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INTERIM ACTION WORK PLAN
700 DEXTER HVOC PLUME
PORTION OF 700 DEXTER SITE
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

Submitted by:
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ACRONYMS AND ABBREVIATIONS

2015 Groundwater Cleanup Report	*Groundwater Cleanup Report, South Lake Union Block 43 Site, Seattle, Washington* dated October 28, 2015, prepared by Farallon
700 Dexter HVOC Plume	a regional plume known to extend as far east as the eastern portion of the Block 37 Property
700 Dexter Property	former dry cleaning facility owned and operated by American Linen Supply Co. (American Linen) at 700 Dexter Avenue North
700 Dexter Site	area where contamination attributable to the former American Linen facility has come to be located
American Linen	American Linen Supply Co.
ARARs	applicable state and federal laws or relevant and appropriate requirements
bgs	below ground surface
Block 25 Property	property at 609 Fairview Avenue North and 630 Boren Avenue North
Block 31 Property	property at 625 Boren Avenue North
Block 37 Property	property at 630 Westlake Avenue North
CFR	Code of Federal Regulations
City Investors	City Investors XI LLC
DCE	dichloroethene
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
Gauging	manual gauging of groundwater level elevations so that the groundwater flow gradient and flow direction may be inferred over time and over distance from pumping wells and to corroborate logging data
gpm	gallons per minute
Groundwater Control Plans	*Groundwater Control Plan, Block 25, Seattle, Washington* and *Groundwater Control Plan, Block 31, Seattle, Washington* dated July 11, 2016, prepared by Middour Consulting LLC
HVOCs	tetrachloroethene and its degradation compounds trichloroethene, isomers of dichloroethene, and vinyl chloride
IAWP	Interim Action Work Plan

Influent	influent of the wastewater treatment system
Interim Action	interim action to be conducted in the South Lake Union area of Seattle, Washington
Lakefront Investors	Lakefront Investors 1 LLC and Lakefront Investors 2 LLC
Logging	automatic recording of water levels with pressure transducers and data loggers so that the groundwater gradient and flow direction may be inferred over time and over distance from pumping wells
msl	mean sea level
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
NPDES	National Pollutant Discharge Elimination System
O&M	observation and maintenance
Observation Wells	monitoring wells FMW-131 and FMW-3D and observation wells OW-6 through OW-8
PCE	tetrachloroethene
Performance Monitoring	compliance monitoring per Section 410 of Chapter 173-340 of the Washington Administrative Code to monitor whether the Interim Action system is achieving the Interim Action objectives
PLPs	potentially liable persons
PVC	polyvinyl chloride
RCW	Revised Code of Washington
Sampling	groundwater and wastewater sampling for halogenated volatile organic compound analysis for evaluation of halogenated volatile organic compound concentrations at specific locations and times
SAP	Sampling and Analysis Plan
SES	SoundEarth Strategies, Inc.
WAC	Washington Administrative Code

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Interim Action Work Plan (IAWP) on behalf of City Investors XI LLC (City Investors), owner of the property at 630 Westlake Avenue North (Block 37 Property), to describe an interim action to be conducted in the South Lake Union area of Seattle, Washington (Interim Action) (Figure 1). Groundwater in the South Lake Union area is impacted by tetrachloroethene (PCE) and its degradation compounds trichloroethene, isomers of dichloroethene (DCE), and vinyl chloride (collectively referred to as HVOCs) released at and migrating from a former dry cleaning facility owned and operated by American Linen Supply Co. (American Linen) at 700 Dexter Avenue North (700 Dexter Property) (Figure 2), currently owned by 700 Dexter, LLC. HVOCs have migrated through groundwater to the northeast, east, and south of the 700 Dexter Property and comprise a regional plume of unknown extent; however, based on empirical data, the regional plume is known to extend as far east as the eastern portion of the Block 37 Property (Figure 2).

This regional plume (700 Dexter HVOC Plume) does not constitute the entire site affected by releases attributable to the former American Linen facility. The area where contamination attributable to the former American Linen facility has come to be located is commonly known as the 700 Dexter Site.[1] The Washington State Department of Ecology (Ecology) has determined that 700 Dexter, LLC and American Linen are potentially liable persons (PLPs) under the Model Toxics Control Act (Chapter 70.105D of the Revised Code of Washington [RCW 70.105D]) for the 700 Dexter Site. Based upon available data, neither 700 Dexter, LLC nor American Linen has, to date, fully characterized the 700 Dexter Site or implemented remedial actions to treat or contain portions of the 700 Dexter HVOC Plume that extend beyond the 700 Dexter Property.

Lakefront Investors 1 LLC and Lakefront Investors 2 LLC (collectively, Lakefront Investors) are planning to redevelop two properties in the South Lake Union area with work scheduled to begin in December 2016. The two properties to be redeveloped are referred to herein as the Block 25 Property (609 Fairview Avenue North and 630 Boren Avenue North) and the Block 31 Property (625 Boren Avenue North), and collectively as the Blocks 25 and 31 Properties (Figure 2). Construction at the Blocks 25 and 31 Properties requires dewatering for a period of up to 10 months scheduled to begin in January 2017. Based on the known eastern limit of the 700 Dexter HVOC Plume at the Block 37 Property, construction dewatering at the Blocks 25 and 31 Properties would result in further eastward migration of contaminated groundwater and an expansion of the lateral extent of the 700 Dexter HVOC Plume into areas that are not currently impacted.

The purpose of this Interim Action is to prevent further migration of the 700 Dexter HVOC Plume and manage contaminated groundwater by extraction and treatment to avoid potential impacts to the down-gradient Block 25 and 31 Properties. An interim action is a remedial action that is

[1] Available documentation regarding conditions known to date pertaining to the 700 Dexter Site and cleanup plans include SoundEarth Strategies, Inc. (SES) reports (SES 2013a, 2013b, 2014, 2015).

necessary to reduce a threat to human health or the environment, corrects a problem that may become substantially worse or cost substantially more to address (Section 430[1] of Chapter 173-340 of the Washington Administrative Code [WAC 173-340-430(1)]), and will not foreclose reasonable alternatives for the cleanup action of the site (WAC 173-340-430[3]). The Interim Action will be conducted in accordance with the Washington State Model Toxics Control Act Cleanup Regulation (MTCA), as established in WAC 173-340 on an independent basis per WAC 173-340-515, Independent Remedial Actions. It is not currently known what involvement Ecology will have with the Interim Action, but City Investors intends to keep Ecology apprised of the interim actions described in this IAWP.

The Interim Action addresses certain directives of Ecology issued to 700 Dexter, LLC provided in a letter regarding American Linen—Work to be Performed dated December 24, 2015, prepared by Ecology (2015). Ecology (2015) identified the following remedial action objectives for the 700 Dexter Site:

i) Protect potential current and future receptors against vapor intrusion;

ii) Protect sediment and surface water in Lake Union;

iii) Protect groundwater as a source of drinking water;

iv) Prevent further migration of the contaminated plume;

v) Manage contaminated groundwater during construction dewatering in the area; and

vi) Ensure impacted properties off the 700 Dexter Property meet applicable cleanup standards within a reasonable restoration time frame.

Ecology (2015) includes not only a mandate to prevent further migration of the 700 Dexter HVOC Plume, but also specifically makes PLPs for the 700 Dexter Site responsible for managing contaminated groundwater during construction projects in the South Lake Union area.

The Interim Action specifically addresses items (iv) and (v) above, which are referred to in this IAWP as Ecology Directives. In the letter regarding American Linen Supply Co. Dexter Avenue Site dated September 28, 2016,[2] City Investors (2016) invited 700 Dexter, LLC and American Linen to develop an interim action to prevent the 700 Dexter HVOC Plume from migrating to the Blocks 25 and 31 Properties. Farallon understands that 700 Dexter, LLC declined to take any

[2] The PLPs for the 700 Dexter Site were notified by City Investors that the 700 Dexter HVOC Plume extends to the Block 37 Property, and that remedial action would be necessary to prevent further plume migration, particularly in light of Lakefront Investors' plans for construction at the Blocks 25 and 31 Properties. City Investors also advised the PLPs that it would proceed with design and implementation of appropriate measures to prevent further migration of the 700 Dexter HVOC Plume and manage contaminated groundwater during construction dewatering at the Blocks 25 and 31 Properties if the PLPs did not come forward with a plan and implementation of the same (Joyce Ziker Parkinson, PLLC 2016).

action because 700 Dexter, LLC was not certain it would be the long-term owner of the 700 Dexter Property. American Linen did not reply to the notice letter. Accordingly, City Investors has developed the Interim Action in compliance and consistent with the Ecology Directives.

The purpose of this IAWP is to provide:

- A description of the Interim Action and how it will meet the criteria identified in WAC 173-340-430(1), (2), and (3);
- A description of existing conditions and a summary of available data related to the Interim Action;
- A description of alternative interim action approaches that were considered and the rationale for selection of the proposed alternative; and
- Information to support the applicable subsections of the design and construction requirements of WAC 173-340-400(4), (6), and (8).

This IAWP includes four additional sections with content summarized below.

- **Section 2: Background**. Section 2 provides background information regarding the South Lake Union area, the 700 Dexter HVOC Plume, hydrogeologic conditions in the South Lake Union area, and planned construction at the Blocks 25 and 31 Properties.
- **Section 3: Interim Action**. Section 3 provides the basis for the Interim Action and lists objectives for the Interim Action. Applicable local, state, and federal laws are identified; two interim action alternatives for addressing the Interim Action objectives are described and evaluated; and one interim action alternative is selected for implementation. The selected interim action alternative, interception of the 700 Dexter HVOC Plume, is described.
- **Section 4: References**. Section 4 lists documents cited in the text of this IAWP.
- **Section 5: Limitations**. Section 5 presents standard Farallon limitations for work products of this nature.

2.0 BACKGROUND

Section 2 presents a summary of physical, environmental, and hydrogeologic conditions relevant or pertaining to the South Lake Union area; describes the 700 Dexter HVOC Plume; and summarizes planned construction at the Blocks 25 and 31 Properties relevant to selection, construction, and operation of an interim action.

2.1 SOUTH LAKE UNION AREA PHYSICAL CONDITIONS

The ground surface to the south of Lake Union is generally flat, lying at an elevation of approximately 30 feet above mean sea level (msl) and sloping gently toward the lake in some areas. The ground surface elevation at the Block 37 Property is about 30 feet above msl and slopes gently upward toward the east and Fairview Avenue North (between approximately 32 and 42 feet above msl on the eastern Block 25 Property boundary) where the ground surface steepens along the base of Capitol Hill. Lake Union has a variable water level elevation of approximately 16 to 17 feet above msl. The South Lake Union area is generally developed with urban commercial buildings, streets, parking areas, and a few landscaped areas. The South Lake Union area is zoned by the City of Seattle as "Seattle Mixed," a zoning designation that provides for a wide range of residential, commercial, and office uses in former industrial areas. Seattle Mixed zoning encourages dense and diverse development with a strong pedestrian orientation.

2.2 SOUTH LAKE UNION AREA ENVIRONMENTAL CONDITIONS

Properties in the South Lake Union area have seen a wide range of commercial and industrial uses since the late 1800s beginning with filling along the shore of Lake Union, which formerly extended further to the west and south of the existing shore line. Various areas were filled with a wide variety of materials, including wood waste and other types of refuse. As would be expected of an area with a long history of waterfront commercial and industrial land uses, a number of properties are listed in Ecology databases, including: Confirmed and Suspected Contaminated Sites List, Confirmed and Suspected Contaminated Sites List—No Further Action, Leaking Underground Storage Tanks, Registered Underground Storage Tanks, Voluntary Cleanup Program, and Independent Cleanup Reports.

In recent years, a number of redevelopment projects have occurred in the South Lake Union area with cleanup of contaminated media occurring during construction. Washington Builders LLC completed redevelopment of the Block 43 Property in 2015 (Figure 2). Shallow soil at the Block 43 Property was affected by releases of petroleum constituents and metals associated with former operations at the Block 43 Property. All impacted soil other than a small area in the northeastern corner of the Block 43 Property has been remediated through excavation and off-site disposal. In-situ treatment of residual petroleum-contaminated shallow soil and groundwater is underway in the northeastern corner of the Block 43 Property. After construction started, HVOCs associated with the 700 Dexter HVOC Plume were encountered in the dewatering system in use at the Block 43 Property (see Section 2.4, 700 Dexter HVOC Plume). Washington Builders LLC immediately implemented a treatment system to prevent HVOCs from being discharged from the dewatering system. The HVOCs present in the Block 43 Property dewatering system were associated with the 700 Dexter HVOC Plume that was later documented to have migrated as far east as the Block 37 Property (see Section 2.4, 700 Dexter HVOC Plume). As indicated in the *Groundwater Cleanup Report, South Lake Union Block 43 Site, Seattle, Washington* dated October 28, 2015, prepared by Farallon (2015) (2015 Groundwater Cleanup Report), there is no evidence for an HVOC source on the Block 43 Property that contributed to the 700 Dexter HVOC Plume.

Environmental cleanup of contamination unrelated to the 700 Dexter Site is planned to occur along with redevelopment of the Blocks 25 and 31 Properties. Cleanups will be conducted independently under MTCA. Shallow soil and groundwater have been affected in limited areas by releases of petroleum constituents and some metals from fill and/or former operations at the Blocks 25 and 31 Properties. There is no evidence of an HVOC source on the Blocks 25 and 31 Properties that could affect conditions in deep groundwater. Following the planned dewatering and the removal and disposal of contaminated soil from the Blocks 25 and 31 Properties during redevelopment, residual contaminant concentrations in groundwater are expected to be remediated by natural attenuation processes.

2.3 SOUTH LAKE UNION AREA HYDROGEOLOGIC CONDITIONS

The Puget Sound region is underlain by Quaternary sediments deposited by a number of glacial episodes. Deposition occurred prior to, during, and following glacial advances and retreats, creating the existing subsurface conditions. The naturally occurring sediments in the South Lake Union area consist primarily of interlayered and/or sequential deposits of alluvial clays, silts, and sands that typically are situated over deposits of glacial till consisting of silty sand to sandy silt with gravel. Outwash sediments consisting of sands, silts, clays, and gravels were deposited by rivers, streams, and glacial lakes during glacial advances and recessions. Advance outwash sediments have been largely over-consolidated by the overriding ice sheets. These advance outwash sediments are overlain by a till-like layer and recessional outwash sediments that are less consolidated (Galster and Laprade 1991).

Figures 3 and 4 show a west-northwest to east-southeast trending hydrogeologic cross-section A-A'' from 9th Avenue North to Terry Avenue North. Appendix A presents boring logs and well completion diagrams used in the cross-sections that were produced by a number of different parties for various subsurface investigations in the South Lake Union area.

Three general stratigraphic units occur in the South Lake Union area:

- The shallowest unit consists of fill material with some recent deposits, including lacustrine sediments comprised of silty sand, sandy silt, and sand with variable gravel content from the surface grade of approximately 30 feet above msl to approximately 10 feet above msl to 0 feet msl (20 to 30 feet below ground surface [bgs]). In some areas, the shallowest unit includes peat and organic silt. According to a U.S. Geological Survey (1909) Seattle Special Quadrangle Map, the original shoreline of Lake Union extended farther south than its present location. The original southern shoreline of Lake Union extended as far south as the current location of Mercer Street. In the late 1800s and the early 1900s, the southern end of Lake Union was filled with sawdust, wood waste generated by lumber mill operations and other fill materials such as cobbles, boulders, slag material, construction debris, and other wastes. A wood waste layer up to 12 feet thick has been observed during drilling at the Block 31 Property and up to 9 feet thick at the Block 25 Property.

- The shallowest unit is underlain by a dense intermediate unit of heterogeneous and anisotropic native glacially consolidated soil comprised of silt, silty sand, and sandy silt with variable gravel content to depths of approximately 20 to 30 feet below msl (50 to 60 feet bgs) and somewhat deeper in some areas. This intermediate unit has been noted to be absent in some parts of the South Lake Union area. Alluvial material deposited during periods of glacial retreat can overlie this intermediate unit in certain areas (e.g., the Block 25 Property).
- A poorly graded dense advance glacial outwash sand with minor silt is encountered below the intermediate unit of glacially consolidated soil at a depth of approximately 30 feet below msl extending to depths greater than 100 feet below msl (130 feet bgs). In some areas where the intermediate glacially consolidated unit is absent, the top of the outwash sand is encountered at shallower depths. The glacial outwash has been noted to be underlain by very dense fine-grained soil during drilling west and northwest of the Block 43 Property.

Three general water-bearing units occur in the South Lake Union area:

- Shallow Water-Bearing Zone. The Shallow Water-bearing Zone is typically encountered at depths of approximately 15 to 20 feet above msl (10 to 15 feet bgs) within the shallowest unit comprised of fill material with some recent deposits. The Shallow Water-Bearing Zone extends to a depth of approximately 10 feet above msl to 0 feet msl (20 to 30 feet bgs). Groundwater levels in the Shallow Water-Bearing Zone fluctuate and have been measured at depths as shallow as approximately 22 feet above msl (approximately 8 feet bgs). In some areas, laterally discontinuous perched groundwater may occur.
- Intermediate Water-Bearing Zone. The Intermediate Water-Bearing Zone is laterally variable and generally present from depths of approximately 10 feet above msl to 30 feet below msl (20 to 60 feet bgs) within the intermediate glacially consolidated soil unit.
- Deep Outwash Aquifer. The Deep Outwash Aquifer is present at depths greater than approximately 30 feet below msl (60 feet bgs) within the dense advance glacial outwash sand.

Based on groundwater levels measured at co-located wells screened in the Shallow Water-Bearing Zone, the Intermediate Water-Bearing Zone, and the Deep Outwash Aquifer (installed for subsurface investigations conducted by others to characterize the 700 Dexter HVOC Plume), and on groundwater levels measured in monitoring wells FMW-3D and FMW-4 adjacent to the Block

31 Property, there is a general downward vertical hydraulic gradient in areas northwest and in the vicinity of the Block 31 Property and Block 43 Property.

The horizontal groundwater flow direction in the Deep Outwash Aquifer has been estimated to be generally easterly under static non-pumping conditions in the vicinity of the Block 43 Property and, although not assessed to the east of the Block 43 Property, generally westerly in the vicinity of the Blocks 25 and 31 Properties. Interpretation of empirical data related to the extent of the 700 Dexter HVOC Plume in the Deep Outwash Aquifer indicates a groundwater "divide" in the Deep Outwash Aquifer beneath the Block 37 Property with components of groundwater flow to the north and Lake Union and to the south toward the Republican Street drain. Groundwater in the Intermediate Water-Bearing Zone flows generally southeasterly in the vicinity of the Blocks 25 and 31 Properties, but is affected by underground structures and construction dewatering systems in the South Lake Union area. Groundwater flow direction is locally affected by Lake Union, recharge to shallow groundwater flowing from Queen Anne and Capitol Hill, the Republican Street Drain, and heterogeneity and anisotropy of water-bearing units.

2.4 700 DEXTER HVOC PLUME

According to the Draft Cleanup Action Plan prepared for the 700 Dexter Site (SES 2015), the 700 Dexter HVOC Plume is present in the Shallow and Intermediate Water-Bearing Zones and in the Deep Outwash Aquifer. The 700 Dexter HVOC Plume appears to have migrated farthest from the former American Linen facility in the Deep Outwash Aquifer. The lateral and vertical extent of the 700 Dexter HVOC Plume, particularly in the Deep Outwash Aquifer, has not been fully characterized; however, empirical data indicate a general estimated eastern extent at the Block 37 Property shown on Figure 2 and in cross-sections shown on Figures 3 and 4. As described in Section 2.3, South Lake Union Area Hydrogeologic Conditions, the groundwater flow direction affecting the lateral extent of the 700 Dexter HVOC Plume in the Deep Outwash Aquifer west of the Block 37 Property under static (non-pumping) conditions is generally toward the east, and a groundwater divide beneath the eastern portion of the Block 37 Property with components of flow to the north and to the south.

The 700 Dexter HVOC Plume has affected a number of properties in the South Lake Union area. One affected property is the Block 43 Property located approximately two blocks, or approximately 400 feet, west of the Blocks 25 and 31 Properties. Construction dewatering at the Block 43 Property in 2013 and 2014 extracted groundwater impacted by the 700 Dexter HVOC Plume. The construction dewatering and the Block 43 Property impacts from the 700 Dexter HVOC Plume are summarized in the 2015 Groundwater Cleanup Report. As described in the 2015 Groundwater Cleanup Report, there is no evidence that the source of HVOCs encountered during construction dewatering at the Block 43 Property during redevelopment was located at the Block 43 Property. Also as described in the 2015 Groundwater Cleanup Report, SES collected a groundwater sample from monitoring well MW-128, located approximately 80 feet northeast of the Block 43 Property in the right-of-way on the western side of the Block 37 Property. Monitoring well MW-128 is screened at depths ranging from approximately 32 to 42 feet below msl (60 to 70 feet bgs) at the top of the Deep Outwash Aquifer. Cis-1,2-DCE and vinyl chloride were detected at concentrations of 960 and 290 micrograms per liter (µg/l), respectively, in a groundwater sample collected from monitoring well MW-128 on January 13, 2014, approximately 8 weeks after construction dewatering at Block 43 Property began. These concentrations substantially exceed the MTCA cleanup levels of 16 µg/l (Method B) and 0.2 µg/l (Method A) for cis-1,2-DCE and vinyl chloride, respectively, as selected in the Draft Cleanup Action Plan prepared for the 700 Dexter Site (SES 2015). These data confirm that HVOCs associated with the 700 Dexter HVOC Plume migrated beneath, north of, and east of the Block 43 Property prior to the initiation of construction dewatering at the Block 43 Property.

Results of subsequent work at the Block 37 Property and Block 31 Property indicate that the eastern extent of this portion of the 700 Dexter HVOC Plume likely terminates in the eastern portion of the Block 37 Property, approximately 150 feet west of the western boundary of the Block 31 Property and between monitoring wells FMW-131 on the south-central portion of the Block 37 Property and FMW-3D near the western edge of the Block 31 Property. Figure 2 shows the current estimated eastern extent of the 700 Dexter HVOC Plume on the Block 37 Property. Figure 4 shows the current estimated eastern extent of the 700 Dexter HVOC Plume on the Block 37 Property in cross-section.

Prior to installing monitoring well FMW-131, a test boring was advanced at nearly the same location to a depth of approximately 73 feet below msl (approximately 102.5 feet bgs) on August 25, 2016. One soil sample was collected from a depth of 51.5 feet bgs near the top of the Deep Outwash Aquifer. Six reconnaissance groundwater samples were collected from depths of 52.5, 62.5, 72.5, 82.5, 92.5, and 102.5 feet bgs. Monitoring well FMW-131 was installed on August 30, 2016 with a screen interval between depths of approximately 34 to 44 feet below msl (63 and 73 feet bgs) in the Deep Outwash Aquifer. A groundwater sample was collected from monitoring well FMW-131 on September 2, 2016. Results of analytical testing of soil and groundwater samples collected from the test boring and from monitoring well FMW-131 are summarized below:

- HVOCs were not detected at concentrations exceeding laboratory practical quantitation limits in the soil sample collected from the test boring at a depth of 51.5 feet bgs;
- cis-1,2-DCE and vinyl chloride were detected in reconnaissance groundwater samples collected from the test boring at depths of 52.5 to 82.5 bgs, with the highest concentrations exceeding applicable MTCA Method B and Method A cleanup levels detected in samples collected from between 62.5 and 82.5 feet bgs.
- cis-1,2-DCE and vinyl chloride were detected at concentrations of 41 and 1.7 µg/l, respectively, in the groundwater sample collected from monitoring well FMW-131, exceeding their respective MTCA Method B and A cleanup levels.

Appendix B contains monitoring well FMW-131 construction details, tabulated analytical results from testing soil and groundwater samples, and analytical laboratory reporting.

Monitoring well FMW-3D was installed west of the Block 31 Property on March 8, 2016 with a screen interval between depths of approximately 30 to 40 feet below msl (59 to 69 feet bgs) in the Deep Outwash Aquifer. Groundwater from monitoring well FMW-3D was sampled on March 10, 2016. HVOCs were not detected at concentrations exceeding laboratory practical quantitation limits in the groundwater sample collected from monitoring well FMW-3D, demonstrating that the 700 Dexter HVOC Plume does not extend as far east as the Block 31 Property. Monitoring well FMW-3D was installed as part of a remedial investigation conducted at the Block 31 Property and will be described in a remedial investigation report for the Block 31 Property.

2.5 PLANNED CONSTRUCTION AT BLOCKS 25 AND 31 PROPERTIES

Construction at the Blocks 25 and 31 Properties will include three multi-story buildings with below-grade parking—one structure will be constructed on the Block 31 Property and two structures will be constructed on the Block 25 Property. Excavation is planned to approximately 7.0 feet above msl on the eastern portion of the Block 25 Property, to depths between approximately 3.5 and 6.2 feet above msl (between approximately 26 to 37 feet bgs) on the western portion of the Block 25 Property, and to a depth of approximately 4 feet above msl (between approximately 24 to 32 feet bgs) on the Block 31 Property. Deeper excavation will occur beneath elevator cores. Construction is planned to begin in December 2016 with demolition of existing structures and installation of solider pile shoring for excavation, including lagging with tie-backs. Excavations are planned to the property lines and environmental cleanup activities will be conducted for petroleum- and metals-contaminated soil as part of the excavation work (see Section 2.2, South Lake Union Area Environmental Conditions). Construction dewatering will commence at least 2 weeks prior to excavation below static groundwater level (approximately 17 feet above msl) and is scheduled to begin in January 2017.

