D, and the lime sludges generated at the OxyChem Tacoma site and disposed at on-site and off-site locations in the Tacoma Flats are not listed hazardous waste under 40 CFR Part 261 Subpart D.

cc: KSeiler, Ecology w/attachments
A.McGregor, OxyChem w/attachments
A.Hiltner, EPA wo/attachments
K.Keeley, EPA wo/attachments
H.Craig, EPA wo/attachments