Excavation will occur to about 14 feet below the groundwater table under static conditions; therefore, construction dewatering will be required to reduce groundwater levels to approximately 2 feet below excavation depth and until sufficient structural weight of the building is in place to counteract the buoyancy force, assumed to be a period of approximately 10 months. Planned construction dewatering is described in two reports: 1) *Groundwater Control Plan, Block 25, Seattle, Washington* dated July 11, 2016, prepared by Middour Consulting LLC (2016a); and 2) *Groundwater Control Plan, Block 31, Seattle, Washington* dated July 11, 2016, prepared by Middour Consulting LLC (2016b). These two reports for the Blocks 25 and 31 Properties are collectively referred to herein as the Groundwater Control Plans.

The Groundwater Control Plans provide design basis and information for a dewatering system for construction at the Blocks 25 and 31 Properties that is comprised of 24 dewatering wells installed around the perimeter of the Blocks 25 and 31 Properties. Each dewatering well will be constructed of 12-inch-diameter polyvinyl chloride (PVC), constructed in 30- to 36-inch-diameter bore holes, with 40-foot-long 30-slot sized screens set at an approximate depth of 25 feet below msl. Each dewatering well will be capable of extracting up to 100 gallons per minute (gpm). The construction dewatering wells for the Blocks 25 and 31 Properties will be operated concurrently and as a single system to achieve the necessary groundwater drawdown with groundwater elevations at least 2 feet below construction subgrade. It is estimated that the construction dewatering system will generate approximately 750 gpm after approximately 2 weeks of operation and 580 gpm after approximately 1 month of operation.

According to the Groundwater Control Plans, total groundwater level drawdown will be to a depth of approximately 4 feet below msl (approximately 34 feet bgs) at the Block 31 Property and will depress static groundwater level elevations for some radial distance from the dewatering system. The drawdown “cone” around each dewatering well will likely expand as pumping continues and until steady state is achieved with a maximum radius of influence difficult to estimate as the drawdown cone expands into varying aquifer conditions. The construction pumping is expected to affect groundwater flow gradients over an extended area around the Blocks 25 and 31 Properties. Groundwater will be extracted into a main header and conveyance piping, and will be treated for discharge to a private conveyance system with an outfall at the southern end of Lake Union and per a National Pollutant Discharge Elimination System (NPDES) permit.

3.0 INTERIM ACTION

This section provides the basis for conducting an interim action; identifies interim action objectives; summarizes applicable local, state, and federal laws pertaining to the alternative interim actions; develops, evaluates, and selects an interim action alternative; and describes general design, construction, operation, and monitoring of the selected Interim Action.

3.1 BASIS FOR INTERIM ACTION

Empirical groundwater data indicate that the eastern-most extent of the 700 Dexter HVOC Plume in the Deep Outwash Aquifer is beneath the eastern portion of the Block 37 Property and has not migrated as far as the Block 31 Property.

The Groundwater Control Plans for construction dewatering at the Blocks 25 and 31 Properties specify a total of 24 dewatering wells, including 5 dewatering wells on the western Block 31 Property boundary within approximately 150 feet of the inferred eastern extent of the 700 Dexter HVOC Plume at the Block 37 Property. Per the Groundwater Control Plans, the total extraction rate for the construction dewatering system is up to 750 gpm initially and a Block 31 Property maximum drawdown of up to approximately 22 feet. Middour Consulting LLC (2016a) includes a groundwater drawdown profile calculated using the Theis non-equilibrium equation for the dewatering well system after 2 weeks of pumping. Based on the calculated 2-week groundwater drawdown profile, drawdown at the western Block 31 Property boundary will be approximately 17 feet. Assuming that hydrogeologic conditions estimated for the Blocks 25 and 31 Properties in the construction dewatering system design approximate hydrogeologic conditions to the west, drawdown effects may extend more than 1,000 feet west of the western Block 31 Property boundary with a drawdown of up to approximately 12 feet in the area of the estimated eastern extent of the 700 Dexter HVOC Plume. Based on the calculated 2-week groundwater drawdown profile for the Blocks 25 and 31 Properties, construction dewatering at the Blocks 25 and 31 Properties will create a significant area of groundwater drawdown for up to about 10 months with a capture zone that will draw the 700 Dexter HVOC Plume eastward and into the construction dewatering system absent implementation of migration control measures.

To control migration of the 700 Dexter HVOC Plume and reduce the likelihood that HVOC-contaminated groundwater will be drawn into the Blocks 25 and 31 Properties construction dewatering system, and in compliance with Ecology Directives, City Investors will implement the Interim Action described in this IAWP.

3.2 INTERIM ACTION OBJECTIVES

The specific objectives for the Interim Action are the following:

- To the extent practicable, prevent further eastern migration of the 700 Dexter HVOC Plume located at and under the Block 37 Property; and

- Manage HVOC-contaminated groundwater by extraction and treatment to avoid potential impacts to the down-gradient (under pumping conditions) Blocks 25 and 31 Properties.

Implementation of the Interim Action will also have a beneficial impact by reducing the mass of HVOCs in groundwater in the vicinity of the Block 37 Property by pumping and treating groundwater, although it is not intended to serve as a final remedy for the 700 Dexter Site. The cleanup action to be implemented for the 700 Dexter Site is not known, and the Interim Action is designed so as to not foreclose reasonable alternatives for cleanup of the 700 Dexter Site per WAC 173-340-430(3)(b). Farallon understands that the PLPs for the 700 Dexter Site currently are conducting remedial investigation and feasibility study work to evaluate the best approach for cleanup of the 700 Dexter Site.

3.3 APPLICABLE LOCAL, STATE AND FEDERAL LAWS

Pursuant to WAC 173-340-710 (Applicable Local, State, and Federal Laws), all remedial actions conducted by City Investors will comply with applicable state and federal laws. Other relevant and appropriate requirements are to be considered for addressing problems or situations sufficiently similar to those encountered that their use is well suited.

This section describes the regulatory considerations applicable to the alternative interim actions, including applicable state and federal laws or relevant and appropriate requirements (ARARs).

The following ARARs are anticipated to be the applicable requirements for an interim action and encompass applicable and relevant regulatory guidelines, cleanup standards, waste disposal criteria, and documentation standards:

- Model Toxics Control Act (RCW 70.105D);
- MTCA (WAC 173-340);
- Water Quality Standards for Groundwaters of the State of Washington (WAC 173-200);
- Hazardous Waste Management Act (RCW 70.105);
- Washington State Solid Waste Management Laws and Regulations (RCW 70.95, WAC 173-351, and WAC 173-304);
- Dangerous Waste Regulations (WAC 173-303);
- Accreditation of Environmental Laboratories (WAC 173-50);
- Occupational Safety and Health Act (Part 1910 of Title 29 of the Code of Federal Regulations [29 CFR 1910] and WAC 296-62);
- State Environmental Policy Act Checklist (RCW 43.21);
- State NPDES Program (WAC 173-220);
- State Waste Discharge General Permit Program (WAC 173-226);

- Maximum Contaminant Levels, National Primary Drinking Water Regulations (WAC 246-290-310 and 46 CFR 141);
- Safety Standards for Construction Work (WAC 296-155);
- Minimum Standards for Construction and Maintenance of Wells (WAC 173-160); and
- Applicable local permits and ordinances indicated by the City of Seattle Municipal Code.

Ecology Directives related to the 700 Dexter HVOC Plume listed in Section 1, Introduction, while not considered an ARAR, will be considered.

As noted previously, the Interim Action will be undertaken pursuant to the provisions of MTCA, the overarching regulation governing the Interim Action. The Interim Action is designed to comply with ARARs.

3.4 INTERIM ACTION ALTERNATIVES

The MTCA provisions pertaining to interim actions (WAC 173-340-430) require identification and evaluation of alternatives, though not at the detailed level of analyses conducted in support of final cleanup actions. Numerous potential cleanup technologies (e.g., in-situ chemical oxidation, enhanced bioremediation, physical containment) were identified and briefly evaluated to assess whether they were capable of meeting the Interim Action objectives identified in Section 3.2. Most of these alternatives were determined to have substantive technical constraints, implementability issues, or disproportionate costs and were eliminated from further consideration. Given that construction at the Blocks 25 and 31 Properties is scheduled to begin in December 2016, only one feasible interim action alternative was identified that would satisfy the Interim Action objectives. A brief description of this interim action alternative and a no action alternative are presented below.

3.4.1 Alternative 1—No Action

A no action alternative typically is included in the evaluation of cleanup alternatives to provide a basis for comparing the effectiveness of other alternatives. Inclusion of this alternative helps to ensure that the consequences of taking no action are fully understood. Alternative 1 assumes that construction dewatering at the Blocks 25 and 31 Properties would occur without mitigating its effects on the 700 Dexter HVOC Plume and would result in HVOCs being drawn into the construction dewatering system.

3.4.2 Alternative 2—Interception of 700 Dexter HVOC Plume

Alternative 2 is comprised of a network of interception wells on the Block 37 Property situated and designed so as to achieve the Interim Action objectives described in Section 3.2. Alternative 2 assumes a network of four interception wells equally spaced in a north-south line on the western third of the Block 37 Property. The interception wells would be placed to the west of the estimated eastern extent of the 700 Dexter HVOC Plume so as to not draw HVOCs into areas not yet impacted by the 700 Dexter HVOC Plume. The interception wells would have the capacity to pump up to 80 gpm each, and extracted groundwater would be treated prior to discharge to the private conveyance system and eventually to an outfall on the southern end of Lake Union per an existing NPDES permit. Alternative 2 includes monitoring the performance of the Interim Action.

3.5 INTERIM ACTION ALTERNATIVE EVALUATION AND SELECTION

MTCA (WAC 173-340-360[2][a]) stipulates that the following threshold criteria be met when selecting a cleanup alternative, and this framework was used in evaluating the alternatives for this Interim Action:

- Protection of human health and the environment;
- Compliance with cleanup standards (WAC 173-340-700 through -760);
- Compliance with other ARARs; and
- Performance of compliance monitoring.

Alternative 1 (No Action) will not achieve compliance with cleanup standards; will not mitigate migration of the 700 Dexter HVOC Plume; does not limit the transport of contaminants toward the Blocks 25 and 31 Properties construction dewatering system or to surface water via groundwater; does not limit direct contact exposure by humans to impacted groundwater or to dewatering wastewater generated by construction dewatering at the Blocks 25 and 31 Properties or other construction projects underway in the area in the future; and does not satisfy the Ecology Directives. Under Alternative 1, no action will be taken to achieve ARARs such as the Water Quality Standards for Groundwaters of the State of Washington or Maximum Containment Levels, National Primary Drinking Water Regulations. Alternative 1 will not achieve the objectives specified for the Interim Action and does not achieve MTCA threshold criteria. Alternative 1 is therefore not suitable for use as an interim action.

Alternative 2 (Interception of the 700 Dexter HVOC Plume) would provide protection of human health and the environment by limiting potential exposure via the direct contact exposure by humans to impacted groundwater and reducing the likelihood that HVOCs would be transported to surface water via groundwater. By intercepting HVOC-contaminated groundwater west of the Blocks 25 and 31 Properties, potential exposure of construction workers to dewatering wastewater will be reduced and the total mass of HVOCs in the distal (eastern) end of the 700 Dexter HVOC Plume will be significantly reduced.

Alternative 2 will satisfy Ecology Directives by drawing groundwater toward the interception well network and likely limiting some migration toward Lake Union, reducing HVOC concentrations in the 700 Dexter HVOC Plume, and preventing further migration of the contaminant plume toward the east during operation of the Blocks 25 and 31 Properties construction dewatering system. Alternative 2 will avoid the need to manage contaminated groundwater during construction dewatering at the Blocks 25 and 31 Properties and will contribute to cleanup of the 700 Dexter Site by reducing contaminant mass in groundwater. Groundwater extracted in the

Alternative 2 interception system will be treated to achieve NPDES permit criteria prior to discharge to a private conveyance system discharging to Lake Union. While Alternative 2 will not necessarily achieve MTCA groundwater cleanup standards or other chemical-specific ARARs during the time period when the Interim Action is operational, it will achieve objectives specified for the Interim Action, will not foreclose reasonable alternatives for cleanup of the 700 Dexter Site, and will include monitoring of the performance of the Interim Action. Additionally, the interception wells to be installed as part of the Interim Action are not temporary wells and could be operated by other properties conducting remedial actions subsequent to dewatering activities at the Blocks 25 and 31 Properties (see Section 3.6.1, Interim Action Design Criteria).

Alternative 2 is consistent with the MTCA threshold criteria and is selected as the Interim Action.

3.6 INTERIM ACTION DESCRIPTION

This section describes the Interim Action. Figure 5 shows components of the Interim Action in plan view. Appendix C contains Interim Action design documentation. Appendix D contains the Interim Action Sampling and Analysis Plan (SAP) to support performance monitoring procedures to be conducted during implementation of the Interim Action (see Section 3.6.3, Interim Action Construction, Operation, and Monitoring).

3.6.1 Interim Action Design Criteria

The Interim Action is designed to intercept the 700 Dexter HVOC Plume to satisfy objectives of the Interim Action listed in Section 3.2, Interim Action Objectives, to the extent practicable. Subsurface conditions were evaluated by hydrogeologists and engineers familiar with other dewatering projects in the South Lake Union area to position the Interim Action interception well network where pumping would not cause further migration of the 700 Dexter HVOC Plume beyond the Block 37 Property and to protect the construction dewatering system at the Blocks 25 and 31 Properties from encroachment of the 700 Dexter HVOC Plume. The Interim Action interception wells were designed to enable sufficient pumping capacity from an appropriate depth interval to satisfy the Interim Action objectives.

Specific design criteria for the Interim Action were identified as:

1. Number and Positions of Interception Wells. Four interception wells will be installed as approximately shown on Figure 5.
2. Screen Interval. Each interception well will be screened from depths of 2 to 62 feet below msl.
3. Initial Pumping Rate. Inception wells will have the capacity to pump 40 gpm per inception well (but potentially higher at start-up and potentially lower with steady-state operation).
4. Well Construction. Interception wells will be constructed as “resource protection wells” (remediation wells) per WAC 173-160, Minimum Standards for Construction and Maintenance of Wells, with a design life of at least 3 years.

5. Wastewater Treatment. Groundwater extracted from the interception wells will be conveyed via a header pipe to a wastewater treatment system designed and operated so as to comply with the NPDES permit effluent requirements for the Blocks 25 and 31 Properties construction project.

3.6.2 Interim Action Components

The Interim Action system will be comprised of the following primary components: interception well network; conveyance piping and requisite sampling ports, valving, and instrumentation; wastewater treatment system; and observation wells. The Interim Action system will be designed for continuous operation for up to 10 months.

Interception wells will be installed in 12-inch minimum diameter borings advanced to depths of approximately 62 feet below msl (approximately 92 feet bgs) by a drilling contractor licensed in the State of Washington. Each of the four interception wells will be constructed of 6-inch-minimum-diameter PVC with 60 feet of machine slotted well screen of 30-slot size set at depths between 2 and 62 feet below msl. Sand pack will consist of a gradation similar to or in between a 16x30 or 12x20 sand installed in the boring annulus surrounding the well screen and a minimum of 2 feet above the well screen. A minimum 18-foot cement-bentonite seal will be placed between the ground surface and cement-bentonite grout or bentonite pellets/chips tremied to the top of the sand pack. Interception wells will be completed above or below grade and connected to an 8-inch minimum diameter PVC or high-density polyethylene header pipe to convey extracted groundwater to a wastewater treatment system.

Each interception well will be developed by the drilling contractor using surging and purging techniques to maximize well efficiency and connectivity with groundwater-bearing strata. Each interception well will be fitted with a sampling port and flow control valving. Pressure transducers with data loggers to monitor groundwater levels during operation of the Interim Action system will be installed in select monitoring wells. A submersible pump capable of pumping up to 80 gpm under a head of 70 feet will be installed at the base of the well screen. A 2-inch-diameter PVC discharge riser pipe will convey extracted groundwater to the header pipe. Achievable drawdown in each of the interception wells will be evaluated during start-up.

Extracted groundwater will be treated with a wastewater treatment system comprised of the following equipment connected in series: detention tank with air sparge, sand filter, and granular activated carbon filter. Some components of the wastewater treatment system may be constructed with redundancy in parallel to facilitate maintenance or additional capacity, if needed. The wastewater treatment system will be designed for a capacity of 300 gpm and will be scalable for higher or lower flows. Sampling ports will be installed for sampling, at minimum, influent and treated effluent and the system will include requisite pumps, valving, meters, and instrumentation. Treated effluent will be discharged to a private conveyance system and eventually an outfall on the southern end of Lake Union per an existing NPDES permit.

Aquifer response to pumping of the Interim Action interception wells will be measured with pressure transducers installed in non-pumping observation wells to measure groundwater level elevations. Observation wells will include selected existing monitoring wells and observation wells installed as part of the Blocks 25 and 31 Properties construction dewatering system.

3.6.3 Interim Action Construction, Operation, and Monitoring

Construction of the Interim Action system is tentatively scheduled to be complete by early December 2016. Start-up of the Interim Action system is planned to occur approximately 1 month prior to start-up of the Blocks 25 and 31 Properties construction dewatering system, which currently is scheduled for early 2017. Pumping associated with the Interim Action system and the construction dewatering system is estimated to occur uninterrupted until late October 2017. Shut-down of the Interim Action system will occur 2 weeks after shut-down of the construction dewatering system.

Compliance monitoring per WAC 173-340-410 will monitor whether the Interim Action system is achieving the Interim Action objectives described in Section 3.2, Interim Action Objectives (Performance Monitoring). Data collected during Performance Monitoring will be used to assess the effectiveness of the Interim Action system.

Performance Monitoring of the response of the 700 Dexter HVOC Plume to groundwater pumping associated with the Interim Action system and construction dewatering includes:

1. Automatic recording of water levels with pressure transducers and data loggers so that the groundwater gradient and flow direction may be inferred over time and over distance from pumping wells (Logging).
2. Manual gauging of groundwater level elevations so that the groundwater flow gradient and flow direction may be inferred over time and over distance from pumping wells and to corroborate Logging data (Gauging).
3. Groundwater and wastewater sampling for HVOC analysis for evaluation of HVOC concentrations at specific locations and times (Sampling). Sampling applies only to monitoring wells FMW-131 and FMW-3D and to influent of the wastewater treatment system (Influent). Monitoring wells FMW-131 and FMW-3D will be sampled using low-flow sampling techniques and Influent samples will be collected from a sampling port and directly into sample vials.

Results of Performance Monitoring will be supplemented by results of operation and maintenance (O&M) monitoring to be conducted by operators of the wastewater treatment system for the Interim Action and for construction dewatering per separate O&M plans. Sampling for NPDES permit compliance or compliance with other discharge authorizations will likewise be conducted by others.

Field procedures and sampling and analysis protocols associated with Performance Monitoring are presented in Appendix D, SAP. The purpose of the SAP is to provide protocols and quality assurance/quality control procedures associated with Performance Monitoring. The SAP also includes a Health and Safety Plan for use by Farallon personnel during Performance Monitoring.

Performance Monitoring will be conducted at the following locations (Figure 5):

- Four Interim Action interception wells: IA-1 through IA-4;
- Five wells: monitoring wells FMW-131 and FMW-3D, and observation wells OW-6 through OW-8 (collectively, Observation Wells); and
- Sampling port upstream of the wastewater treatment system (Influent).

Performance Monitoring will be conducted in three general phases as described below.

Start-Up Phase Monitoring

Start-up will occur during three time periods as described below. Proposed frequency of start-up phase Performance Monitoring is indicated below. Details of start-up phase Performance Monitoring are subject to refinement as project planning is completed and per the judgement of the supervising environmental professional.

Part 1 Start-Up

Within 1 month of start-up, Logging will commence with a recording interval of one reading every 6 hours, and up to two Gauging events will be conducted in Interim Action interception wells and in Observation Wells.

Part 1 start-up includes pumping Interim Action interception well IA-2 for a period of up to 48 hours with the objective to evaluate sustainable yield and drawdown for Interim Action interception wells and to confirm pump and wastewater treatment system capacities. Start-up also provides an opportunity to do a shake-down test of the wastewater treatment system to assure equipment operates correctly and per specifications. Logging and Gauging will occur in select Interim Action interception wells and in the Observation Wells.

Part 2 Start-Up

Full-scale start-up of the Interim Action system will commence after adjustments to the Interim Action system are made based on results of Part 1 start-up. Part 2 start-up is planned for up to a 1-month period prior to commencement of construction dewatering at the Blocks 25 and 31 Properties. Proposed frequency of Part 2 start-up Performance Monitoring is indicated below:

- Logging—Select Interim Action interception wells: once per second for the first 10 minutes of pumping, once per minute through the first hour, once every 10 minutes through the first 12 hours, once per hour through the first week, and once every 4 hours through the first month until Part 3 start-up;
- Logging—Observation Wells: once every 2 minutes for the first 48 hours, once every 4 hours through the first month, and until Part 3 start-up;

- Gauging—Interim Action interception wells: once per hour through the first 4 hours, once per day through the first 2 days, once per week through the first month, and until Part 3 start-up;
- Gauging—Observation Wells: once per week through the first month, and until Part 3 start-up; and
- Sampling—one sample during the first hour, on sample weekly, and one sample during the last hour of Part 2 start-up from Influent.

Part 3 Start-Up

Part 3 start-up assumes combined operation of the Interim Action system and the Blocks 25 and 31 Properties construction dewatering system for a duration of up to 1 month. Proposed frequency of monitoring is indicated below:

- Logging—Select Interim Action interception wells and Observation Wells: once per hour for the first week and once every 4 hours through the first month;
- Gauging—Interim Action interception wells and Observation Wells: once per week through the first month; and
- Sampling—one sample during the first hour and one sample weekly thereafter for the duration of Part 3 start-up from Influent.

Operational Phase Monitoring

Start-up will be considered complete following the first month of the combined operation of the Interim Action system and the Blocks 25 and 31 Properties construction dewatering system. Details of operational phase monitoring are subject to refinement as project planning is completed and per the judgment of the supervising environmental professional. Proposed frequency of operational phase monitoring is indicated below:

- Logging—Select Interim Action interception wells and Observation Wells: twice per day for the duration of the operational phase;
- Gauging—Interim Action interception wells and Observation Wells: twice per month through the first 2 months of the operational phase and monthly thereafter for the duration of the operational phase; and
- Sampling—one sample every other week for the duration of the operational phase from Influent.

Shut-Down Phase Monitoring

Shut-down monitoring will occur for 2 weeks following shut-down of the Interim Action system, which will occur 2 weeks following shut-down of the Blocks 25 and 31 Properties construction dewatering system. Details of shut-down phase monitoring are subject to refinement as project planning is completed and per the judgment of the supervising environmental professional. Proposed frequency of shut-down monitoring is indicated below:

- Logging—Select Interim Action interception wells and Observation Wells: twice per day through the duration of shut-down phase monitoring;
- Gauging—Interim Action interception wells and Observation Wells: once per week for the duration of shut-down phase monitoring; and
- Sampling—one sample from Influent within 1 hour prior to shut-down of the Interim Action system, and one sample from monitoring wells FMW-131 and FMW-3D within 2 hours after shut-down of the Interim Action system.

3.6.4 Interim Action Completion Report

An Interim Action Completion Report will be prepared per WAC 173-340-400(6) to document the Interim Action. The Interim Action Completion Report will include the following:

- Description of the Interim Action;
- Summary of the basis for design of the Interim Action;
- Design documentation of the Interim Action;
- As-built documentation of the Interim Action;
- Presentation and evaluation of data collected during the Interim Action; and
- Assessment of the Interim Action in achieving the Interim Action objectives, to the extent practicable.

3.6.5 Waste Management and Disposal

Construction of the Interim Action system will generate soil wastes when the Interim Action well network and conveyance system is installed. This soil will be evaluated for potential contamination. Potentially contaminated soil will be contained and characterized for appropriate off-site disposal according to requirements of the receiving disposal facility. Wastewater will be treated using the Interim Action wastewater treatment system.

4.0 REFERENCES

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5.0 LIMITATIONS

5.1 GENERAL LIMITATIONS

The conclusions contained in this work plan are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- **Accuracy of Information.** Farallon obtained, reviewed, and evaluated certain information used in this work plan from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy or authenticity. Should the information upon which Farallon relied prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.

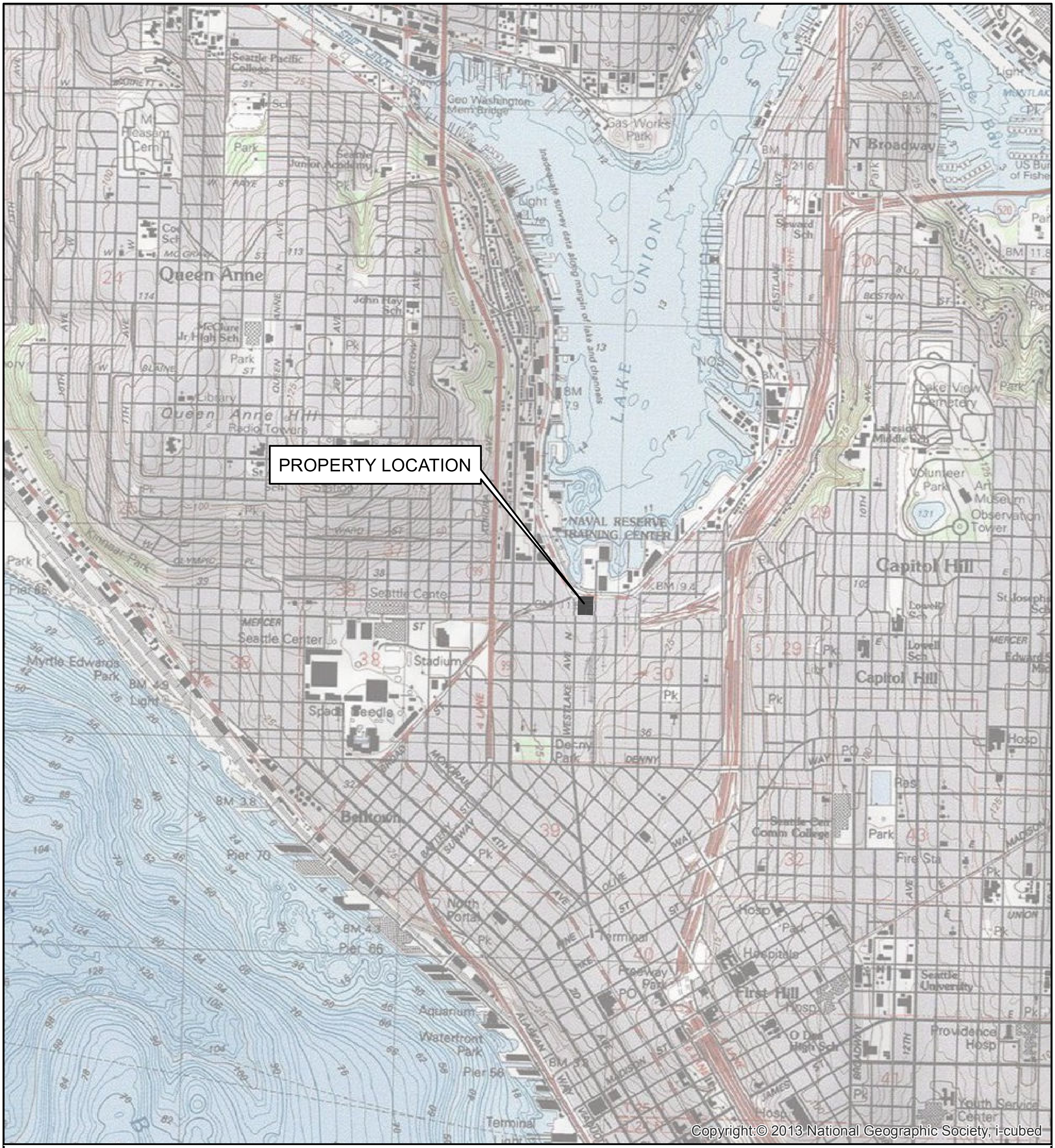
For the foregoing reasons, Farallon cannot and does not warrant or guarantee that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions can be considered valid only as of the date of the report hereof.

This work plan has been prepared in accordance with the contract for services between Farallon and City Investors, and currently accepted industry standards. No other warranties, representations, or certifications are made. Any use, interpretation, or reliance upon this work plan by anyone other than City Investors is at the sole risk of that party, and Farallon will have no liability for such unauthorized use, interpretation, or reliance.

FIGURES

INTERIM ACTION WORK PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044



REFERENCE: 7.5 MINUTE USGS QUADRANGLE SEATTLE NORTH, WASHINGTON, DATED 1983

0 1,000 2,000
SCALE IN FEET

N

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FIGURE 1

VICINITY MAP
INTERIM ACTION 700 DEXTER HVOC PLUME
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: tperrin | Checked By: BJ | Date: 9/27/2016 | Disc Reference:

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LEGEND

- MONITORING WELL
- SHALLOW WATER-BEARING ZONE WELL
- INTERMEDIATE WATER-BEARING ZONE WELL
- INTERMEDIATE B WATER-BEARING ZONE WELL
- INTERMEDIATE A WATER-BEARING ZONE WELL
- DEEP OUTWASH AQUIFER WELL
- DECOMMISSIONED SHALLOW WELL
- DECOMMISSIONED INTERMEDIATE WELL
- DECOMISSIONED MONITORING WELL (UNKNOWN ZONE)
- PROPOSED DEWATERING WELL
- PROPOSED OBSERVATION WELL
- APPROXIMATE EASTERN EXTENT OF 700 DEXTER HVOC PLUME AT THE BLOCK 37 PROPERTY
- A—A' CROSS SECTION
- KING COUNTY PARCELS

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SCALE IN FEET

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FIGURE 2

SOUTH LAKE UNION AREA
INTERIM ACTION 700 DEXTER HVOC PLUME
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: tperrin | Checked By: | Date: 10/5/2016 | Disc Reference:
Document Path: G:\Projects\397 Vulcan\GIS\Block 37\FIGURE2_Block37_DWSamples.mxd

LEGEND

MW-128 (TP27'SW) — BORING LOCATION TRANSPOSED (TP) IN FEET, NORTH (N), SOUTH (S), EAST (E), OR WEST (W) OF CROSS-SECTION LINE.

APPROXIMATE BOUNDARY TO DEXTER HVOC PLUME

BLANK CASING

STRATIGRAPHIC CONTACT, DASHED WHERE APPROXIMATE

[SOIL SAMPLE]

DEPTH TO GROUNDWATER AT TIME OF INSTALLATION

WELL SCREEN INTERVAL

(DISCRETE GROUNDWATER SAMPLE)

(NON-DISCRETE GROUNDWATER SAMPLE)

ALL GROUNDWATER ANALYTICAL RESULTS IN MICROGRAMS PER LITER (µg/L)

(9/2/2016|—|<0.20|<0.20|**41**|<0.20|**1.7**) DISCRETE GROUNDWATER ANALYTICAL RESULT (DATE SAMPLED|DEPTH MSL|PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC)

(—|—|<0.20|<0.20|**41**|<0.20|**1.7**) NON-DISCRETE GROUNDWATER ANALYTICAL RESULT (DATE SAMPLED|DEPTH MSL|PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC)

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

cis-DCE= cis-DICHLOROETHENE

trans-DCE= trans-DICHLOROETHENE

VC= VINYL CHLORIDE

— = INDICATES SAMPLE COLLECTED FROM CENTER OF WELL SCREEN

BOLD = INDICATES CONCENTRATIONS EXCEED WASHINGTON STATE DEPARTMENT OF ECOLOGY MODEL TOXICS CONTROL ACT (MTCA) CLEANUP LEVELS

< = INDICATES CONCENTRATIONS NOT DETECTED ABOVE THE LABORATORY PRACTICAL QUANTITATION LIMIT

ELEVATIONS IN FEET ABOVE MSL

ALL SOIL ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

[<0.20|<0.20|1.3|<0.20|1.3] SOIL ANALYTICAL RESULT (PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC)

APPROXIMATE AREA WITH HALOGENATED VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER THAT EXCEED THE MODEL TOXICS CONTROL ACT (MTCA) CLEANUP LEVEL.

FILL AND RECENT DEPOSITS- SILTY SAND, SANDY SILT, GRAVEL, AND DEBRIS (WOOD WASTE, BRICK, COBBLES, BOULDERS, AND CONSTRUCTION DEBRIS). MAY INCLUDE OCCASIONAL LACUSTRINE MATERIAL

OUTWASH SAND - DENSE SAND WITH MINOR SILT

GLACIALLY CONSOLIDATED SOIL - DENSE SILT, SANDY SILT, AND SILTY SAND WITH VARIABLE AMOUNT OF GRAVEL

SAND - LATERALLY DISCONTINUOUS SAND UNIT WITHIN GLACIAL TILL

NOTES:
1. ANALYTICAL RESULTS SHOWN WERE FOR SAMPLES COLLECTED PRIOR TO ISSUING THE CLEANUP ACTION PLAN FOR THE 700 DEXTER SITE ON JANUARY 31, 2014, EXCEPT GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GEI-1 (APRIL 2014).
2. ALL LOCATIONS ARE APPROXIMATE

10' 0' 0' 20'

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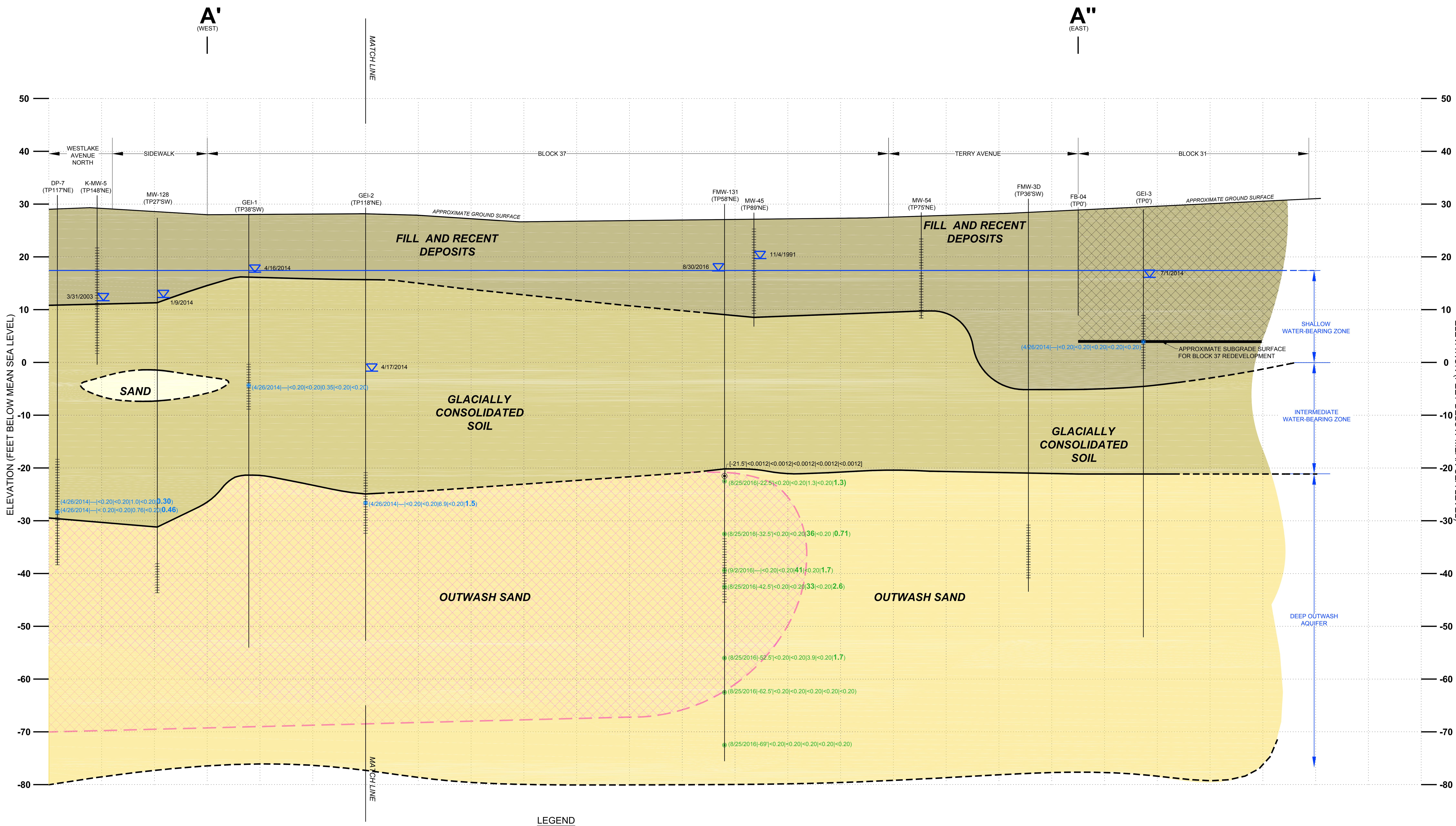
FIGURE 3

CROSS-SECTION A-A'
SOUTH LAKE UNION PROPERTIES
INTERIM ACTION 700 DEXTER HVOC PLUME
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: DJR | Checked By: EB | Date: 12/1/2016 | Disk Reference: 397-010_X-SEC A-A".dwg



LEGEND

MW-128 (TP27'SW) BORING LOCATION TRANSPOSED (TP) IN FEET, NORTH (N), SOUTH (S), EAST (E), OR WEST (W) OF CROSS-SECTION LINE.

APPROXIMATE BOUNDARY TO DEXTER HVOC PLUME

BLANK CASING

STRATIGRAPHIC CONTACT, DASHED WHERE APPROXIMATE

[SOIL SAMPLE]

DEPTH TO GROUNDWATER AT TIME OF INSTALLATION

WELL SCREEN INTERVAL

(GROUNDWATER SAMPLE)

(NON-DISCRETE GROUNDWATER SAMPLE)

ALL GROUNDWATER ANALYTICAL RESULTS IN MICROGRAMS PER LITER (µg/L)

(4/26/2014|—|<0.20|<0.20|6.9|<0.20|**1.5**) GROUNDWATER ANALYTICAL RESULT (DATE SAMPLED|DEPTH MSL|PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC)

(8/25/2016|-69'|<0.20|<0.20|<0.20|<0.20|<0.20) NON-DISCRETE GROUNDWATER ANALYTICAL RESULT (DATE SAMPLED|DEPTH MSL|PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC)

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

cis-DCE= cis-DICHLOROETHENE

trans-DCE= trans-DICHLOROETHENE

VC= VINYL CHLORIDE

— = INDICATES SAMPLE COLLECTED FROM CENTER OF WELL SCREEN

BOLD = INDICATES CONCENTRATIONS EXCEED WASHINGTON STATE DEPARTMENT OF ECOLOGY MODEL TOXICS CONTROL ACT (MTCA) CLEANUP LEVELS

< = INDICATES CONCENTRATIONS NOT DETECTED ABOVE THE LABORATORY PRACTICAL QUANTITATION LIMIT

ELEVATIONS IN FEET ABOVE MSL

SOIL ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

[-18'|<0.0012|<0.0012|<0.0012|<0.0012|<0.0012] SOIL ANALYTICAL RESULT [DEPTH MSL|PCE|TCE|cis-1,2-DCE|trans-1,2-DCE|VC]

APPROXIMATE AREA WITH HALOGENATED VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER THAT EXCEED THE MODEL TOXICS CONTROL ACT (MTCA) CLEANUP LEVEL.

PLANNED EXCAVATION FOR BLOCK 31 PROPERTY REDEVELOPMENT

FILL AND RECENT DEPOSITS - SILTY SAND, SANDY SILT, GRAVEL, AND DEBRIS (WOOD WASTE, BRICK, COBBLES, BOULDERS, AND CONSTRUCTION DEBRIS). MAY INCLUDE OCCASIONAL LACUSTRINE MATERIAL

OUTWASH SAND - DENSE SAND WITH MINOR SILT

GLACIALLY CONSOLIDATED SOIL - DENSE SILT, SANDY SILT, AND SILTY SAND WITH VARIABLE AMOUNT OF GRAVEL

SAND - LATERALLY DISCONTINUOUS SAND UNIT WITHIN GLACIAL TILL

NOTES:
1. ANALYTICAL RESULTS SHOWN WERE FOR SAMPLES COLLECTED PRIOR TO ISSUING THE CLEANUP ACTION PLAN FOR THE 700 DEXTER SITE ON JANUARY 31, 2014, EXCEPT GROUNDWATER ANALYTICAL RESULTS FOR MONITORING WELL GEI-1 (APRIL 2014).
2. ALL LOCATIONS ARE APPROXIMATE

10'
0'
0'
20'

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FIGURE 4

CROSS-SECTION A'-A"
SOUTH LAKE UNION PROPERTIES
INTERIM ACTION 700 DEXTER HVOC PLUME
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: DJR | Checked By: EB | Date: 12/1/2016 | Disk Reference: 397-010_X-SEC A-A".dwg

LEGEND

- INTERMEDIATE WATER-BEARING ZONE WELL
- DEEP OUTWASH AQUIFER WELL
- MONITORING WELL
- PROPOSED DEWATERING WELL
- PROPOSED OBSERVATION WELL
- PROPOSED INTERIM ACTION INTERCEPTION WELL
- WASTEWATER TREATMENT SYSTEM
- KING COUNTY PARCELS

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FIGURE 5

INTERIM ACTION COMPONENTS
INTERIM ACTION 700 DEXTER HVOC PLUME
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: tperrin | Checked By: | Date: 11/29/2016 | Disc Reference:

Document Path: G:\Projects\397 Vulcan\GIS\Block 37\FIGURE5_Block37_IntWells.mxd

APPENDIX A
LITHOLOGIC LOGS USED IN CROSS-SECTIONS

INTERIM ACTION WORK PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Laboratory / Field Tests

%F Percent fines
AL Atterberg limits
CA Chemical analysis
CP Laboratory compaction test
CS Consolidation test
DS Direct shear
HA Hydrometer analysis
MC Moisture content
MD Moisture content and dry density
OC Organic content
PM Permeability or hydraulic conductivity
PI Plasticity index
PP Pocket penetrometer
PPM Parts per million
SA Sieve analysis
TX Triaxial compression
UC Unconfined compression
VS Vane shear

Sheen Classification

NS No Visible Sheen
SS Slight Sheen
MS Moderate Sheen
HS Heavy Sheen
NT Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled	Start 4/16/2014	End 4/16/2014	Total Depth (ft) 81.5	Logged By TKC / Checked By DPC	Driller Geologic Drill	Drilling Method Hollow-Stem Auger

Hammer Data	Pneumatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo	DOE Well I.D.: BIJ 461 A 2 (in) well was installed on 4/16/2014 to a depth of 36.75 (ft).
Surface Elevation (ft) Vertical Datum	28.35 NAVD88	Top of Casing Elevation (ft)	27.95	
Easting (X) Northing (Y)	1269362.7704 231828.1831	Horizontal Datum	NAD83	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
7/1/2014	19.2	8.7

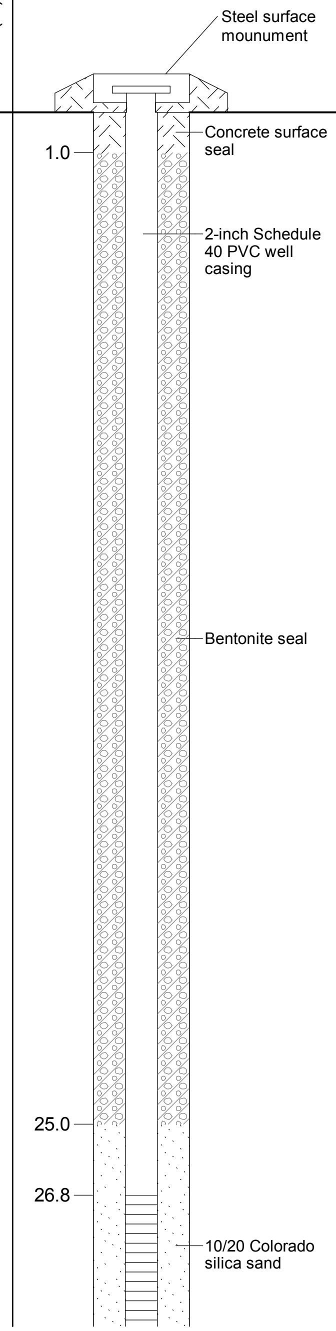
Notes:

FIELD DATA

Depth (feet)	Recovered (in)	Blows/foot	Sample Name Testing	Group Classification	MATERIAL DESCRIPTION
0				AC	3 inches asphalt concrete pavement
				CR	8 inches base course
				SM	Brown silty fine to medium sand with gravel and occasional cobbles (dense, moist) (fill)
5					(Brick debris)
10		30	3		
12					(Easier drilling at 12 feet below ground surface)
15	18	3	2		Grades to gravel
20	12	9	3		(Groundwater encountered at approximately 21 feet at the time of drilling)
25	18	7	4		(Peat layer in sampler shoe)
29				ML	Gray sandy silt (stiff to very stiff, wet) (recent deposits)
30					

Elevation (feet): 25, 20, 15, 10, 5, 0

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Log of Monitoring Well B-37-1

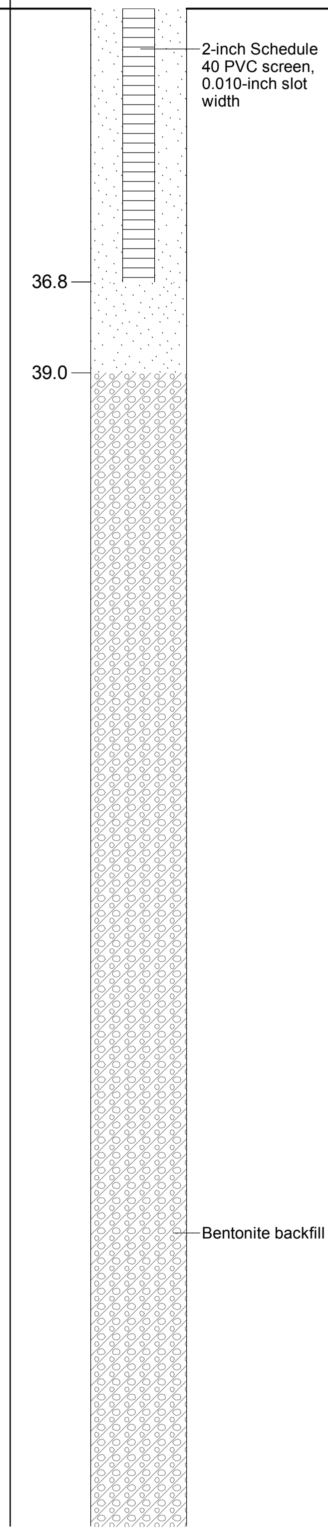
GeoEngineers

Project: Block 37
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-2
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	30		18	2		5						
-5												
	35		18	18		6				Grades to silt with sand		
-10												
	40		18	22		7				(Driller noted feels like drilling though interbeds of silty sands and silt)		
-15									SM	Brown silty fine to medium sand with occasional gravel (dense, wet)		
	45		18	31		8						
-20									SP-SM	Gray fine to medium sand with silt (very dense, wet) (glacially consolidated soil)		
	50		18	54		9 / %F					20	10
-25												
	55		18	63		10 / %F				(Driller noted slight heave at 55 feet)	21	7
-30												
	60		18	74		11 / %F				(Heave at 60 feet, approximately 1 bucket of water added)	15	5
-35									SP	Gray fine to medium sand with trace silt (very dense, wet)		
	65		13	50/6"		12 / %F					17	5

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Log of Monitoring Well B-37-1 (continued)

GEOENGINEERS

Project: Block 37
Project Location: Seattle, Washington
Project Number: 7087-027-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	WELL LOG
-40									SP-SM	Gray fine to medium sand with silt (dense to very dense, wet)			
	70		18	40		13 / %F					19	6	
-45													
	75		18	65		14							
-50									SM	Gray silty fine to medium sand (very dense, wet)			
	80		18	60		15 / %F					21	16	
													81.5

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-37-1 (continued)

GeoEngineers

Project: Block 37
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-2
Sheet 3 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Drilled	Start 4/16/2014	End 4/17/2014	Total Depth (ft)	81.5	Logged By TKC / Checked By DPC	Driller	Geologic Drill	Drilling Method	Hollow-Stem Auger

Hammer Data	Pneumatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo	DOE Well I.D.: BIJ 462 A 2 (in) well was installed on 4/16/2014 to a depth of 60.61 (ft).	
Surface Elevation (ft) Vertical Datum	29.6 NAVD88	Top of Casing Elevation (ft)	29.38		
Easting (X) Northing (Y)	1269358.7011 231666.0835	Horizontal Datum	NAD83		

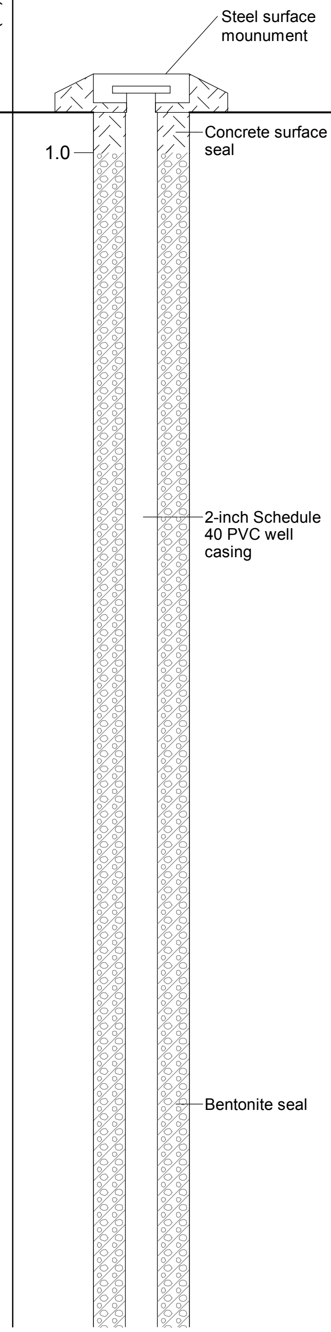
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
7/1/2014	31.4	-2.0

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0								AC	3 inches asphalt concrete pavement		
									CR	8 inches base course		
						1			GM	Brown silty fine to medium gravel with sand (moist) (fill)		
									SM	Brown silty fine to medium sand with gravel and occasional cobbles (medium dense, moist)		
25	5		12	27		2						
									SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense, moist)		
20	10		15	15		3						
									SM	Gray-brown silty fine to medium sand with occasional gravel (medium dense, moist) (with geogrid debris)		
15	15		12	20		4						
10	20		10	8		5			SM	Gray silty sand (medium dense, moist to wet) (with up to 2 feet wood debris)		
									ML	Gray sandy silt or silt with sand and occasional gravel (medium stiff, wet) (with wood debris)		
5	25		18	6		6						
									ML	Gray sandy silt (stiff, wet) (recent deposits) (with wood debris)		
0	30											

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-37-2

GEOENGINEERS

Project:	Block 37
Project Location:	Seattle, Washington
Project Number:	7087-027-00

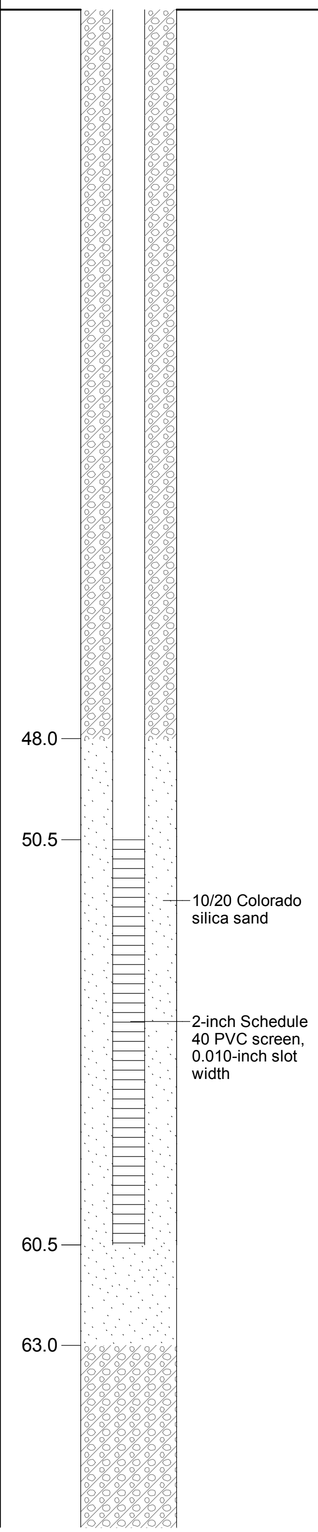
Figure A-3
Sheet 1 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	30	18	11	7 / %F	▼	ML	Gray sandy silt (medium stiff, wet)	26	62
-5	35	12	24	8					
-10	40	18	48	9					
						SM	Gray silty fine to medium sand (dense, wet) (glacially consolidated soils)		
-15	45	15	41	10					
-20	50	15	37	11					
-25	55	18	48	12			(Driller added bucket of water at approximately 54 feet) (4 inch silt layer in the middle of sample, interbedded)		
-30	60	18	58	13 / %F		SM	Gray silty fine to medium sand (very dense, wet)	18	13
-35	65	18	84	14		SP-SM	Gray fine to medium sand with silt (very dense, wet)		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-37-2 (continued)

GEOENGINEERS

Project: Block 37
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-3
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	WELL LOG
										(Driller added 2 buckets of water at approximately 68 feet)			
-40	70		18	41		15 / %F					19	8	Bentonite backfill
-45	75		18	45		16 / %F			SM	Gray silty fine to medium sand (dense, wet)	19	35	
-50	80		18	68		17 / %F			SP-SM	Gray fine to medium sand with silt and occasional gravel (very dense, wet)	19	9	81.5

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-37-2 (continued)

GEOENGINEERS

Project: Block 37
Project Location: Seattle, Washington
Project Number: 7087-027-00

Drilled	Start 4/10/2014	End 4/10/2014	Total Depth (ft)	81	Logged By DTM	Checked By DPC	Driller	Geologic Drill	Drilling Method	Hollow-Stem Auger

Hammer Data	Pneumatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo
Surface Elevation (ft) Vertical Datum	28.7 NAVD88	Top of Casing Elevation (ft)	28.41
Easting (X) Northing (Y)	1269675.6231 231774.012	Horizontal Datum	NAD83

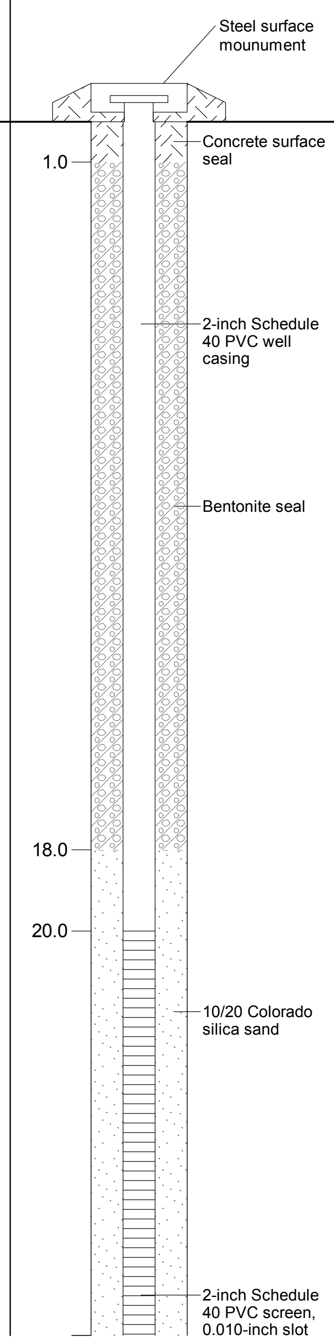
DOE Well I.D.: BIJ 460
A 2 (in) well was installed on 4/10/2014 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
7/1/2014	13.0	15.4

Notes:

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0							AC	4 inches asphalt concrete pavement		
								CR	5 inches base course		
								ML/CL	Gray silt/clay with fine sand and occasional gravel (soft, moist) (fill)		
25											
	5		12	56/10"		1			(Wood debris, blow counts may not be representative of soil)		
20								SM	Grayish brown silty fine to coarse sand with gravel (loose, moist to wet) (Construction debris; brick fragments)		
	10		6	2		2					
							▼				
15											
	15		10	2		3 MC			(Perched groundwater; constructions debris)		
10											
	20		12	6		4			(Wood waste)		
5								SM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (recent deposits)		
	25		18	25		5					
0											
	30										



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-31-3

GEOENGINEERS

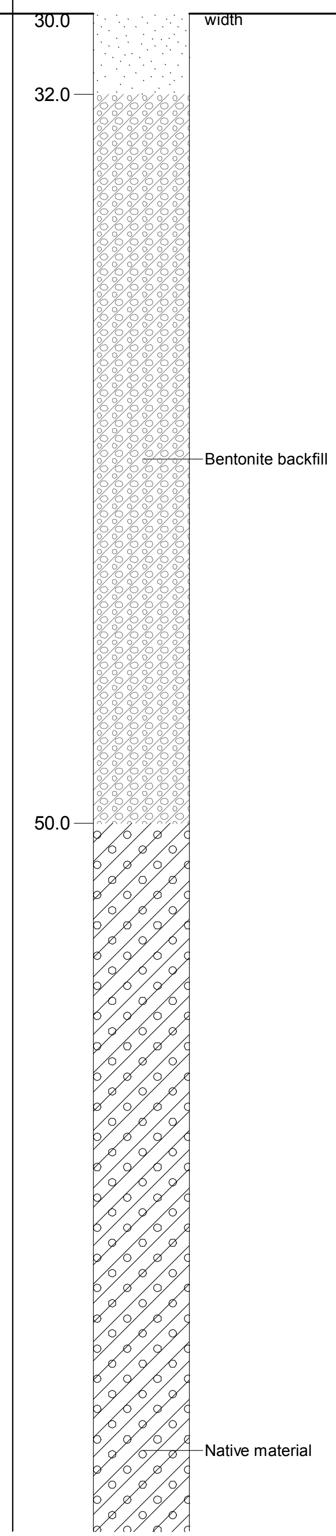
Project: Block 31
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-4
Sheet 1 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\708702700\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Sample Name / Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	30	18	16	6 / %F			(Adding mud at 30 feet)	26	79
						ML	Gray silt with sand (medium stiff to stiff, wet)		
-5						SM	Gray silty fine to medium sand (dense, moist?)		
	35	16	39	7			(Silt interbedding)		
-10						SP-SM	Gray fine to medium sand with silt (dense, wet) (glacially consolidated soil)		
	40	18	44	8 / %F				18	8
-15						SM	Gray silty fine to medium sand (dense, wet)		
	45	18	41	9 / %F			(Interbeds of silt with fine sand)	21	17
-20						ML	Gray sandy silt (hard, wet) (Driller notes firmed up at 48.5 feet)		
	50	14	52	10					
-25						SM	Grayish brown silty fine sand (dense, wet)		
	55	16	47	11					
-30						ML	Gray silt with sand (hard, wet)		
	60	18	67	12 / %F				21	63
-35						SP-SM	Brownish-gray sand with silt (very dense, wet)		
	65	18	58	13 / %F				19	10

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-31-3 (continued)

GEOENGINEERS

Project: Block 31
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-4
Sheet 2 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	WELL LOG
-40													
	70		18	50		14							
-45													
	75		6	50/6"		15							
-50													
	80		12	50/6"		16 / %F					21	8	81.0

Notes: See Figure A-1 for explanation of symbols

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Log of Monitoring Well B-31-3 (continued)

GeoEngineers

Project: Block 31
Project Location: Seattle, Washington
Project Number: 7087-027-00

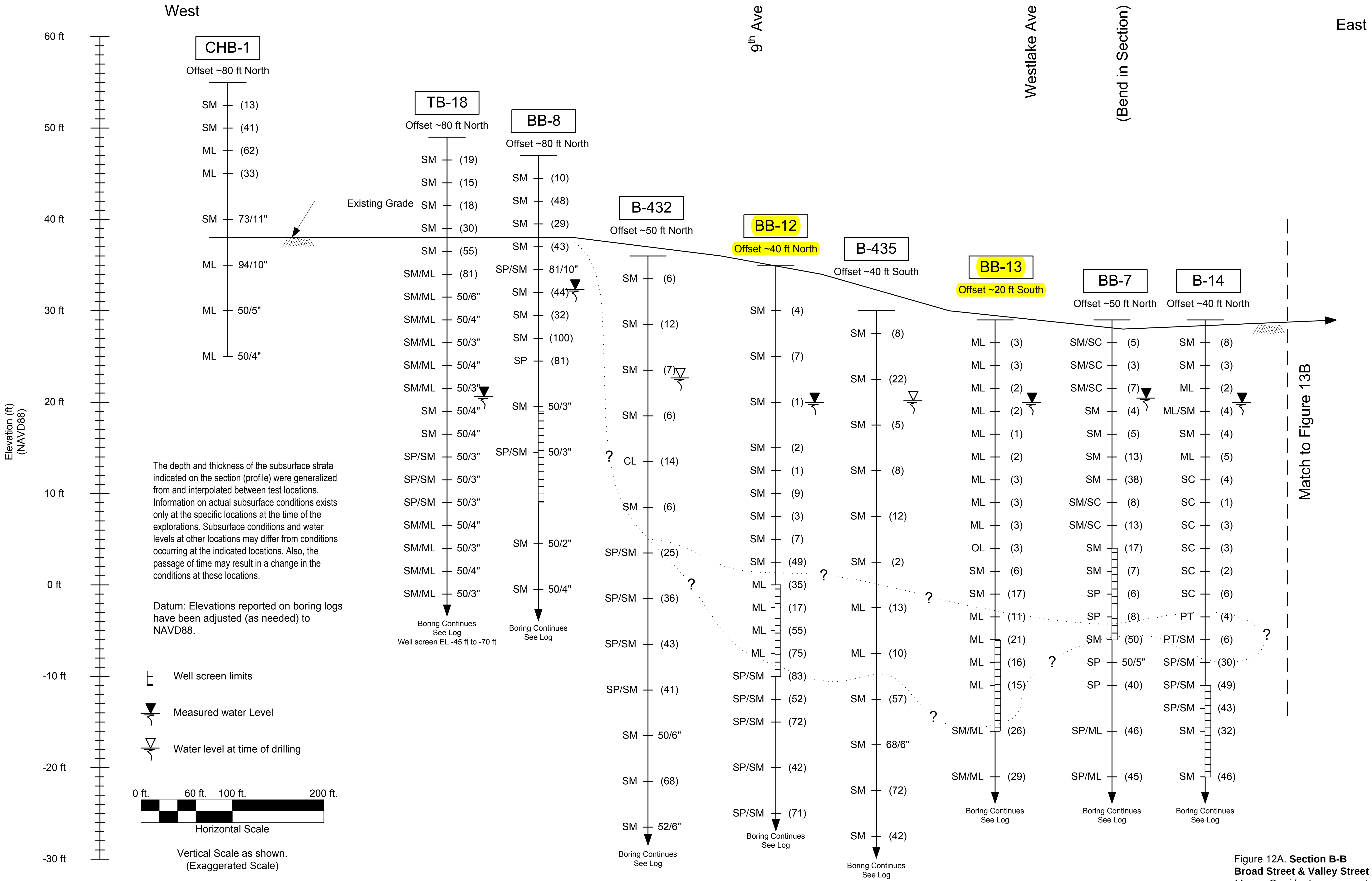


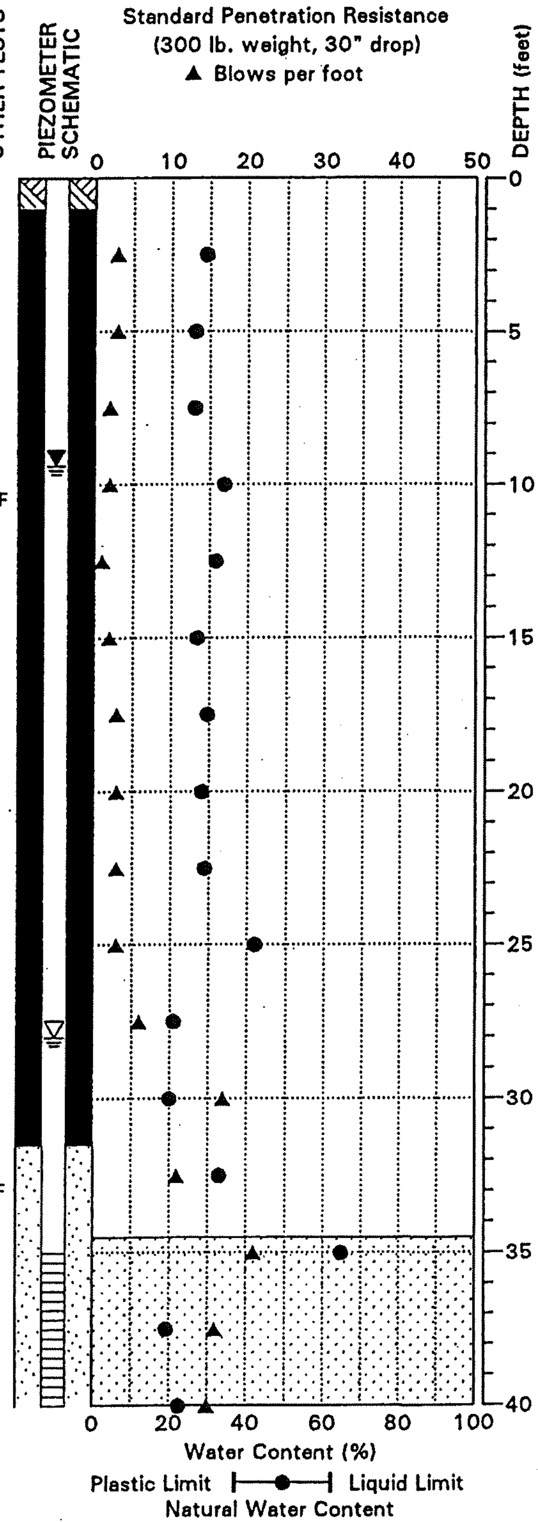
Figure 12A. **Section B-B**
Broad Street & Valley Street
Mercer Corridor Improvements

DOC ID 3364

DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

LOCATION:
DATE COMPLETED: 3/19/98
LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	ML	Soft, mottled olive brown ,SILT, moist. (FILL)			
			S-1	1-1-2	
5		At 5 feet, becomes slightly sandy. Fine sand.	S-2	1-2-1	
		At 7.5 feet, becomes olive brown to gray. Iron oxide staining.	S-3	1-1-1	
10	ML	Very soft to soft, mottled dark gray to olive gray, slightly sandy SILT, moist. Fine to coarse sand.	S-4	1-1-1	%F
			S-5	1/12"-1	
15			S-6	1-1-1	
		At 17.5 feet, wood debris.	S-7	1-2-1	
20		At 20 feet, trace organics.	S-8	1-2-1	
			S-9	1-2-1	
25	OL	Soft, mottled brown to gray, organic SILT with coarse organic debris, wet.	S-10	1-2-1	
	SM	Loose to medium dense, gray, silty fine to medium SAND, wet. Silt interbeds. Trace fine gravel. (RECESSIONAL OUTWASH)	S-11	1-2-4	
30			S-12	4-10-7	
	ML	Stiff to very stiff, dark gray, sandy SILT, wet. Lenses of fine to medium sand.	S-13	2-4-7	%F
35			S-14	4-14-7	
			S-15	1-9-7	
40					



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: BB-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-14

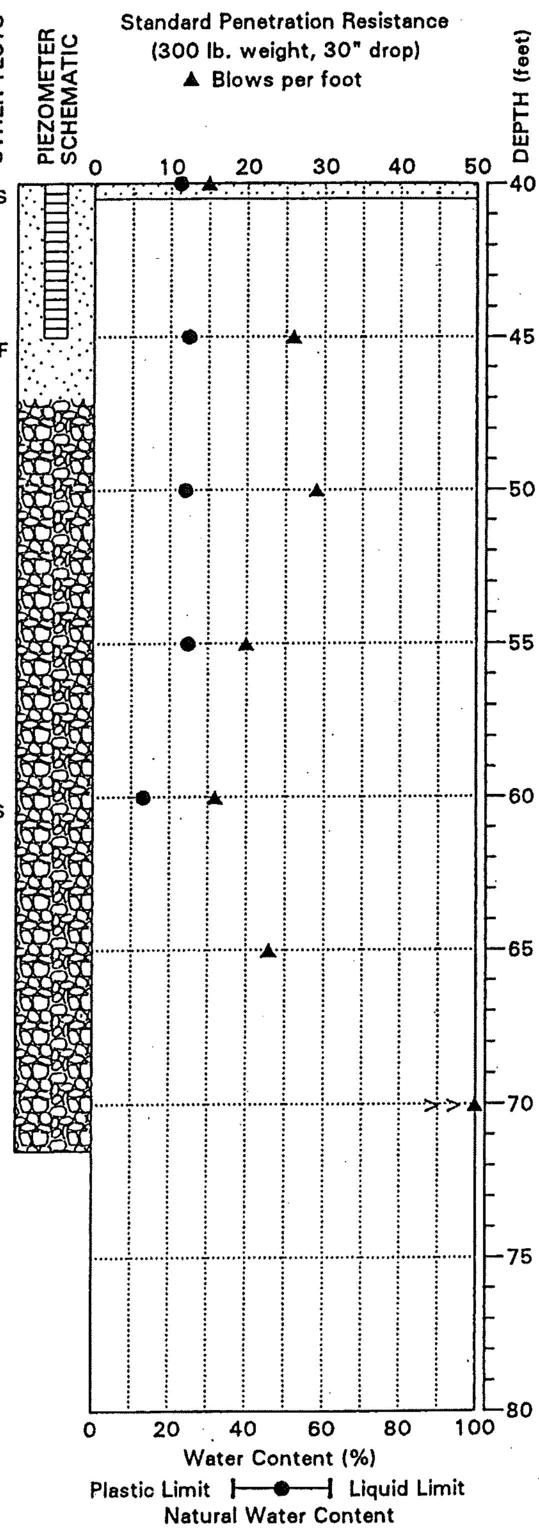
PZO300 DWB 6/1/98

DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

DOC ID 3364

LOCATION:
DATE COMPLETED: 3/19/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			At 40 feet, trace fine gravel and fine sand.	S-16	4-8-7	GS
		SM ML	Hard, dark gray, sandy SILT / silty fine SAND, wet.			
45				S-17	7-13-13	%F
50				S-18	14-14-15	
55				S-19	4-7-13	
		SM	Medium dense to very dense, dark gray, silty fine to medium SAND, wet.			
60			(ADVANCE OUTWASH)	S-20	1-9-7	GS
65			No Sample Recovery.	S-21	3-7-16	
70			No Sample Recovery.	S-22	7-16 50/5.5"	
			Total depth = 71.5 feet.			
75						
80						



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: BB-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061 FIGURE: A-14

PZO300 DWB 5/1/98

DP-05

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number ______

CURRENT

Notice of Intent No. DE 01368

Unique Ecology Well ID Tag No. BAP 945

Water Right Permit No. ______

Property Owner Name City Investors

Well Street Address Westlake and mercer

City Seattle County King

Location NE1/4-1/4 SE1/4 Sec 30 Twn 25N R 4R EWM ☒ Or WWM ☐

(s, t, r Still REQUIRED)

Lat/Long Lat Deg ____ Lat Min/Sec ____

Long Deg ____ Long Min/Sec ____

Tax Parcel No. (Required) 4088803385

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven

☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 70 ft.

Depth of completed well 70 ft.

CONSTRUCTION DETAILS

Casing Installed: ☐ Welded ____" Diam. from ____ ft. to ____ ft.

☐ Liner installed ____" Diam. from ____ ft. to ____ ft.

☒ Threaded 8" Diam. From 0 ft. to 70 ft.

Perforations: ☐ Yes ☐ No

Type of perforator used ______

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location 50' to 70'

Manufacturer's Name Western Well

Type PVC Model No. ______

Diam. 4 Slot size .030 from 50 ft. to 70 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 10/20

Materials placed from 50 ft. to 70 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 50ft.

Material used in seal Neat cement grout

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off Treemee grout

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.

Static level 40ft. below top of well Date 12/6

Artesian pressure 0 lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom? ______

Yield: ____ gal./min. with ____ ft. drawdown after 1 hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ______

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Silts and wood debre	0	48
Silts with traces of sands	48	55
Moist water @ 48'.		
Black sands with traces of	55	70
Silts		

Start Date 12/12/13 Completed Date 12/12/13

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print)

Driller/Engineer/Trainee Signature 2

Driller or trainee License No. 2589

IF TRAINEE: Driller's License No:

Driller's Signature: [signature]

Drilling Company Malcolm Drilling

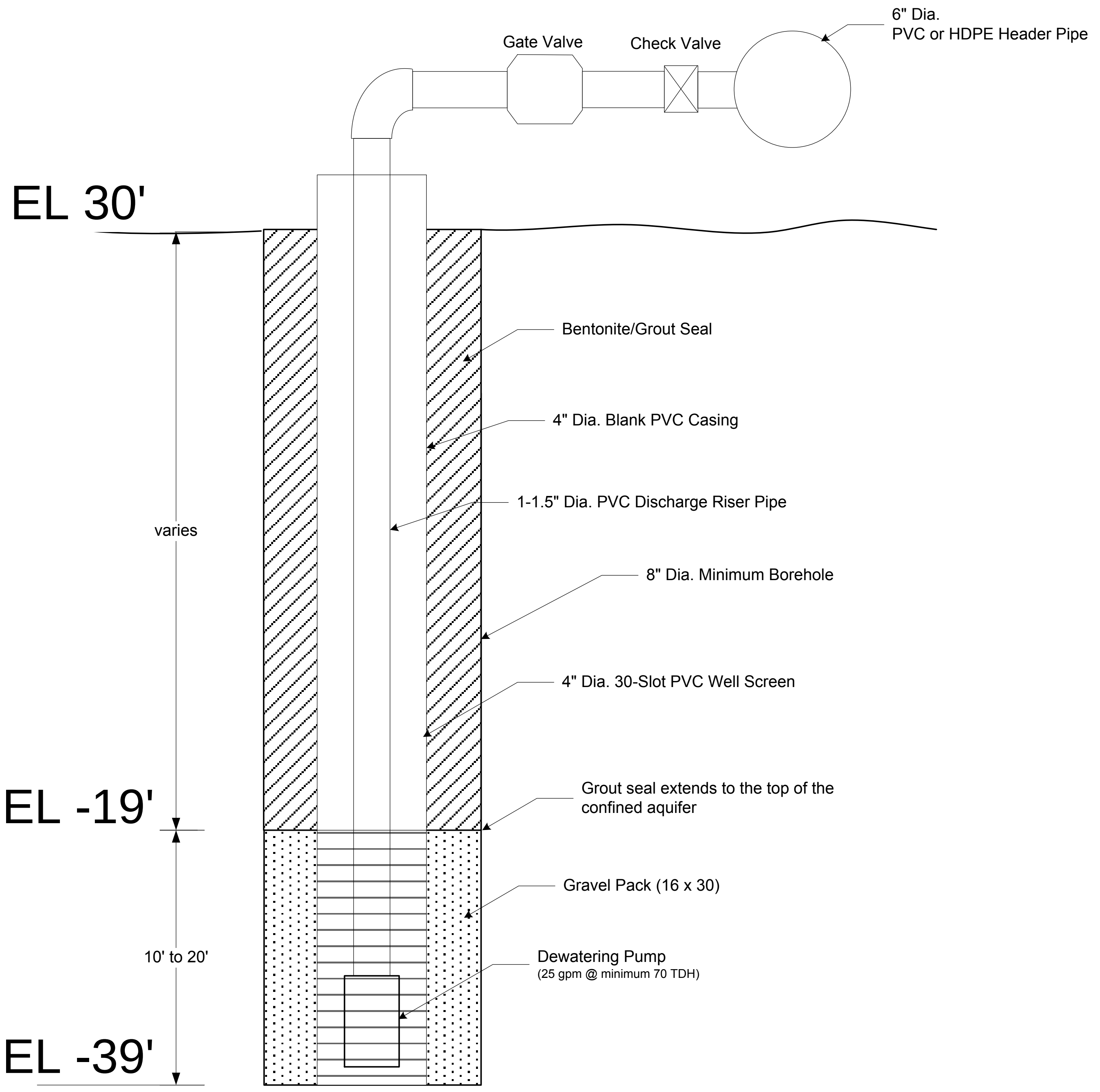
Address 8701 s 192nd street

City, State, Zip Kent Wa 98031

Contractor's Registration No. malcod*263bs Date 12-22-13

ECY 050-1-20 (Rev 02/10) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6872. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

DP-05



Not to Scale

MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 2
Typical Depressurization Well Schematic
BLOCK 43 GWCP | Seattle, WA
Project No. 13001015.01 | May 17, 2013

DP-07

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

DEPARTMENT OF ECOLOGY State of Washington

Construction/Decommission *("x" in circle)*

☒ Construction

☐ Decommission *ORIGINAL INSTALLATION*

Notice of Intent Number ______

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 70 ft. Depth of completed well 70ft.

CONSTRUCTION DETAILS

Casing Installed: ☐ Welded ____" Diam. from ____ ft. to ____ ft.
☐ Liner installed ____" Diam. from ____ ft. to ____ ft.
☒ Threaded 8" Diam. From 0 ft. to 70 ft.

Perforations: ☐ Yes ☐ No

Type of perforator used ______

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location 50' to 70'

Manufacturer's Name Western Well

Type PVC Model No. ______

Diam. 4 Slot size .030 from 50 ft. to 70 ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☒ Yes ☐ No Size of gravel/sand 10/20

Materials placed from 50 ft. to 70 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 50ft.

Material used in seal Neat cement grout

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off Treemee grout

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.

Static level 40ft. below top of well Date 12/6

Artesian pressure 0 lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom? ______

Yield: ____ gal./min. with ____ ft. drawdown after 1 hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ______

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☐ No

CURRENT

Notice of Intent No. DE 01368

Unique Ecology Well ID Tag No. BAP 947

Water Right Permit No. ______

Property Owner Name City Investors

Well Street Address Westlake and mercer

City Seattle County King

Location NE1/4-1/4 SE1/4 Sec 30 Twn 25N R 4R EWM ☒ Or WWM ☐

(s, t, r Still REQUIRED)

Lat/Long Lat Deg ____ Lat Min/Sec ____
Long Deg ____ Long Min/Sec ____

Tax Parcel No. (Required) 4088803385

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Silts and wood debre	0	48
Silts with traces of sands	48	55
Moist water @ 48'.		
Black sands with traces of	55	70
Silts		

Start Date 12/12/13 Completed Date 12/12/13

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print)

Driller/Engineer/Trainee Signature

Driller or trainee License No.

IF TRAINEE: Driller's License No: 2589

Driller's Signature [signature]

Drilling Company Malcolm Drilling

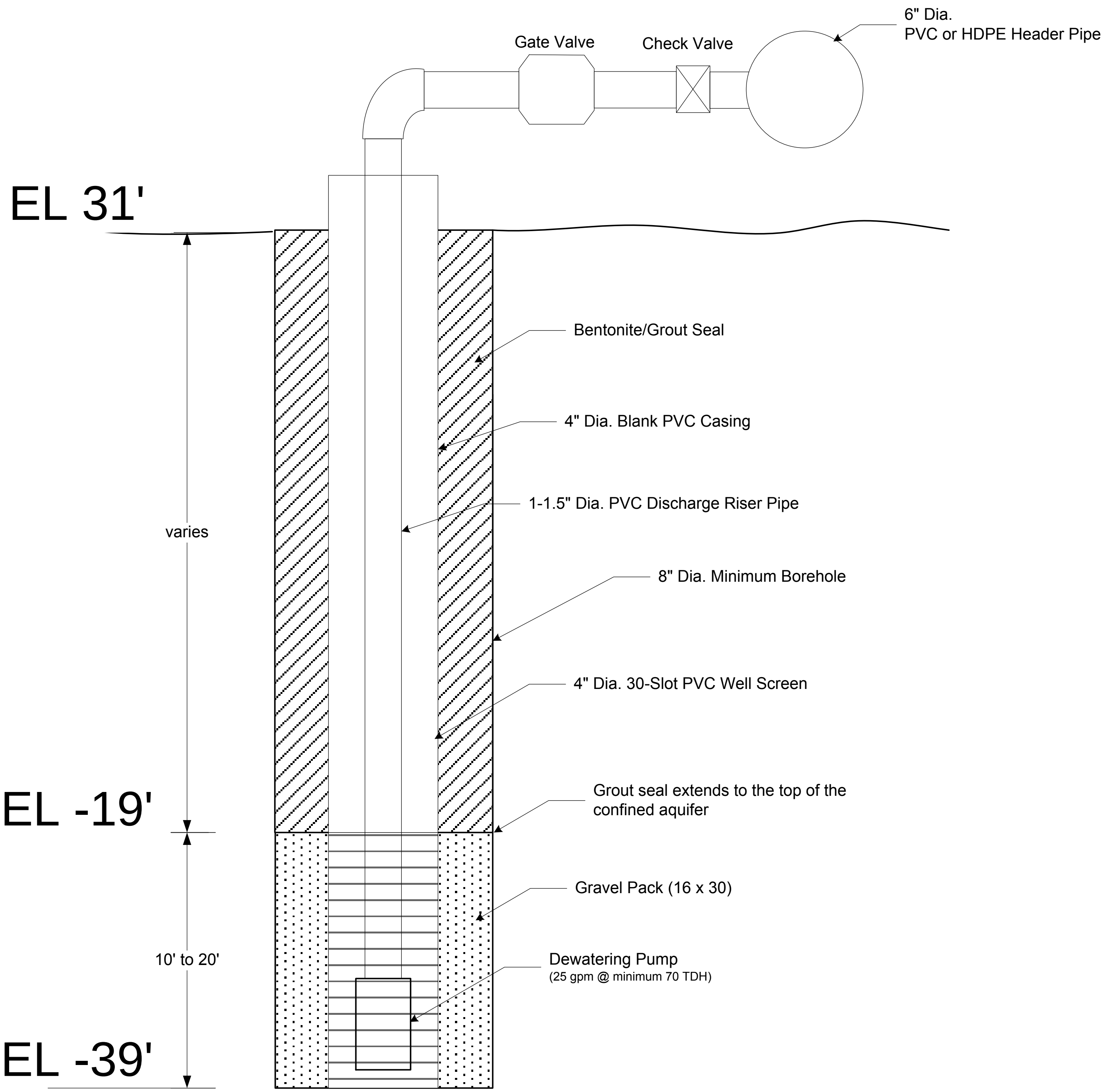
Address 8701 s 192nd street

City, State, Zip Kent Wa 98031

Contractor's Registration No. malcod*263bs Date 12-22-13

ECY 050-1-20 (Rev 02/10) *If you need this document in an alternate format, please call the Water Resources Program at 360-407-6872. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.*

DP-07



Not to Scale

MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 2
Typical Depressurization Well Schematic
BLOCK 43 GWCP | Seattle, WA
Project No. 13001015.01 | May 17, 2013

04.13.027

DW-7

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

ECOLOGY

Construction/Decommission *("x" in circle)*

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

CURRENT

Notice of Intent No. OE01368

Unique Ecology Well ID Tag No. BIJ 104

Water Right Permit No. ______

Property Owner Name City Investors

Well Street Address Westlake + Mercer

City Seattle County King

Location SE 1/4-1/4 NE 1/4 Sec 30 Twn 25N R 4E EWM or WWM (circle one)

Lat/Long (s, t, r Still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

Tax Parcel No. 4088803385

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) Multiple

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven

☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 36 inches, drilled 40 ft.

Depth of completed well 40 ft.

CONSTRUCTION DETAILS

Casing Installed: ☐ Welded ______" Diam. from ______ ft. to ______ ft.

☒ Liner installed 12" Diam. from 0 ft. to 40 ft.

☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ______

SIZE of perfs ______ in. by ______ in. and no. of perfs ______ from ______ ft. to ______ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location ______

Manufacturer's Name Western Well Screen

Type Sched 40 PVC Model No. ______

Diam. 12" Slot size .030 from 20 ft. to 40 ft.

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel/Filter packed: ☒ Yes ☐ No ☒ Size of gravel/sand 4x8

Materials placed from 40 ft. to 4 ft.

Surface Seal: ☒ Yes ☐ No To what depth? 1 ft.

Material used in seal 3/8" Bentonite Chips

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.

Static level ______ ft. below top of well Date ______

Artesian pressure ______ lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom? ______

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.

Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.

Artesian flow ______ g.p.m. Date ______

Temperature of water ______ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Med-Fine Brown sandy silts	0'	18'
Brown/Grey sand, silts w/ trace organics	18'	24'
Grey silty sands	24'	40'

Start Date 11/8/13 Completed Date 11/8/13

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Mike Kittler

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 2831

If TRAINEE, Driller's Licensed No. ______

Driller's Signature ______

Drilling Company Malcolm Drilling

Address 8701 S. 192nd St

City, State, Zip Kent WA 98031

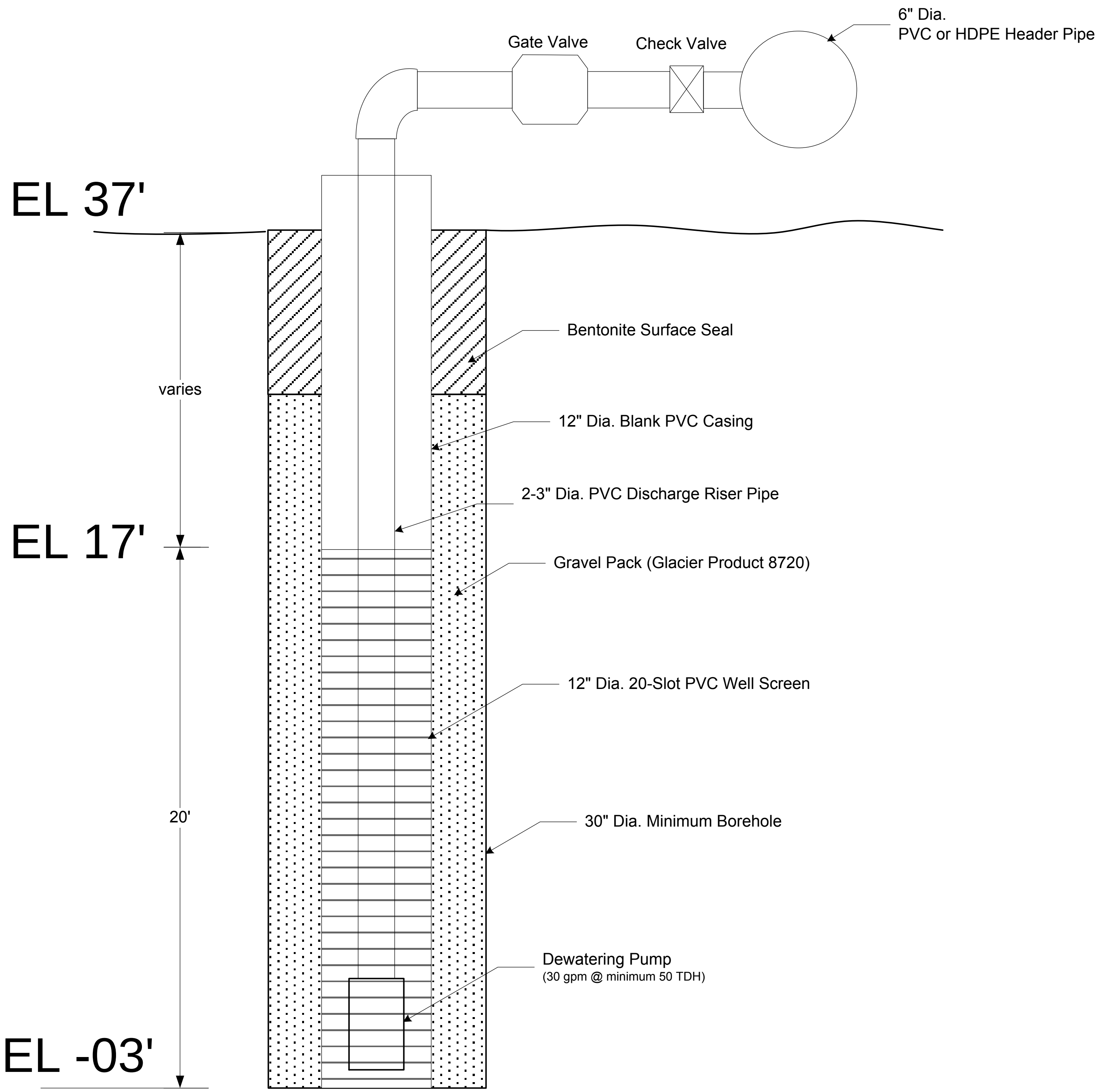
Contractor's Registration No. 439189009 Date 2/10/14

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05)

The Department of Ecology does NOT warrant the Data and/or Information on this Well Report.

DW-7



Not to Scale

MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 4
Typical Shallow Dewatering Well Schematic
BLOCK 43 GWCP | Seattle, WA
Project No. 13001015.01 | May 17, 2013

04.13.027

DW-10

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

ECOLOGY

Construction/Decommission (*"x" in circle*)
☒ Construction
○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

CURRENT
Notice of Intent No. DE 01368
Unique Ecology Well ID Tag No. BIT 101
Water Right Permit No. ______
Property Owner Name City Investors
Well Street Address Westlake + Mercer
City Seattle County King
Location SE 1/4-1/4 NE 1/4 Sec 30 Twn 25N R 4E (EWM or WWM — circle one)
Lat/Long (s, t, r Still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______
Tax Parcel No. 4088803385

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) Multiple
☒ New well ☐ Reconditioned ☐ Deepened
Method: ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 36 inches, drilled 40 ft.
Depth of completed well 40 ft.

CONSTRUCTION DETAILS
Casing Installed: ☐ Welded ___" Diam. from ___ ft. to ___ ft.
☒ Liner installed 12" Diam. from 0 ft. to 40 ft.
☐ Threaded ___" Diam. from ___ ft. to ___ ft.

Perforations: ☐ Yes ☒ No
Type of perforator used ______
SIZE of perfs ___ in. by ___ in. and no. of perfs ___ from ___ ft. to ___ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location ______
Manufacturer's Name Western Well Screen
Type Sched 40 PVC Model No. ______
Diam. 12" Slot size .030 from 20 ft. to 40 ft.
Diam. ___ Slot size ___ from ___ ft. to ___ ft.

Gravel/Filter packed: ☒ Yes ☐ No ☒ Size of gravel/sand 4x8
Materials placed from 40 ft. to 1? ft.

Surface Seal: ☒ Yes ☐ No To what depth? 1 ft.
Material used in seal 3/8" Bentonite Chips
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

PUMP: Manufacturer's Name ______
Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level ______ ft. below top of well Date ______
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☒ No If yes, by whom? ______
Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.
Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.
Yield: ___ gal./min. with ___ ft. drawdown after ___ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ___ gal./min. with ___ ft. drawdown after ___ hrs.
Airtest ___ gal./min. with stem set at ___ ft. for ___ hrs.
Artesian flow ___ g.p.m. Date ___
Temperature of water ___ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Med-Fine gray sandy silts	0'	27'
Gray/Brown silty sands w/ trace organics	27'	30'
Med-Course silty sands	30'	38'
Gray silt; very dense	38'	40'

Start Date 11/4/13 Completed Date 11/4/13

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Mike Kastler
Driller/Engineer/Trainee Signature [signature]
Driller or trainee License No. 2836

If TRAINEE,
Driller's Licensed No. ______
Driller's Signature ______

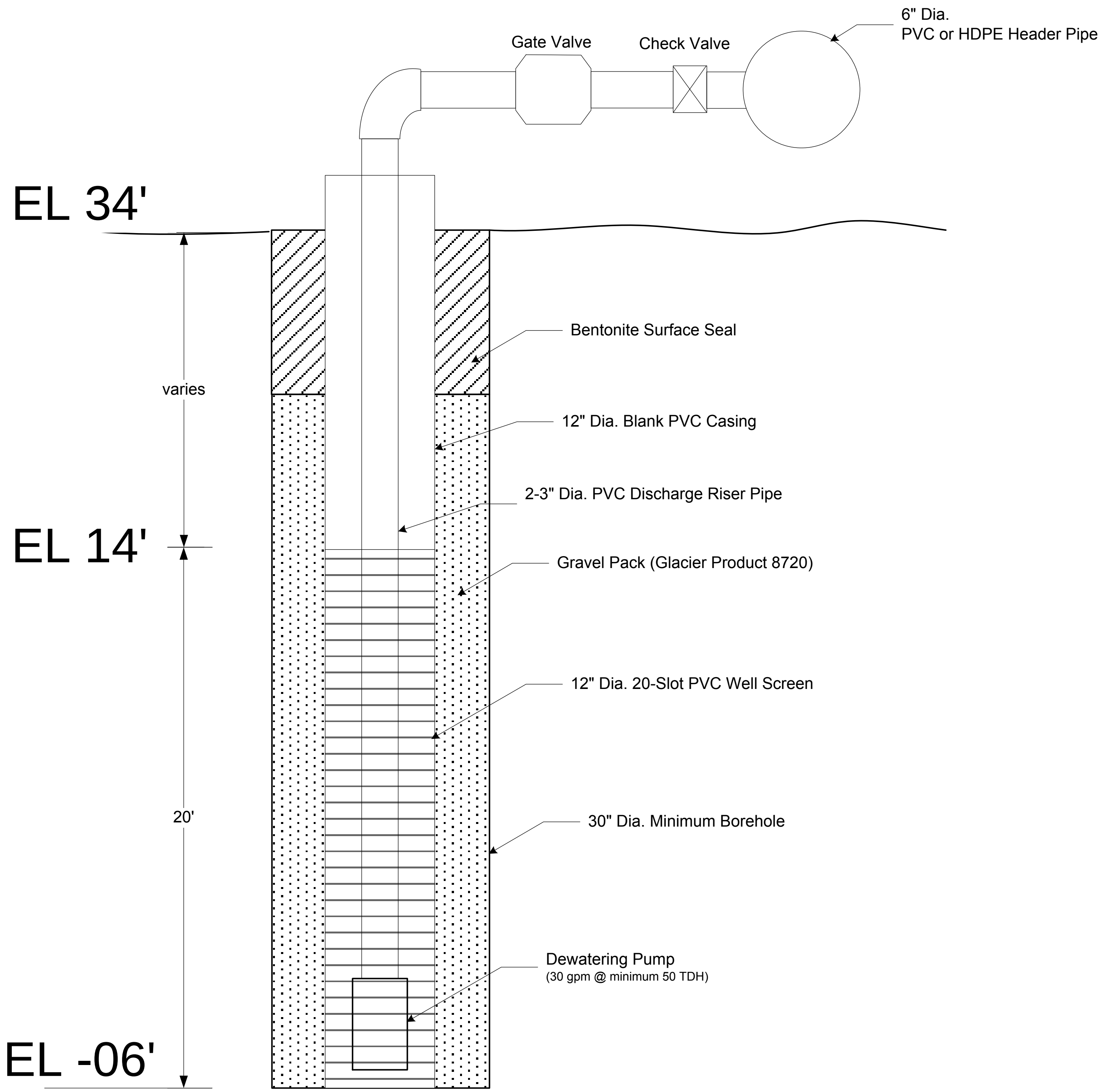
Drilling Company Malcolm Drilling
Address 8701 S 192nd St.
City, State, Zip Kent WA 98031
Contractor's Registration No. 439189009 Date 3/10/14

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05)

The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.

DW-10



Not to Scale

MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 4
Typical Shallow Dewatering Well Schematic
BLOCK 43 GWCP | Seattle, WA
Project No. 13001015.01 | May 17, 2013

Log of Boring: FB-4

FARALLON consulting
975 5th Avenue Northwest
Issaquah, Washington 98027

Client: City Investors XI LLC
Project: Block 31
Location: Seattle, WA
Farallon PN: 397-014
Logged By: R. Ostrom

Date/Time Started:	10/6/14 @ 1126	**Sampler Type:**	5' Macrocore
Date/Time Completed:	10/6/14 @ 1212	**Drive Hammer (lbs.):**	Auto
Equipment:	Power Probe 9630	**Depth of Water ATD (ft bgs):**	11.6
Drilling Company:	ESN NW	**Total Boring Depth (ft bgs):**	20.0
Drilling Foreman:	Brian B.	**Total Well Depth (ft bgs):**	NA
Drilling Method:	Direct Push		

Depth (feet bgs.)	Lithologic Description	USCS	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0	0.0-0.7': Concrete.	CO						Concrete
	0.7-3.4': Silty SAND with gravel (70% sand, 15% gravel, 15% silt), fine to medium sand, fine to coarse gravel, brown, dry, no odor.	SM	68					
	3.4-5.0': No recovery.				0.1	FB-4-3.4-100614		
5	5.0-7.5': Silty SAND (60% sand, 30% silt, 10% gravel), fine to medium sand, fine gravel, brown, dry to moist at 6.8', no odor.	SM						
	7.5-10.0': No recovery.		50		0.0	FB-4-7.5-100614	X	
10	10.0-12.4': Silty SAND (70% sand, 25% silt, 5% gravel), fine to medium sand, fine gravel, brown, moist to wet at 11.6', no odor, lense of wood debris from 12.3 to 12.4'.	SM						Bentonite Water Level
	12.4-15.0': No recovery.		48		2.3	FB-4-12.2-100614	X	
						FB-4-GW-100614	X	
15	15.0-15.3': Wood debris, wet, organic odor.	WD						
	15.3-15.9': Silty SAND (70% sand, 25% silt, 5% gravel), fine to medium sand, fine gravel, dark gray, wet, no odor.	SM			0.1	FB-4-15.9-100614	X	
	15.9-16.9': Wood debris, wet, organic odor.	WD	38					
	16.9-20.0': No recovery.							
20								

Well Construction Information

Monument Type:	NA	**Filter Pack:**	NA	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	NA	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	NA	**Annular Seal:**	NA	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	NA	**Boring Abandonment:**	Bentonite		**Y:** NA

Log of Boring: FMW-3D

FARALLON CONSULTING

Client: City Investors XI LLC
Project: Block 31
Location: Seattle, Washington
Farallon PN: 397-014
Logged By: Ryan Ostrom

Date/Time Started:	3/7/2016 @ 1150	**Sampler Type:**	1.5' SPT
Date/Time Completed:	3/8/2016 @ 1100	**Drive Hammer (lbs.):**	140
Equipment:	BK 81	**Depth of Water ATD (ft bgs):**	15.0
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	71.5
Drilling Foreman:	Jerrod Thompson	**Total Well Depth (ft bgs):**	69.0
Drilling Method:	Auger		

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0.0-0.5': Asphalt.	AC							Concrete
		0.5-5.0': Well-graded SAND with silt and gravel (60% sand, 30% gravel, 10% silt), fine to coarse sand and gravel, gray, wet, no odor.	SW-SM							
5		5.0-6.4': Silty SAND with gravel (60% sand, 20% gravel, 20% silt), fine to medium sand, fine to coarse gravel, gray, dense, moist, no odor.	SM		93	3/6 /25	0.8	FMW-3D-5.0	X	
		6.4-6.5': No recovery.								
10		10.0-10.6': Silty SAND with gravel (60% sand, 20% gravel, 20% silt), fine to medium sand, fine to coarse gravel, gray, very loose, moist, no odor.	SM		40	1/2/2	0.3	FMW-3D-10.0		Bentonite
		10.6-11.5': No recovery.								
15		15.0'-15.3': Well graded SAND (90% sand, 10% gravel), fine to coarse sand, fine gravel, very loose, gray, wet, no odor.	SW		20	1/1/1	0.2	FMW-3D-15.0	X	Water Level
		15.3-16.5': No recovery.								
20		20.0-20.5': Well graded SAND (90% sand, 10% gravel), fine to medium sand, fine gravel, medium dense, gray, wet, no odor.	SW		80	8/11 /13	1.7	FMW-3D-20.0		
		20.5-20.8': Wood debris.	WD							
		20.8-21.2': Poorly graded SAND with gravel (80% sand, 20% gravel), fine to medium sand, fine gravel, medium dense, gray, wet, no odor.	SP							
		21.2-21.5': No recovery.								
25										

Well Construction Information

Monument Type:	Flush	**Filter Pack:**	Sand 10/20	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	2.0	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	0.010	**Annular Seal:**	Bentonite	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	59-69	**Boring Abandonment:**	NA		**Y:** NA

FARALLON CONSULTING

Log of Boring: FMW-3D

Client: City Investors XI LLC
Project: Block 31
Location: Seattle, Washington

Farallon PN: 397-014

Logged By: Ryan Ostrom

Date/Time Started:	3/7/2016 @ 1150	**Sampler Type:**	1.5' SPT
Date/Time Completed:	3/8/2016 @ 1100	**Drive Hammer (lbs.):**	140
Equipment:	BK 81	**Depth of Water ATD (ft bgs):**	15.0
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	71.5
Drilling Foreman:	Jerrod Thompson	**Total Well Depth (ft bgs):**	69.0
Drilling Method:	Auger		

Depth (feet bgs.)	Lithologic Description	USCS	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
25	25.0'-26.3': Poorly graded SAND with silt (90% sand, 10% gravel), fine sand, medium dense, gray, wet, no odor.	SP-SM	80	10/11 /16	3.0	FMW-3D-25.0	X	
	26.3-26.5': No recovery.							
30	30.0-31.0': SILT (90% silt, 10% sand) fine sand, very stiff, gray, wet, no odor.	ML	100	3/5/7	2.3	FMW-3D-30.0	X	
	31.0-31.5': SILT with sand (75% silt, 25% sand), fine to medium sand, very stiff, gray, wet, no odor.	ML						
35	35.0-36.0': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, medium dense, gray, wet, no odor.	SP	67	8/12 /15	1.1	FMW-3D-35.0		
	36.0-36.5': No recovery.							Bentonite
40	40.0-41.3': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, medium dense, gray, wet, no odor.	SP	87	3/11 /9	NA			
	41.3-41.5': No recovery.							
45	45.0-45.9':Poorly graded SAND (95% sand, 5% silt), fine to medium sand, very dense, gray, wet, no odor.	SP	100	24/50 for 5"	NA			
50								

Well Construction Information

Monument Type:	Flush	**Filter Pack:**	Sand 10/20	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	2.0	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	0.010	**Annular Seal:**	Bentonite	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	59-69	**Boring Abandonment:**	NA		**Y:** NA

Log of Boring: FMW-3D

Client: City Investors XI LLC
Project: Block 31
Location: Seattle, Washington
Farallon PN: 397-014
Logged By: Ryan Ostrom

Date/Time Started:	3/7/2016 @ 1150	**Sampler Type:**	1.5' SPT
Date/Time Completed:	3/8/2016 @ 1100	**Drive Hammer (lbs.):**	140
Equipment:	BK 81	**Depth of Water ATD (ft bgs):**	15.0
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	71.5
Drilling Foreman:	Jerrod Thompson	**Total Well Depth (ft bgs):**	69.0
Drilling Method:	Auger		

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
50		50.0-50.8': Well-graded SAND (95% sand, 5% silt), fine to coarse sand, medium dense, dark gray, wet, no odor.	SW		53	7/12 /12	NA			
		50.8-51.5': No recovery.								Bentonite
55		55.0-56.5': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, dense, gray, wet, no odor.	SP		100	6/15 /20	NA			
										Sand
60		60.0-61.5': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, dense, gray, wet, no odor.	SP		100	6/15 /20	NA			
										Screen
65		65.0-66.3': Well-graded SAND (95% sand, 5% silt), fine to coarse sand, medium dense, gray, wet, no odor.	SW		87	4/7 /13	NA			
		66.3-66.5': No recovery.								
70		70.0-71.3': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, medium dense, gray, wet, no odor.	SP		87	5/7 /13	NA			
		71.3-71.5': No Recovery.								
75										

Well Construction Information

Monument Type:	Flush	**Filter Pack:**	Sand 10/20	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	2.0	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	0.010	**Annular Seal:**	Bentonite	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	59-69	**Boring Abandonment:**	NA		**Y:** NA

FARALLON CONSULTING

Log of Boring: FMW-131

Client: Vulcan
Project: Block 37
Location: Seattle, WA
Farallon PN: 397-010
Logged By: Jared Kerr/ Amber

Date/Time Started: 8/30/16 @ 0740
Date/Time Completed: 8/30/16 @ 0918
Equipment: D-120
Drilling Company: Holocene
Drilling Foreman: Matt Graham
Drilling Method: Hollow Stem Auger

Sampler Type: SPT 18"
Drive Hammer (lbs.): 140lbs
Depth of Water ATD (ft bgs): 12.64
Total Boring Depth (ft bgs): 75.0'
Total Well Depth (ft bgs): 74.85'

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0.0-3.0': Hydrovac to 5.0' bgs, poorly graded SAND with silt and gravel (70% sand, 20% gravel, 10% silt), fine to medium sand, coarse gravel, dark gray, dry, no odor.	SP-SM							Concrete
5		3.0-5.0': Poorly graded Gravel (100% pea gravel), fine gravel, dark gray, dry, no odor.	GP							
10		10.0-15.0': SILT cuttings (90% silt, 10% sand) fine sand, trace gravel, gray, wet, no odor.	ML							
15		15.0-50.0': Sandy SILT cuttings (60 to 75% silt, 40 to 25% sand), fine sand, gray, wet, no odor, trace wood encountered at 15.0' bgs.	ML							
50		50.0-51.5': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, trace gravel, dark gray, wet, no odor.	SP		100	3,12, 19	0.0	FMW-131-51.5-082516 @0950 FMW-131-52.5-082516-GW @1130	x x	Bentonite
55		51.5-105.0': Silty SAND to Well-graded SAND cuttings (80 to 95% sand, 20 to 5% silt), fine to coarse sand, trace sand, dark gray, very wet, no odor.	SW-SM							
60										

Well Construction Information

Monument Type:	Flush Mount	**Filter Pack:**	Silica Sand 10-20
Casing Diameter (inches):	2"	**Surface Seal:**	Concrete
Screen Slot Size (inches):	0.010"	**Annular Seal:**	Bentonite
Screened Interval (ft bgs):	63-73'	**Boring Abandonment:**	NA

Ground Surface Elevation (ft): NA
Top of Casing Elevation (ft): NA
Surveyed Location: **X:** NA **Y:** NA

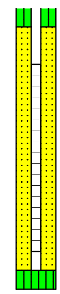
FARALLON CONSULTING

Log of Boring: FMW-131

Client: Vulcan
Project: Block 37
Location: Seattle, WA
Farallon PN: 397-010
Logged By: Jared Kerr/ Amber

Date/Time Started:	8/30/16 @ 0740	**Sampler Type:**	SPT 18"
Date/Time Completed:	8/30/16 @ 0918	**Drive Hammer (lbs.):**	140lbs
Equipment:	D-120	**Depth of Water ATD (ft bgs):**	12.64
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	75.0'
Drilling Foreman:	Matt Graham	**Total Well Depth (ft bgs):**	74.85'
Drilling Method:	Hollow Stem Auger		

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
60										
65								FMW-131-62.5-082516-GW @1230	x	Silica Sand Screen
70										
75								FMW-131-72.5-082516-GW @1350	x	Bentonite
80										
85								FMW-131-82.5-082516-GW @1535	x	
90										
95								FMW-131-92.5-082516-GW @1645	x	
100										
105								FMW-131-102.5-082516-GW	x	



Well Construction Information

Monument Type:	Flush Mount	**Filter Pack:**	Silica Sand 10-20	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	2"	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	0.010"	**Annular Seal:**	Bentonite	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	63-73'	**Boring Abandonment:**	NA		**Y:** NA

Drilled	Start 4/10/2014	End 4/10/2014	Total Depth (ft) 81	Logged By DTM / Checked By DPC	Driller Geologic Drill	Drilling Method Hollow-Stem Auger

Hammer Data	Pneumatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo
Surface Elevation (ft) / Vertical Datum	28.7 / NAVD88	Top of Casing Elevation (ft)	28.41
Easting (X) / Northing (Y)	1269675.6231 / 231774.012	Horizontal Datum	NAD83

DOE Well I.D.: BIJ 460
A 2 (in) well was installed on 4/10/2014 to a depth of 30 (ft).

Groundwater

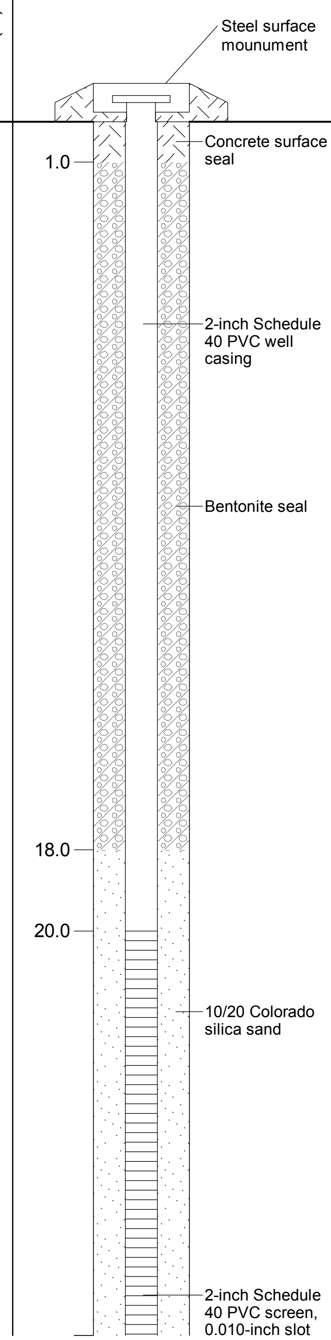
Date Measured	Depth to Water (ft)	Elevation (ft)
7/1/2014	13.0	15.4

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0								AC	4 inches asphalt concrete pavement		
									CR	5 inches base course		
									ML/CL	Gray silt/clay with fine sand and occasional gravel (soft, moist) (fill)		
25												
	5		12	56/10"		1				(Wood debris, blow counts may not be representative of soil)		
20									SM	Grayish brown silty fine to coarse sand with gravel (loose, moist to wet) (Construction debris; brick fragments)		
	10		6	2		2						
15							▼					
	15		10	2		3 MC				(Perched groundwater; constructions debris)		
10												
	20		12	6		4				(Wood waste)		
5									SM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (recent deposits)		
	25		18	25		5						
0												
	30											

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-31-3

GEOENGINEERS

Project: Block 31
Project Location: Seattle, Washington
Project Number: 7087-027-00

Figure A-4
Sheet 1 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	30	18	16	6 %F		(Adding mud at 30 feet)	26	79
					ML	Gray silt with sand (medium stiff to stiff, wet)		
-5					SM	Gray silty fine to medium sand (dense, moist?)		
	35	16	39	7		(Silt interbedding)		
-10					SP-SM	Gray fine to medium sand with silt (dense, wet) (glacially consolidated soil)		
	40	18	44	8 %F			18	8
-15					SM	Gray silty fine to medium sand (dense, wet)		
	45	18	41	9 %F		(Interbeds of silt with fine sand)	21	17
-20					ML	Gray sandy silt (hard, wet) (Driller notes firmed up at 48.5 feet)		
	50	14	52	10				
-25					SM	Grayish brown silty fine sand (dense, wet)		
	55	16	47	11				
-30					ML	Gray silt with sand (hard, wet)		
	60	18	67	12 %F			21	63
-35					SP-SM	Brownish-gray sand with silt (very dense, wet)		
	65	18	58	13 %F			19	10

WELL LOG

30.0 — width

32.0

Bentonite backfill

50.0

Native material

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well B-31-3 (continued)

GEOENGINEERS

Project: Block 31

Project Location: Seattle, Washington

Project Number: 7087-027-00

Figure A-4
Sheet 2 of 3

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Elevation (feet)	Depth (feet)	Interval / Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	WELL LOG
-40											
	70	18	50	14							
-45											
	75	6	50/6"	15							
-50											
	80	12	50/6"	16 / %F					21	8	81.0

Notes: See Figure A-1 for explanation of symbols

Redmond: Date:7/31/14 Path:\\RED\PROJECTS\7\7087027\GINT\708702700.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

Log of Monitoring Well B-31-3 (continued)

GeoEngineers

Project: Block 31
Project Location: Seattle, Washington
Project Number: 7087-027-00

Depth Below Ground Surface (bgs) in feet	Sample Number	Sample Interval	Groundwater	Blow Counts	PID (ppm)	Well Construction	Soil Log	Soil Description
0								Concrete ~ 4".
							SP	Brown sandy GRAVEL, moist.
5		X		11 13 12			ML	Brownish-grey clayey SILT, moist.
10		X		5 9 12			CL	Grey silty CLAY with fine to medium-grained sand, moist.
15	K-MW-5-16.0	X		8 7 5			CL	Same as above.
20		X	▼	2 2 2			SP	Grey medium to coarse-grained SAND with gravel, wet. Wood chips in sample.
25		X		6 5 5				
								Wood chips ~ 2".
								CLAY, wet.
								Wood chips.
30								

(continued on next page)

Logged by: IY
Driller: Cascade Drilling, Inc.
Drilling Method: Hollow Stem Auger
Sampling Method: Split spoon
Casing Type: 2-inch PVC
Annular Pack: 2/12 Silica sand
Slot Size: 0.010 inch

Hammer Size: 130 lbs.
Date Drilled: 3/31/03
Hole Diameter: 8 inches
Hole Depth: 31.5 feet
Well Diameter: 2 inches
Well Depth: 30 feet
Screened Interval: 10 - 30 feet

Soils classified visually using the Unified Soils Classification System

Depth (bgs) in feet	Sample Number	Sample Interval	Groundwater	Blow Counts	PID (ppm)	Well Construction	Soil Log	Soil Description
30		X		15 15 19			ML	Clayey SILT, wet.
							CL	CLAY, wet.
								End of Boring at 31.5' bgs.

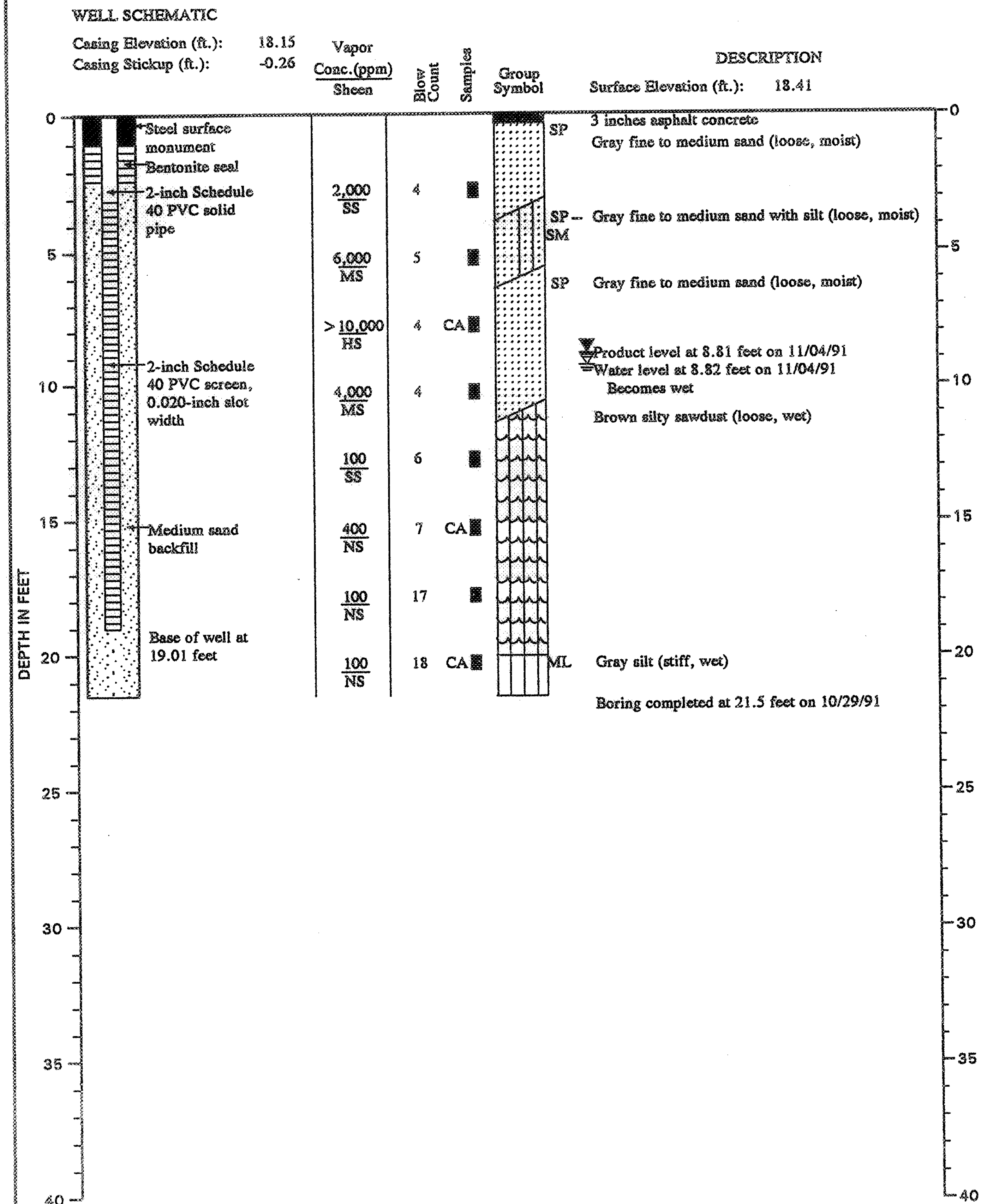
Depth Below Ground Surface (bgs) in feet: 30, 35, 40, 45, 50, 55, 60

Logged by: IY
Driller: Cascade Drilling, Inc.
Drilling Method: Hollow Stem Auger
Sampling Method: Split spoon
Casing Type: 2-inch PVC
Annular Pack: 2/12 Silica sand
Slot Size: 0.010 inch

Hammer Size: 130 lbs.
Date Drilled: 3/31/03
Hole Diameter: 8 inches
Hole Depth: 31.5 feet
Well Diameter: 2 inches
Well Depth: 30 feet
Screened Interval: 10 - 30 feet

Soils classified visually using the Unified Soils Classification System

MONITORING WELL NO. MW-45



Note: See Figure A-2 for explanation of symbols

GeoEngineers

LOG OF MONITORING WELL

FIGURE A-16

:WAP:LJB:DAC:CBK:CMS 6/24/92

0161-013-R69

Delta

Environmental Consultants, Inc.

PROJECT NO:	WA255-3510-1	CLIENT:	ConocoPhillips
LOGGED BY:	C. Fleming	LOCATION:	600 Westlake Ave N, Seattle, WA
DRILLER:	CDI	DATE DRILLED:	6/7/2005
DRILLING METHOD:	HSA	HOLE DIAMETER:	8"
SAMPLING METHOD:	SS	HOLE DEPTH:	20'
CASING TYPE:	PVC	WELL DIAMETER:	2"
SLOT SIZE:	0.020	WELL DEPTH:	20'
GRAVEL PACK:	2-12	CASING STICKUP:	Flush

BORING/WELL NO: MW-54

PAGE 1 OF 1

Location Map

See Figure 2

ELEVATION	NORTHING	EASTING

Well Completion: Backfill — Conc. (0–1.5'), BENT. (1.5–3'), SAND (3–20'); Casing — blank to 5', screened 5–20'

Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Soil Type	LITHOLOGY / DESCRIPTION
				0		Asphalt (4")
				1		(4" asphalt layer at 8" below surface grade)
				2		Air-knifed/vac-cleared to 5' (sand fill with broken concrete, bricks, and other debris)
			3, 4	5		
	Moist	0.0	4, 3, 4	6	SP	Poorly Graded SAND; brown, with trace wood debris, (charcoal-like) and brick fragments at 7.5' to 8'
	Moist	0.1	3, 3	8		
▽ ▼	Wet	0.1	2, 2, 2	9		(grades more well-graded, subrounded gravel, no charcoal)
		0.3	2, 2, 4	10		(as above, with 5%-10% sandy silt lenses)
	Sat	0.0	10, 3, 3, 3	12		
	Sat	0.1	4, 6, 5	14	WDFill	Wood debris; brown
	Sat	0.1	4, 1, 2	15		(grades finer wood debris (sawdust))
	Sat	0.6	2, 6, 8	17		(grades coarser wood debris)
		0.0	9, 9, 21	18	SP	Poorly Graded SAND; grey, fine sand
	Sat	0.1	17	20		
				21		**BOTTOM OF HOLE @ 20'**

SoundEarth Strategies

Project: 700 Dexter
Project Number: 0797-001
Logged by: RAH
Date Started: 12/17/12
Surface Conditions: Concrete
Well Location N/S: --
Well Location E/W: --
Reviewed by: CCC
Date Completed: 12/17/12

BORING LOG B113
MW113

Site Address: 700 Dexter Avenue North
Seattle, Washington

Water Depth At Time of Drilling 20 feet bgs
Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
0								**Concrete 1.5 feet thick at surface.**	
								Cleared borehole with a vactor truck to a depth of 9 feet below ground surface.	
5									
10		12 12 12	100	44.8	B113-10	**SM**		**Dry, medium dense, silty medium to fine SAND with gravel, light brown, no solvent or hydrocarbon odor (15-70-15).**	
15									

Drilling Co./Driller: Cascade
Drilling Equipment: HSA
Sampler Type: Dames and Moore
Hammer Type/Weight: 300 lbs
Total Boring Depth: 80 feet bgs
Total Well Depth: 80 feet bgs
State Well ID No.: BHS764

Well/Auger Diameter: 2/8.25 inches
Well Screened Interval: 70-80 feet bgs
Screen Slot Size: 0.010 inches
Filter Pack Used: 2/12 Silica Sand
Surface Seal: Concrete
Annular Seal: Bentonite
Monument Type: Flush mount

Notes/Comments:

SoundEarth Strategies

Project:	700 Dexter
Project Number:	0797-001
Logged by:	RAH
Date Started:	12/17/12
Surface Conditions:	Concrete
Well Location N/S:	--
Well Location E/W:	--
Reviewed by:	CCC
Date Completed:	12/17/12

BORING LOG **B113** MW113

Site Address: 700 Dexter Avenue North, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
15		15, 16, 22	100	63.7		SM		**Damp, dense, silty SAND with gravel, gray, moderate hydrocarbon odor (25-65-10).**	
20		8, 8, 9	100	5.2	B113-20	SP-SM		**Wet, medium dense, medium to fine SAND with gravel, gray, no solvent or hydrocarbon odor (10-75-15).**	
25		8, 10, 12	100	1.5		SM		**Wet, medium dense, silty medium to fine SAND with gravel, gray, no solvent or hydrocarbon odor (25-60-15).**	
30									

Drilling Co./Driller:	Cascade		**Well/Auger Diameter:**	2/8.25	inches
Drilling Equipment:	HSA		**Well Screened Interval:**	70-80	feet bgs
Sampler Type:	Dames and Moore		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Silica Sand	
Total Boring Depth:	80	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	80	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:	BHS764		**Monument Type:**	Flush mount	

Notes/Comments:

SoundEarth Strategies

Project: 700 Dexter
Project Number: 0797-001
Logged by: RAH
Date Started: 12/17/12
Surface Conditions: Concrete
Well Location N/S: --
Well Location E/W: --
Reviewed by: CCC
Date Completed: 12/17/12

BORING LOG B113 MW113

Site Address: 700 Dexter Avenue North
Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
30		12, 13, 10	100	0.3	B113-30	**SM-ML**		**Wet, medium dense, silty fine SAND with gravel, gray, no solvent or hydrocarbon odor (40-50-10). Lacostrine sediments.**	
35		13, 14, 13	100	0.3		**SM-ML**		**Wet, medium dense, silty fine SAND with trace gravel, gray, no solvent or hydrocarbon odor (45-50-5). Lacostrine sediments.**	
40		9, 11, 14	100	0.0	B113-40	**ML**		**Damp, medium dense, SILT with fine sand, gray, no solvent or hydrocarbon odor (80-20-0).**	
45									

Drilling Co./Driller: Cascade
Drilling Equipment: HSA
Sampler Type: Dames and Moore
Hammer Type/Weight: 300 lbs
Total Boring Depth: 80 feet bgs
Total Well Depth: 80 feet bgs
State Well ID No.: BHS764

Well/Auger Diameter: 2/8.25 inches
Well Screened Interval: 70-80 feet bgs
Screen Slot Size: 0.010 inches
Filter Pack Used: 2/12 Silica Sand
Surface Seal: Concrete
Annular Seal: Bentonite
Monument Type: Flush mount

Notes/Comments:

SoundEarth Strategies

Project:	700 Dexter
Project Number:	0797-001
Logged by:	RAH
Date Started:	12/17/12
Surface Conditions:	Concrete
Well Location N/S:	--
Well Location E/W:	--
Reviewed by:	CCC
Date Completed:	12/17/12

BORING LOG **B113** MW113

Site Address: 700 Dexter Avenue North, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
45		11, 17, 15	100	2.1		SP-SM		**Wet, dense, medium to fine SAND with trace gravel, gray no solvent or hydrocarbon odor (10-85-5).**	
50		14, 21, 23	100	0.3	B113-50	SP-SM		**Wet, dense, medium to fine SAND with silt, gray, no solvent or hydrocarbon odor (10-90-0).**	
55		20, 22, 20	100	0.9		SP		**Wet, dense, medium to fine SAND with trace silt, gray, no solvent or hydrocarbon odor (5-95-0).**	
60									

Drilling Co./Driller:	Cascade		**Well/Auger Diameter:**	2/8.25	inches
Drilling Equipment:	HSA		**Well Screened Interval:**	70-80	feet bgs
Sampler Type:	Dames and Moore		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Silica Sand	
Total Boring Depth:	80	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	80	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:	BHS764		**Monument Type:**	Flush mount	

Notes/Comments:

Project: 700 Dexter
Project Number: 0797-001
Logged by: RAH
Date Started: 12/17/12
Surface Conditions: Concrete
Well Location N/S: --
Well Location E/W: --
Reviewed by: CCC
Date Completed: 12/17/12

BORING LOG **B113** MW113

Site Address: 700 Dexter Avenue North, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs
Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
60			0					**No recovery. Driller reports sandy material.**	
65			0					**No recovery. Driller reports sandy material.**	
70			0					**No recovery.**	
75									

Drilling Co./Driller:	Cascade	
Drilling Equipment:	HSA	
Sampler Type:	Dames and Moore	
Hammer Type/Weight:	300	lbs
Total Boring Depth:	80	feet bgs
Total Well Depth:	80	feet bgs
State Well ID No.:	BHS764	

Well/Auger Diameter:	2/8.25	inches
Well Screened Interval:	70-80	feet bgs
Screen Slot Size:	0.010	inches
Filter Pack Used:	2/12 Silica Sand	
Surface Seal:	Concrete	
Annular Seal:	Bentonite	
Monument Type:	Flush mount	

Notes/Comments:

Project:	700 Dexter
Project Number:	0797-001
Logged by:	RAH
Date Started:	12/17/12
Surface Conditions:	Concrete
Well Location N/S:	--
Well Location E/W:	--
Reviewed by:	CCC
Date Completed:	12/17/12

BORING LOG B113 MW113

Site Address: 700 Dexter Avenue North, Seattle, Washington

Water Depth At Time of Drilling: 20 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
75			0					**No recovery. Driller reports sand.**	
			0					**No recovery. Driller reports sand.**	
80								**Boring terminated at 80 feet below ground surface. Two-inch-diameter well installed to a depth of 80 feet bgs, screened from 70 to 80 feet bgs, and finished with a flush-mounted monument and concrete seal. Completed as monitoring well MW113.**	
85									
90									

Drilling Co./Driller:	Cascade	
Drilling Equipment:	HSA	
Sampler Type:	Dames and Moore	
Hammer Type/Weight:	300	lbs
Total Boring Depth:	80	feet bgs
Total Well Depth:	80	feet bgs
State Well ID No.:	BHS764	

Well/Auger Diameter:	2/8.25	inches
Well Screened Interval:	70-80	feet bgs
Screen Slot Size:	0.010	inches
Filter Pack Used:	2/12 Silica Sand	
Surface Seal:	Concrete	
Annular Seal:	Bentonite	
Monument Type:	Flush mount	

Notes/Comments:

SoundEarth Strategies

DRAFT

Project:	700 Dexter
Project Number:	0797-001
Logged by:	DMM
Date Started:	1/9/14
Surface Conditions:	Concrete
Well Location N/S:	22 ft south of fire hydrant
Well Location E/W:	1 ft east of fire hydrant
Reviewed by:	--
Date Completed:	1/9/14

BORING LOG B128 MW128

Site Address: 700 Dexter
Seattle, Washington

Water Depth At Time of Drilling: 15 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
0								Boring air-knifed to 10 feet bgs prior to drilling.	
5									
10		2 3 4	100	52.8	B128-10	SM		Damp, loose, silty fine SAND with trace gravel, gray, faint hydrocarbon odor (40, 55, 5).	
15									

Drilling Co./Driller:	Cascade/Dave		**Well/Auger Diameter:**	2/8.25	inches
Drilling Equipment:	HSA		**Well Screened Interval:**	60 to 70	feet bgs
Sampler Type:	Split-spoon		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Silica Sand	
Total Boring Depth:	70.5	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	70	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:			**Monument Type:**	Flush mount	

Notes/Comments:

SoundEarth Strategies

DRAFT

Project:	700 Dexter
Project Number:	0797-001
Logged by:	DMM
Date Started:	1/9/14
Surface Conditions:	Concrete
Well Location N/S:	22 ft south of fire hydrant
Well Location E/W:	1 ft east of fire hydrant
Reviewed by:	--
Date Completed:	1/9/14

BORING LOG **B128** MW128

Site Address: 700 Dexter
Seattle, Washington

Water Depth At Time of Drilling 15 feet bgs

Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
15		5 5 3	50	2.6	B128-15	**SM**		**Wet, loose, wood debris with some soil - silty SAND with gravel, brown, no hydrocarbon odor (20, 70, 10).**	
20		4 7 8	33	1.3	B128-20	**SM-GM**		**Wet, medium dense, silty gravelly SAND, dark gray, no hydrocarbon odor (20, 40, 40).**	
25		5 9 11	100	0.6	B128-25	**SM-ML**		**Damp, medium dense, fine sandy SILT with trace gravel and wood debris, gray, no hydrocarbon odor (50, 45, 5).**	
30									

Drilling Co./Driller:	Cascade/Dave		**Well/Auger Diameter:**	2/8.25	inches
Drilling Equipment:	HSA		**Well Screened Interval:**	60 to 70	feet bgs
Sampler Type:	Split-spoon		**Screen Slot Size:**	0.010	inches
Hammer Type/Weight:	300	lbs	**Filter Pack Used:**	2/12 Silica Sand	
Total Boring Depth:	70.5	feet bgs	**Surface Seal:**	Concrete	
Total Well Depth:	70	feet bgs	**Annular Seal:**	Bentonite	
State Well ID No.:			**Monument Type:**	Flush mount	

Notes/Comments:

SoundEarth Strategies

DRAFT

Project:	700 Dexter
Project Number:	0797-001
Logged by:	DMM
Date Started:	1/9/14
Surface Conditions:	Concrete
Well Location N/S:	22 ft south of fire hydrant
Well Location E/W:	1 ft east of fire hydrant
Reviewed by:	--
Date Completed:	1/9/14

BORING LOG **B128** MW128

Site Address: 700 Dexter
Seattle, Washington

Water Depth At Time of Drilling: 15 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
30		6 10 15	100	0.0	B128-30	**SM/SP**		**Wet, medium dense, fine SAND with silt, dark gray, no hydrocarbon odor (10, 90, 0).**	
35		10 10 14	100	0.0	B128-35	**ML**		**Damp, medium dense, sandy SILT with trace gravel and wood debris, gray, no hydrocarbon odor (70, 25, 5).**	
40		12 14 15	100	0.0	B128-40	**ML**		**Damp, dense, SILT with fine sand, gray, no hydrocarbon odor (80, 20, 0).**	
45									

Drilling Co./Driller:	Cascade/Dave	
Drilling Equipment:	HSA	
Sampler Type:	Split-spoon	
Hammer Type/Weight:	300	lbs
Total Boring Depth:	70.5	feet bgs
Total Well Depth:	70	feet bgs
State Well ID No.:		

Well/Auger Diameter:	2/8.25	inches
Well Screened Interval:	60 to 70	feet bgs
Screen Slot Size:	0.010	inches
Filter Pack Used:	2/12 Silica Sand	
Surface Seal:	Concrete	
Annular Seal:	Bentonite	
Monument Type:	Flush mount	

Notes/Comments:

SoundEarth Strategies

DRAFT

Project:	700 Dexter
Project Number:	0797-001
Logged by:	DMM
Date Started:	1/9/14
Surface Conditions:	Concrete
Well Location N/S:	22 ft south of fire hydrant
Well Location E/W:	1 ft east of fire hydrant
Reviewed by:	--
Date Completed:	1/9/14

BORING LOG **B128** MW128

Site Address: 700 Dexter
Seattle, Washington

Water Depth At Time of Drilling: 15 feet bgs

Water Depth After Completion: -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
45		11 18 19	50	0.6	B128-45	**ML**		**Damp, dense, SILT/CLAY with fine sand, with small sand stringer, gray, no hydrocarbon odor (85, 15, 0).**	
50		12 13 15	100	0.6	B128-50	**SM-ML**		**Damp to moist, medium dense, silty fine SAND to sandy SILT, gray, no hydrocarbon odor (50, 50, 0).**	
55		12 12 16	75	0.0	B128-55	**ML**		**Damp, dense, fine sandy SILT, gray, no hydrocarbon odor (60, 40, 0).**	
60									

Drilling Co./Driller:	Cascade/Dave	
Drilling Equipment:	HSA	
Sampler Type:	Split-spoon	
Hammer Type/Weight:	300	lbs
Total Boring Depth:	70.5	feet bgs
Total Well Depth:	70	feet bgs
State Well ID No.:		

Well/Auger Diameter:	2/8.25	inches
Well Screened Interval:	60 to 70	feet bgs
Screen Slot Size:	0.010	inches
Filter Pack Used:	2/12 Silica Sand	
Surface Seal:	Concrete	
Annular Seal:	Bentonite	
Monument Type:	Flush mount	

Notes/Comments:

SoundEarth Strategies

DRAFT

Project:	700 Dexter
Project Number:	0797-001
Logged by:	DMM
Date Started:	1/9/14
Surface Conditions:	Concrete
Well Location N/S:	22 ft south of fire hydrant
Well Location E/W:	1 ft east of fire hydrant
Reviewed by:	--
Date Completed:	1/9/14

BORING LOG B128 MW128

Site Address: 700 Dexter
Seattle, Washington

Water Depth At Time of Drilling 15 feet bgs

Water Depth After Completion -- feet bgs

Depth (feet bgs)	Interval	Blow Count	% Recovery	PID (ppmv)	Sample ID	USCS Class	Graphic	Lithologic Description	Well Construction Detail
60		16 16 19	100	0.6	B128-60	SM/SP		**Moist, dense, fine SAND with silt, gray, no hydrocarbon odor (10, 90, 0).**	
65		11 12 14	100	0.0	B128-65	SM/SP		**Moist, dense, fine SAND with silt, gray, no hydrocarbon odor (10, 90, 0).**	
70		50/6	250	0.0	B128-70	SM/SP		**Wet, very dense, fine SAND with silt, gray, no hydrocarbon odor (10, 90, 0).**	
								End of boring at 70.5. Install MW128.	
75									

Drilling Co./Driller:	Cascade/Dave	
Drilling Equipment:	HSA	
Sampler Type:	Split-spoon	
Hammer Type/Weight:	300	lbs
Total Boring Depth:	70.5	feet bgs
Total Well Depth:	70	feet bgs
State Well ID No.:		

Well/Auger Diameter:	2/8.25	inches
Well Screened Interval:	60 to 70	feet bgs
Screen Slot Size:	0.010	inches
Filter Pack Used:	2/12 Silica Sand	
Surface Seal:	Concrete	
Annular Seal:	Bentonite	
Monument Type:	Flush mount	

Notes/Comments:

APPENDIX B
MONITORING WELL FMW-131 DOCUMENTATION

INTERIM ACTION WORK PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

Log of Boring: FMW-131

FARALLON CONSULTING

Client: Vulcan
Project: Block 37
Location: Seattle, WA
Farallon PN: 397-010
Logged By: Jared Kerr/ Amber

Date/Time Started:	8/30/16 @ 0740	**Sampler Type:**	SPT 18"
Date/Time Completed:	8/30/16 @ 0918	**Drive Hammer (lbs.):**	140lbs
Equipment:	D-120	**Depth of Water ATD (ft bgs):**	12.64
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	75.0'
Drilling Foreman:	Matt Graham	**Total Well Depth (ft bgs):**	74.85'
Drilling Method:	Hollow Stem Auger		

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0		0.0-3.0': Hydrovac to 5.0' bgs, poorly graded SAND with silt and gravel (70% sand, 20% gravel, 10% silt), fine to medium sand, coarse gravel, dark gray, dry, no odor.	SP-SM							Concrete
		3.0-5.0': Poorly graded Gravel (100% pea gravel), fine gravel, dark gray, dry, no odor.	GP							
10		10.0-15.0': SILT cuttings (90% silt, 10% sand) fine sand, trace gravel, gray, wet, no odor.	ML							
15		15.0-50.0': Sandy SILT cuttings (60 to 75% silt, 40 to 25% sand), fine sand, gray, wet, no odor, trace wood encountered at 15.0' bgs.	ML							
50		50.0-51.5': Poorly graded SAND (95% sand, 5% silt), fine to medium sand, trace gravel, dark gray, wet, no odor.	SP		100	3,12, 19	0.0	FMW-131-51.5-082516 @0950 FMW-131-52.5-082516-GW @1130	x x	Bentonite
		51.5-105.0': Silty SAND to Well-graded SAND cuttings (80 to 95% sand, 20 to 5% silt), fine to coarse sand, trace sand, dark gray, very wet, no odor.	SW-SM							

0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

Well Construction Information

Monument Type:	Flush Mount	**Filter Pack:**	Silica Sand 10-20
Casing Diameter (inches):	2"	**Surface Seal:**	Concrete
Screen Slot Size (inches):	0.010"	**Annular Seal:**	Bentonite
Screened Interval (ft bgs):	63-73'	**Boring Abandonment:**	NA

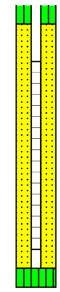
Ground Surface Elevation (ft): NA
Top of Casing Elevation (ft): NA
Surveyed Location: **X:** NA **Y:** NA

Log of Boring: FMW-131

Client: Vulcan
Project: Block 37
Location: Seattle, WA
Farallon PN: 397-010
Logged By: Jared Kerr/ Amber

Date/Time Started:	8/30/16 @ 0740	**Sampler Type:**	SPT 18"
Date/Time Completed:	8/30/16 @ 0918	**Drive Hammer (lbs.):**	140lbs
Equipment:	D-120	**Depth of Water ATD (ft bgs):**	12.64
Drilling Company:	Holocene	**Total Boring Depth (ft bgs):**	75.0'
Drilling Foreman:	Matt Graham	**Total Well Depth (ft bgs):**	74.85'
Drilling Method:	Hollow Stem Auger		

Depth (feet bgs.)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm)	Sample ID	Sample Analyzed	Boring/Well Construction Details
60										
								FMW-131-62.5-082516-GW @1230	x	Silica Sand
65										Screen
70										
								FMW-131-72.5-082516-GW @1350	x	
75										Bentonite
80										
								FMW-131-82.5-082516-GW @1535	x	
85										
90										
								FMW-131-92.5-082516-GW @1645	x	
95										
100										
								FMW-131-102.5-082516-GW	x	
105										



Well Construction Information

Monument Type:	Flush Mount	**Filter Pack:**	Silica Sand 10-20	**Ground Surface Elevation (ft):**	NA
Casing Diameter (inches):	2"	**Surface Seal:**	Concrete	**Top of Casing Elevation (ft):**	NA
Screen Slot Size (inches):	0.010"	**Annular Seal:**	Bentonite	**Surveyed Location:**	**X:** NA
Screened Interval (ft bgs):	63-73'	**Boring Abandonment:**	NA		**Y:** NA

Table 1
Soil Analytical Results for HVOCs
700 Dexter HVOC Plume
Seattle, Washington
Farallon PN: 397-010

Sample Location	Sample Identification	Sample Depth (feet)[1]	Sample Date	Analytical Results (milligrams per kilogram)[2] PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl Chloride
F-MW-131	F-MW-131-51.5-082516	51.5	8/25/2016	< 0.0012	< 0.0012	< 0.0012	< 0.0012	< 0.0012
MTCA Cleanup Levels for Soil[3]				**0.05**	**0.03**	**160[4]**	**1,600[4]**	**0.67[4]**
MTCA Method B Cleanup Levels for Soil Protective of Groundwater Vadose @ 25 Degrees Celsius[5]				**0.053**	**0.0264**	**0.0800**	**0.543**	**0.00183**
MTCA Method B Cleanup Levels for Soil Protective of Groundwater Vadose @ 13 Degrees Celsius[5]				**0.0499**	**0.0252**	**0.0781**	**0.518**	**0.00167**
MTCA Method B Cleanup Levels for Soil Protective of Groundwater Saturated[5]				**0.00276**	**0.00152**	**0.00515**	**0.0325**	**0.0000885**

NOTES:
Results in **bold** denote concentrations exceeding applicable cleanup levels.
< denotes analyte not detected at or exceeding the reporting limit listed.
[1]Depth in feet below ground surface.
[2]Analyzed by U.S. Environmental Protection Agency Method 8260C.
[3]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Soil Cleanup Levels for Unrestricted Land Uses, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013, unless otherwise noted.
[4]Washington State Cleanup Levels and Risk Calculations under the Washington State Model Toxics Control Act Cleanup Regulation, Standard Method B Formula Values for Soil (Unrestricted Land Use) - Direct Contact (Ingestion Only) and Leaching Pathway, https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx
[5]Washington State Cleanup Levels and Risk Calculations under the Washington State MTCA, Standard Method B Formula Values for Soil from CLARC Master spreadsheet updated September 2015, https://fortress.wa.gov/ecy/clarc/CLARCDataTables.aspx

PCE = tetrachloroethene
TCE = trichloroethene
HVOC = volatile organic compound

Table 2
Groundwater Analytical Results for HVOCs
700 Dexter HVOC Plume
Seattle, Washington
Farallon PN: 397-010

Sample Location	Sample Identification	Sample Date	Sample Depth (feet)[1]	Analytical Results (micrograms per liter)[2]				
				PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl Chloride
Reconnaissance Groundwater Samples								
F-MW-131	F-MW-131-52.5-082516-GW	8/25/2016	52.5	< 0.20	< 0.20	1.3	< 0.20	**1.3**
	F-MW-131-62.5-082516-GW	8/25/2016	62.5	< 0.20	< 0.20	**36**	< 0.20	**0.71**
	F-MW-131-72.5-082516-GW	8/25/2016	72.5	< 0.20	< 0.20	**33**	< 0.20	**2.6**
	F-MW-131-82.5-082516-GW	8/25/2016	82.5	< 0.20	< 0.20	3.9	< 0.20	**1.7**
	F-MW-131-92.5-082516-GW	8/25/2016	92.5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	F-MW-131-102.5-082516-GW	8/25/2016	102.5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Monitoring Well Groundwater Sample								
F-MW-131	S-MW-131-090216	9/2/2016	Screened: 63-73	< 0.20	< 0.20	**41**	< 0.20	**1.7**
MTCA Cleanup Levels for Groundwater[3]				**5**	**5**	**16[4]**	**160[4]**	**0.2**

NOTES:

Results in **bold** denote concentrations exceeding applicable cleanup levels.

< denotes analyte not detected at or exceeding the reporting limit listed.

[1]Depth in feet below ground surface.

[2]Analyzed by U.S. Environmental Protection Agency Method 8260C.

[3]Washington State Model Toxics Control Act Cleanup Regulation (MTCA) Method A Cleanup Levels for Groundwater, Table 720-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, as revised 2013, unless otherwise noted.

[4]Washington State Model Toxics Control Act Cleanup Regulation Cleanup Levels and Risk Calculations, Standard Method B Values for Groundwater, https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx

PCE = tetrachloroethene

TCE = trichloroethene

HVOC = volatile organic compound

ANALYTICAL LABORATORY REPORTS

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

August 26, 2016

Brani Jurista
Farallon Consulting, LLC
975 5th Avenue NW
Issaquah, WA 98027

Re: Analytical Data for Project 397-010
Laboratory Reference No. 1608-317

Dear Brani:

Enclosed are the analytical results and associated quality control data for samples submitted on August 25, 2016.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

Case Narrative

Samples were collected on August 25, 2016 and received by the laboratory on August 25, 2016. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Halogenated Volatiles EPA 8260C (soil) Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-51.5-082516**					
Laboratory ID:	08-317-01					
Dichlorodifluoromethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	

This report pertains to the samples analyzed in accordance with the chain of custody,
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Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-51.5-082516**					
Laboratory ID:	08-317-01					
1,1,2-Trichloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.0060	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.0012	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*124*	*76-131*				
Toluene-d8	*115*	*80-126*				
4-Bromofluorobenzene	*104*	*60-146*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0825S2					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Laboratory ID:	MB0825S2					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*119*	*76-131*				
Toluene-d8	*115*	*80-126*				
4-Bromofluorobenzene	*105*	*60-146*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	**Result**		**Spike Level**		**Percent Recovery**		**Recovery Limits**	**RPD**	**RPD Limit**	**Flags**
SPIKE BLANKS										
Laboratory ID:	SB0825S2									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0488**	**0.0495**	0.0500	0.0500	98	99	68-126	1	15	
Benzene	**0.0533**	**0.0533**	0.0500	0.0500	107	107	70-121	0	15	
Trichloroethene	**0.0499**	**0.0503**	0.0500	0.0500	100	101	75-120	1	15	
Toluene	**0.0517**	**0.0517**	0.0500	0.0500	103	103	80-120	0	15	
Chlorobenzene	**0.0478**	**0.0495**	0.0500	0.0500	96	99	76-120	3	15	
Surrogate:										
Dibromofluoromethane					*121*	*122*	*76-131*			
Toluene-d8					*117*	*115*	*80-126*			
4-Bromofluorobenzene					*106*	*106*	*60-146*			

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-52.5-082516-GW**					
Laboratory ID:	08-317-02					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	1.3	0.20	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	1.3	0.20	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	1.8	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-52.5-082516-GW**					
Laboratory ID:	08-317-02					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*117*	*71-131*				
Toluene-d8	*100*	*80-127*				
4-Bromofluorobenzene	*94*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-62.5-082516-GW**					
Laboratory ID:	08-317-03					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	0.71	0.20	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	36	0.20	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	1.8	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	

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Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-62.5-082516-GW**					
Laboratory ID:	08-317-03					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*119*	*71-131*				
Toluene-d8	*101*	*80-127*				
4-Bromofluorobenzene	*96*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-72.5-082516-GW**					
Laboratory ID:	08-317-04					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	2.6	0.20	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	33	0.20	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	1.8	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-72.5-082516-GW**					
Laboratory ID:	08-317-04					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*114*	*71-131*				
Toluene-d8	*101*	*80-127*				
4-Bromofluorobenzene	*97*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0825W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloromethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Vinyl Chloride	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Iodomethane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-25-16	8-25-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chloroform	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Trichloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromomethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
2-Chloroethyl Vinyl Ether	ND	1.8	EPA 8260C	8-25-16	8-25-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-25-16	8-25-16	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0825W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Bromoform	ND	1.0	EPA 8260C	8-25-16	8-25-16	
Bromobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	8-25-16	8-25-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-25-16	8-25-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-25-16	8-25-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*109*	*71-131*				
Toluene-d8	*100*	*80-127*				
4-Bromofluorobenzene	*94*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	**Result**		**Spike Level**		**Percent Recovery**		**Recovery Limits**	**RPD**	**RPD Limit**	**Flags**
SPIKE BLANKS										
Laboratory ID:	SB0825W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**10.1**	**9.76**	10.0	10.0	101	98	62-132	3	20	
Benzene	**10.1**	**10.1**	10.0	10.0	101	101	75-121	0	15	
Trichloroethene	**8.73**	**8.77**	10.0	10.0	87	88	65-115	0	15	
Toluene	**10.0**	**10.0**	10.0	10.0	100	100	78-120	0	15	
Chlorobenzene	**9.27**	**9.07**	10.0	10.0	93	91	77-118	2	15	
Surrogate:										
Dibromofluoromethane					*104*	*108*	*71-131*			
Toluene-d8					*99*	*97*	*80-127*			
4-Bromofluorobenzene					*94*	*94*	*80-125*			

Date of Report: August 26, 2016
Samples Submitted: August 25, 2016
Laboratory Reference: 1608-317
Project: 397-010

% MOISTURE

Date Analyzed: 8-25-16

Client ID	Lab ID	% Moisture
F-MW-131-51.5-082516	08-317-01	20

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 08-317

Company: Farallon
Project Number: ~~375-010~~ 397-010
Project Name: Block 37
Project Manager: Brani Jurista
Sampled by: A. Bailey

Turnaround Request (in working days)
(Check One)
- [x] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [ ] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture
1	F-MW-131-51.5-082516	8/25/16	0950	S	4						X																X
2	F-MW-131-52.5-082516-GW		1130	W	3						X																
3	F-MW-131-62.5-082516-GW		1230	W	3						X																
4	F-MW-131-72.5-082516-GW		1350	W	3						X																

	Signature	Company	Date	Time
Relinquished	[signature]	Farallon	8/25/16	1530
Received	Peggy McMahon	OSE	8.25.16	15:30
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

August 26, 2016

Brani Jurista
Farallon Consulting, LLC
975 5th Avenue NW
Issaquah, WA 98027

Re:	Analytical Data for Project 397-010
	Laboratory Reference No. 1608-335

Dear Brani:

Enclosed are the analytical results and associated quality control data for samples submitted on August 26, 2016.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

Case Narrative

Samples were collected on August 25, 2016 and received by the laboratory on August 26, 2016. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-82.5-082516-GW**					
Laboratory ID:	08-335-01					
Dichlorodifluoromethane	ND	0.25	EPA 8260C	8-26-16	8-26-16	
Chloromethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Vinyl Chloride	1.7	0.20	EPA 8260C	8-26-16	8-26-16	
Bromomethane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
Chloroethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Iodomethane	ND	1.8	EPA 8260C	8-26-16	8-26-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-26-16	8-26-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(cis) 1,2-Dichloroethene	3.9	0.20	EPA 8260C	8-26-16	8-26-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chloroform	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Trichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromomethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2-Chloroethyl Vinyl Ether	ND	2.4	EPA 8260C	8-26-16	8-26-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-82.5-082516-GW**					
Laboratory ID:	08-335-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromoform	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Bromobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichloropropane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*114*	*71-131*				
Toluene-d8	*98*	*80-127*				
4-Bromofluorobenzene	*92*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-92.5-082516-GW**					
Laboratory ID:	08-335-02					
Dichlorodifluoromethane	ND	0.25	EPA 8260C	8-26-16	8-26-16	
Chloromethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Vinyl Chloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromomethane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
Chloroethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Iodomethane	ND	1.8	EPA 8260C	8-26-16	8-26-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-26-16	8-26-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chloroform	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Trichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromomethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2-Chloroethyl Vinyl Ether	ND	2.4	EPA 8260C	8-26-16	8-26-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-92.5-082516-GW**					
Laboratory ID:	08-335-02					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromoform	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Bromobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichloropropane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*118*	*71-131*				
Toluene-d8	*97*	*80-127*				
4-Bromofluorobenzene	*95*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-102.5-082516-GW**					
Laboratory ID:	08-335-03					
Dichlorodifluoromethane	ND	0.25	EPA 8260C	8-26-16	8-26-16	
Chloromethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Vinyl Chloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromomethane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
Chloroethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Iodomethane	ND	1.8	EPA 8260C	8-26-16	8-26-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-26-16	8-26-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chloroform	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Trichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromomethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2-Chloroethyl Vinyl Ether	ND	2.4	EPA 8260C	8-26-16	8-26-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**F-MW-131-102.5-082516-GW**					
Laboratory ID:	08-335-03					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromoform	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Bromobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichloropropane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*116*	*71-131*				
Toluene-d8	*97*	*80-127*				
4-Bromofluorobenzene	*94*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0826W1					
Dichlorodifluoromethane	ND	0.25	EPA 8260C	8-26-16	8-26-16	
Chloromethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Vinyl Chloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromomethane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
Chloroethane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Iodomethane	ND	1.8	EPA 8260C	8-26-16	8-26-16	
Methylene Chloride	ND	1.0	EPA 8260C	8-26-16	8-26-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chloroform	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Trichloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromomethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromodichloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
2-Chloroethyl Vinyl Ether	ND	2.4	EPA 8260C	8-26-16	8-26-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	8-26-16	8-26-16	

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0826W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Tetrachloroethene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Dibromochloromethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Chlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Bromoform	ND	1.0	EPA 8260C	8-26-16	8-26-16	
Bromobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichloropropane	ND	0.27	EPA 8260C	8-26-16	8-26-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	8-26-16	8-26-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	8-26-16	8-26-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*71-131*				
Toluene-d8	*93*	*80-127*				
4-Bromofluorobenzene	*88*	*80-125*				

Date of Report: August 26, 2016
Samples Submitted: August 26, 2016
Laboratory Reference: 1608-335
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	**Result**		**Spike Level**		**Percent Recovery**		**Recovery Limits**	**RPD**	**RPD Limit**	**Flags**
SPIKE BLANKS										
Laboratory ID:	SB0826W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**10.5**	**9.43**	10.0	10.0	105	94	62-132	11	20	
Benzene	**10.8**	**9.89**	10.0	10.0	108	99	75-121	9	15	
Trichloroethene	**10.0**	**8.66**	10.0	10.0	100	87	65-115	14	15	
Toluene	**11.4**	**10.1**	10.0	10.0	114	101	78-120	12	15	
Chlorobenzene	**10.3**	**9.20**	10.0	10.0	103	92	77-118	11	15	
Surrogate:										
Dibromofluoromethane					*99*	*109*	*71-131*			
Toluene-d8					*97*	*95*	*80-127*			
4-Bromofluorobenzene					*92*	*93*	*80-125*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 08-335

Company: Farallon
Project Number: 397-010
Project Name: Block 37
Project Manager: Brani Jurista
Sampled by: A. Bailey

Turnaround Request (in working days)
(Check One)
- [x] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [ ] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture
1	F-MW-131-82.5-082516-GW	8/25/16	1535	W	3						X																
2	F-MW-131-92.5-082516-GW		1645								X																
3	F-MW-131-102.5-082516-GW		1815								X																

	Signature	Company	Date	Time
Relinquished		Farallon	8/25/16	8:00 Am
Received		OSE	8/25/16	8:00 Am
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

5°C

OnSite
Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

September 8, 2016

Brani Jurista
Farallon Consulting, LLC
975 5th Avenue NW
Issaquah, WA 98027

Re: Analytical Data for Project 397-010
Laboratory Reference No. 1609-026

Dear Brani:

Enclosed are the analytical results and associated quality control data for samples submitted on September 2, 2016.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

Case Narrative

Samples were collected on August 30 and September 2, 2016 and received by the laboratory on September 2, 2016. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**S-MW-131-090216**					
Laboratory ID:	09-026-01					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloromethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Vinyl Chloride	1.7	0.20	EPA 8260C	9-2-16	9-2-16	
Bromomethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloroethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Iodomethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Methylene Chloride	ND	1.0	EPA 8260C	9-2-16	9-2-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
(cis) 1,2-Dichloroethene	41	0.20	EPA 8260C	9-2-16	9-2-16	
Bromochloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloroform	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Trichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Dibromomethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromodichloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2-Chloroethyl Vinyl Ether	ND	1.5	EPA 8260C	9-2-16	9-2-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**S-MW-131-090216**					
Laboratory ID:	09-026-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Tetrachloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Dibromochloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromoform	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Bromobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*99*	*71-131*				
Toluene-d8	*101*	*80-127*				
4-Bromofluorobenzene	*94*	*80-125*				

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0902W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloromethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Vinyl Chloride	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromomethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloroethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Trichlorofluoromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Iodomethane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Methylene Chloride	ND	1.0	EPA 8260C	9-2-16	9-2-16	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2,2-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromochloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chloroform	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Carbon Tetrachloride	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Trichloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Dibromomethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromodichloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2-Chloroethyl Vinyl Ether	ND	1.5	EPA 8260C	9-2-16	9-2-16	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	9-2-16	9-2-16	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0902W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Tetrachloroethene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,3-Dichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Dibromochloromethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dibromoethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Chlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Bromoform	ND	1.0	EPA 8260C	9-2-16	9-2-16	
Bromobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	9-2-16	9-2-16	
2-Chlorotoluene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
4-Chlorotoluene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	9-2-16	9-2-16	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Hexachlorobutadiene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260C	9-2-16	9-2-16	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*71-131*				
Toluene-d8	*102*	*80-127*				
4-Bromofluorobenzene	*93*	*80-125*				

Date of Report: September 8, 2016
Samples Submitted: September 2, 2016
Laboratory Reference: 1609-026
Project: 397-010

HALOGENATED VOLATILES EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0902W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.22**	**9.49**	10.0	10.0	92	95	62-132	3	20	
Benzene	**9.79**	**10.2**	10.0	10.0	98	102	75-121	4	15	
Trichloroethene	**9.00**	**8.98**	10.0	10.0	90	90	65-115	0	15	
Toluene	**10.1**	**10.2**	10.0	10.0	101	102	78-120	1	15	
Chlorobenzene	**9.92**	**10.0**	10.0	10.0	99	100	77-118	1	15	
Surrogate:										
Dibromofluoromethane					*98*	*103*	*71-131*			
Toluene-d8					*100*	*101*	*80-127*			
4-Bromofluorobenzene					*92*	*93*	*80-125*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 09-026

Company: Farallon Consulting
Project Number: 377-010
Project Name: Block 37
Project Manager: Brani Jurista
Sampled by: Matt Bonser, Jared Kerr

Turnaround Request (in working days)
(Check One)
- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days) (TPH analysis 5 Days)
- ☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A					% Moisture
1	S-MW-131-090216	9/2/16	0835	W	3						X																
2	F-MW-131-injwater-083016	8/30/16	1450	W	3																						

	Signature	Company	Date	Time
Relinquished	[signature]	Farallon	9/2/16	1115
Received	Van	Speedy	9/2/16	1115
Relinquished	Van	Speedy	9/2/16	1205
Received	[signature]	OSE	9/2/16	1205
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
* Please hold F-MW-131-injwater-083016 until PM calls w/ analysis

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

APPENDIX C
INTERIM ACTION DESIGN DOCUMENTATION

INTERIM ACTION WORK PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

INTERIM ACTION SYSTEM

NOTES:

1) Overview: The Interim Action Interception Wells proposed in this plan will be installed for control of the 700 Dexter HVOC Plume. Geoengineers, with input from Farallon, evaluated the 700 Dexter HVOC Plume and hydrogeologic conditions and Farallon provided Middour Consulting LLC with the number and location of the interception wells, the well screen interval, and pumping rates to provide plume control, to the extent practicable.

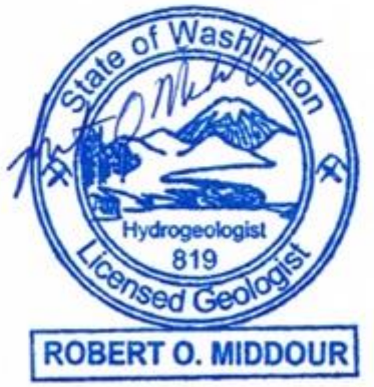
2) Interception wells shall be constructed as "resource protection wells" ("remediation wells") per WAC 173-160 with a design life of at least 3 years.

3) For bidding purposes assume and/or provide the following:

- Provide proposed drilling method and equipment
- Provide proposed well development method(s)
- Provide power requirements for submersible turbine pumps
- Assume a minimum of 4 hrs for well development per well
- Assume 400 lineal feet of 8-inch-diameter header pipe
- Assume 480V, 3-phase power drop on site

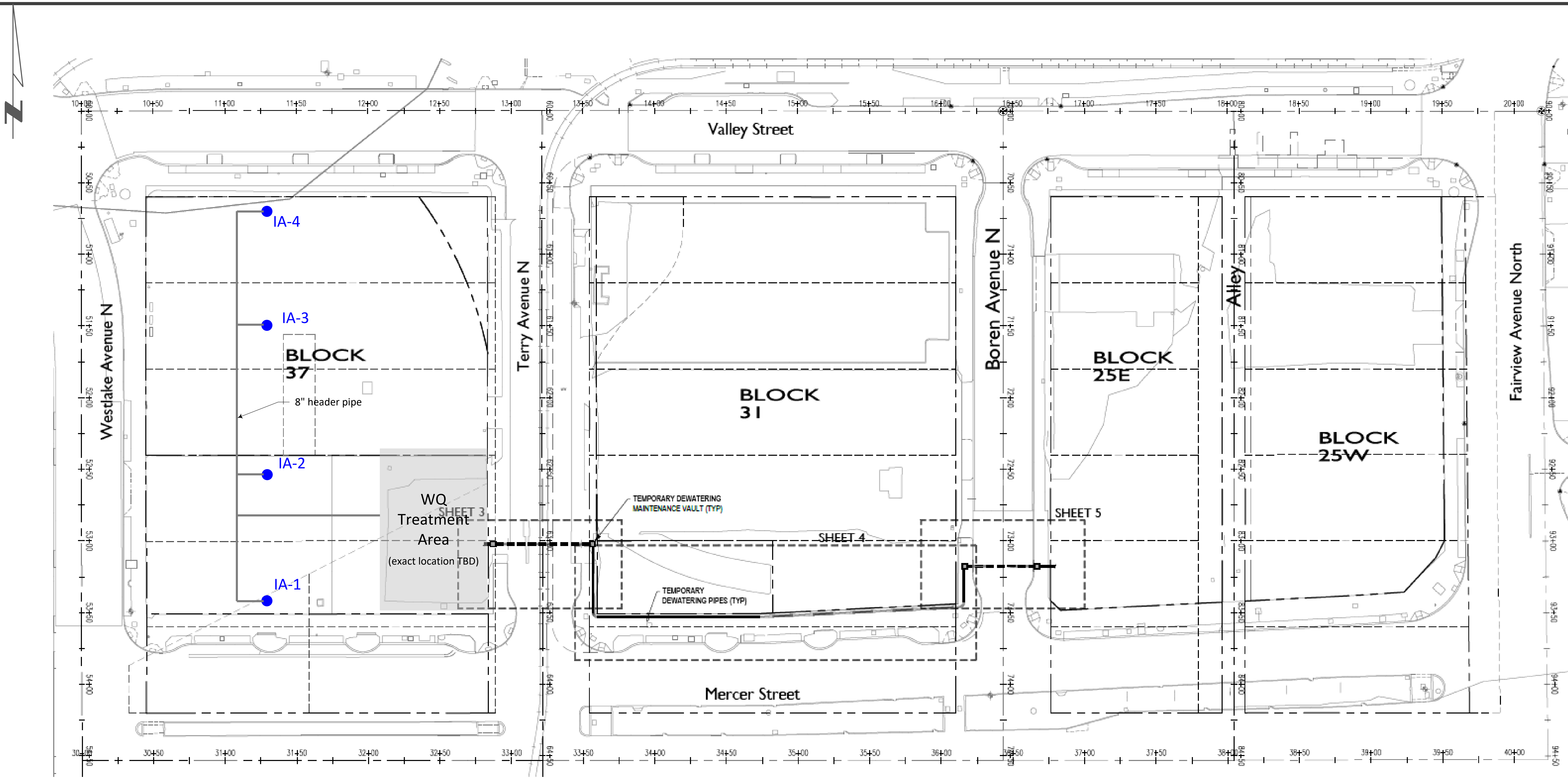
4) Refer to Figure 2 for a plan view layout of the interception wells.

5) Refer to Figure 3 for details regarding well construction and installation details.



MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 1
Construction Notes
INTERIM ACTION INTERCEPTION WELL PLAN | Seattle, WA
Project No. 16048001.01 | November 2, 2016



NOTES:

1) Locations of the interception wells are approximate; actual locations will be field located and staked.

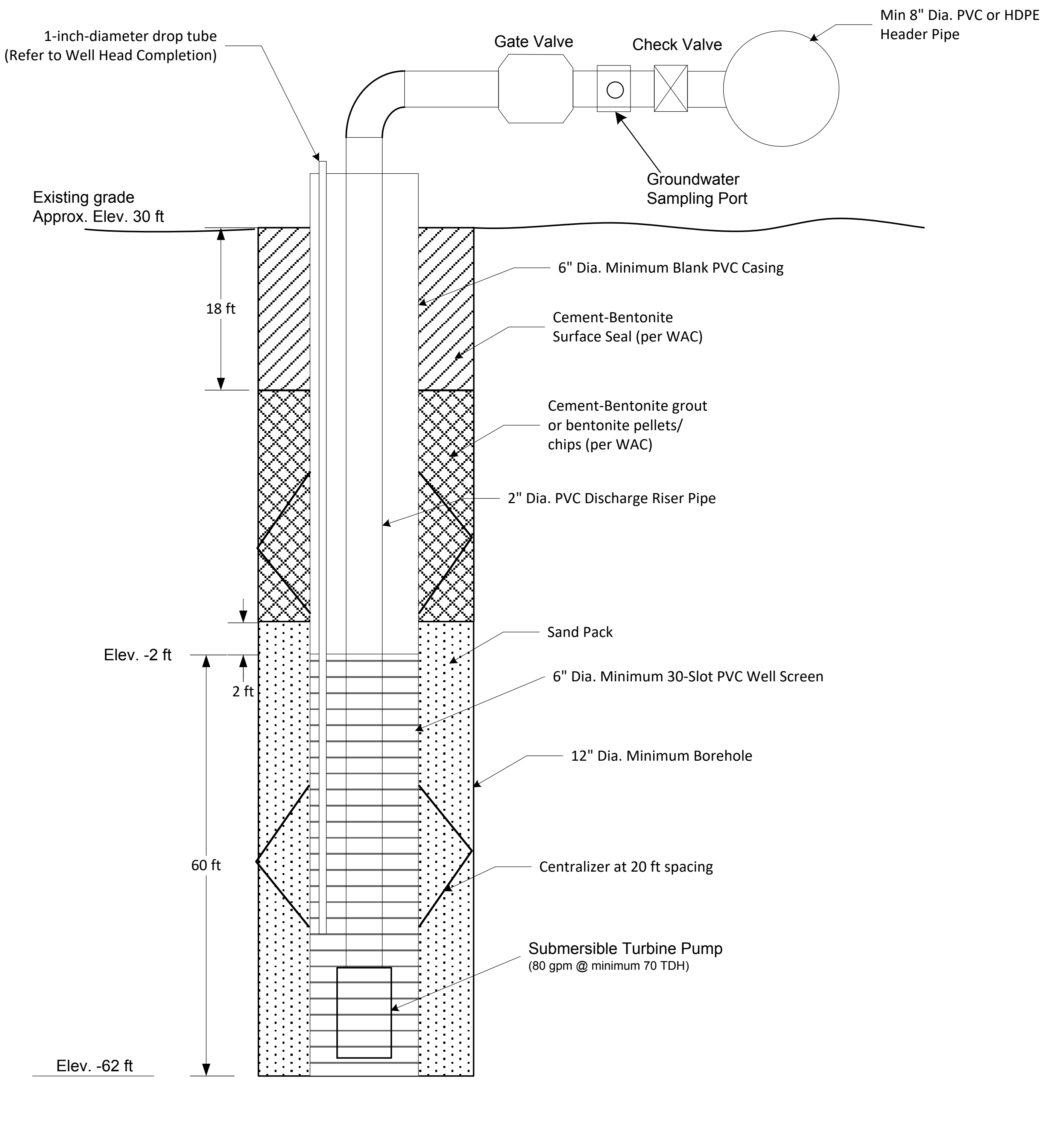
2) For bidding purposes assume 400 LF of 8-inch-diameter header pipe; connections to treatment system to be performed by others.

3) See Figure 3 for interception well construction details.

MIDDOUR CONSULTING LLC
groundwater control for underground construction

● INTERIM ACTION INTERCEPTION WELL LOCATION

FIGURE 2
Interception Well Layout Plan
INTERIM ACTION INTERCEPTION WELL PLAN | Seattle, WA
Project No. 16048001.01 | November 2, 2016



Not to Scale

NOTES:

Interim Action Interception Wells: Boreholes shall be drilled using bucket auger or rotary (air or wash) drilling methods and should be a minimum of 12-inch-diameter. Well casings and screen should be a minimum of 6-inch diameter Schedule 40 PVC. The bottom of the wells should be constructed to elevation -62 feet. The bottom 60 feet of the well should be constructed with well screen and based on the visual descriptions from the soil boring logs, well screens should consist of 30-slot screen size. The proposed locations of the interception wells are provided on Figure 1 and well construction details are shown on this figure.

Well Screen: The slot size shall be 0.030 and shall consist of a minimum of 17 in^2 of open area per lineal foot of well screen.

Sand Pack: The sand pack shall consist of a gradation similar to or in between a 16 x 30 sand or 12 x 20 sand. Based on previous projects with similar aquifer soils, this sand pack in combination with 30-slot well screen should optimize retention of the formation and provide the necessary well yield. The gradations of the proposed sand packs are listed in the table below. Well and seal construction shall be consistent with WAC 173-160.

Well Head Completion: Well head constructed to allow for manual water level measurements and/or pressure transducer installation via minimum 1-inch-diameter PVC drop tube installed to elevation -52 feet. Assume above grade well completion with below grade header pipe (trenching to be provided by others).

Development: Each interception well shall be developed upon completion. Development methods shall cause groundwater to flow into and out of the well screen; all sediment accumulated in the bottom of the well shall be removed. Development data shall be documented to demonstrate that additional development would produce limited improvement.

Submersible Turbine Pumps: Pumps shall be capable of providing up to 80 gpm under 70 feet of total dynamic head (TDH).

Header and Conveyance Piping: The main header and conveyance piping shall be constructed using a minimum of 8-inch-diameter PVC or HDPE pipe. The piping configuration should be coordinated with Farallon and the water treatment contractor. Assume above grade well completion with below grade header pipe (trenching to be provided by others).

Investigation-Derived Wastes (IDW): IDW such as drill cuttings and waste water generated during development shall be on-site in appropriately labeled containers until profiled for disposal or treatment by others.

Power Supply: To be determined with design finalization.

Sand Pack Gradations

Sieve Size	Grain Size		16 x 30		12 x 20	
No.	(mm)	(thousandths)	% Finer	% Retained	% Finer	% Retained
No. 12	1.68	66.1	99	1	96	4
No. 16	1.19	46.9	94	6	20	80
No. 20	0.841	33.1	22	78	1	99
No. 30	0.595	23.4	3	97		

MIDDOUR CONSULTING LLC
groundwater control for underground construction

FIGURE 3
Interception Well Construction Details
INTERIM ACTION INTERCEPTION WELL PLAN | Seattle, WA
Project No. 16048001.01 | November 2, 2016

WASTEWATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

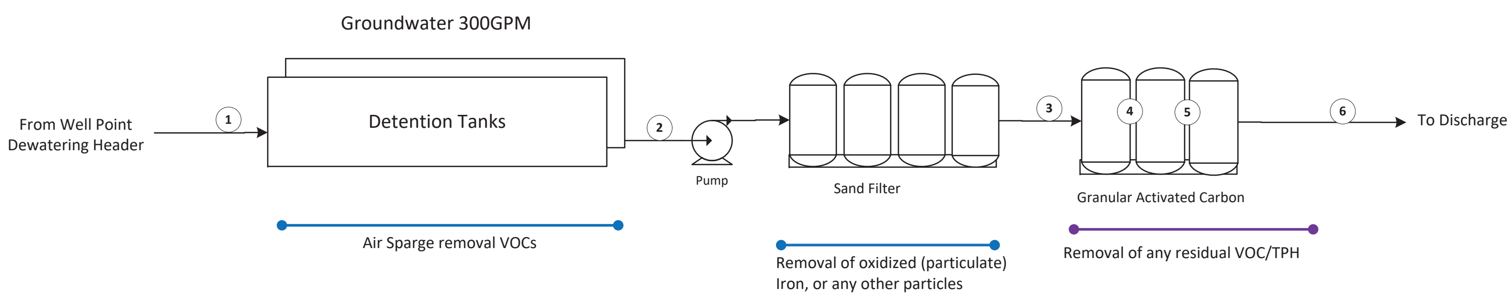
Interim Action

WATERTECTONICS

REVISIONS			
REV	DESCRIPTION	DATE	INITIALS
0	Equipment Layout & Sampling Plan	11/4/2016	LD
1	Added sample location after detention tanks	11/11/2016	LD

Sample Locations

1 – Influent
2 – Post Sparge
3 – Post SF
4 – Post Vessel 1
5 – Post Vessel 2
6 – Post Vessel 3/Effluent



Equipment Specifications

Detention Tanks: Two (Qty 2), max 19,000 gallon capacity each. Dimensions (internal) 40'L x 8'W x 9'H.

Blowers: One (Qty 1) 350CFM, 8.4HP blower/tank

Sand Filter: One (Qty 1) 48" x 4 Pod, unit with pressure gauges and automated backwash

Carbon Vessels: Three (Qty 3) 6000lb capacity each

Water Quality Sampling/Testing

System Start-up: Samples will be collected from locations 1, 2 & 6 within the first 30 minutes of the initial discharge from the system. These samples will be immediately delivered to the lab for a rush (24 hour turnaround) analysis.

Weekly: (first month of operations):
Collect samples at all locations to inform contaminate removal rate calculations which determine operation and maintenance decisions.

Monthly: (thereafter if results remain consistent)
Collect samples at all locations to inform contaminate removal rate calculations which determine operation and maintenance decisions. If abnormal results are found return to weekly sampling.

Upsets:
If data results indicate that discharge limits may not be met, maintenance activities will occur (back washing carbon, sediment removal from tanks, etc.) and the locations will be resampled. If resampling data indicates deficiencies additional treatment (tanks, blowers, carbon vessels) will be mobilized to site or treatment may be provide by secondary construction treatment system onsite.

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WATERTECTONICS	PG SIZE: 11x17	DWG NO: 1	PROJECT NAME: Interim Action – South Lake Union	REV: 1
DRAWN: LDoty				
ISSUED: 11/11/2016	SCALE: 1/8" = 1'-0"			SHEET: 1 of 1

APPENDIX D
SAMPLING AND ANALYSIS PLAN

INTERIM ACTION WORK PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

4841-4944-6973, v. 2

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Bend | Baker City
California
Oakland | Sacramento | Irvine

SAMPLING AND ANALYSIS PLAN

700 DEXTER HVOC PLUME
PORTION OF 700 DEXTER SITE
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 397-044

For:
City Investors XI LLC
505 5th Avenue South, Suite 900
Seattle, Washington 98104

December 1, 2016

Prepared by:

Kim Magruder Carlton
Associate Scientist

Reviewed by:

Thaddeus Cline, P.E., L.G., L.H.G.
Principal Civil Engineer/Hydrogeologist

TABLE OF CONTENTS

TABLE

ATTACHMENTS

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Sampling and Analysis Plan (SAP) on behalf of City Investors XI LLC (City Investors), owner of the property located at 630 Westlake Avenue North (Block 37 Property), in support of an interim action to be conducted in the South Lake Union area of Seattle, Washington (Interim Action) and per the *Interim Action Work Plan, 700 Dexter HVOC Plume, Portion of 700 Dexter Site, South Lake Union Properties, Seattle, Washington* dated December 1, 2016, prepared by Farallon (Interim Action Work Plan) to which this SAP is attached as Appendix D. The location of the Block 37 Property is shown on Figure 1 of the Interim Action Work Plan.

Lakefront Investors 1 LLC and Lakefront Investors 2 LLC (collectively, Lakefront Investors) are planning to redevelop two properties in the South Lake Union area with work scheduled to begin in December 2016. The two properties to be redeveloped are referred to herein as the Block 25 Property (609 Fairview Avenue North and 630 Boren Avenue North) and the Block 31 Property (625 Boren Avenue North) (Figure 2 of the Interim Action Work Plan). Construction at the Blocks 25 and 31 Properties requires dewatering for a period of up to 10 months scheduled to begin in January 2017.

Groundwater in the South Lake Union area is impacted by tetrachloroethene (PCE) and its degradation compounds trichloroethene (TCE), isomers of dichloroethene (DCE), and vinyl chloride (collectively referred to as HVOCs) released at and from a former dry cleaner facility at 700 Dexter Avenue North (700 Dexter Property), known as American Linen Supply Co (American Linen) (Figure 2 of the Interim Action Work Plan) currently owned by 700 Dexter, LLC. HVOCs have migrated through groundwater to the northeast, east, and south of the former American Linen facility and comprise a regional plume of unknown extent; however, based on empirical data, the regional plume (700 Dexter HVOC Plume) is known to extend as far east as the middle of Block 37 Property (Figure 2 of the Interim Action Work Plan) but not as far east as the Block 31 Property.

The purpose of the Interim Action is to prevent further migration of the 700 Dexter HVOC Plume and manage contaminated groundwater by extraction and treatment at the Block 37 Property to avoid potential impacts to the down-gradient Blocks 25 and 31 Properties during construction dewatering. The Interim Action includes installation and pumping of four interception wells. Groundwater extracted from the interception wells will be treated in an on-site wastewater treatment system. Monitoring the effectiveness of the Interim Action (Performance Monitoring) will include:

1. Automatic recording of water levels with pressure transducers and data loggers so that the groundwater gradient and flow direction may be inferred over time and over distance from observation wells (Logging).

2. Manual gauging of groundwater level elevations so that the groundwater flow gradient and flow direction may be inferred over time and over distance from observation wells and to corroborate Logging data (Gauging).
3. Groundwater and wastewater sampling for analysis for HVOCs at specific locations and times (Sampling). Sampling applies only to monitoring wells FMW-131 and FMW-3D and to influent of the wastewater treatment system.

The overall objective for this SAP is to develop and implement procedures that will ensure the collection of representative data of known and acceptable quality. This SAP presents the procedural and quality assurance/quality control (QA/QC) requirements for Performance Monitoring. The purpose of this SAP is to define the specific procedures for data acquisition to ensure that it is conducted in accordance with technically acceptable protocols and the data quality objectives are met.

Further details about the Interim Action and Performance Monitoring are presented in the Interim Action Work Plan.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section identifies Performance Monitoring key project personnel, responsibilities of the team members, and Laboratory Project Managers.

2.1 MANAGEMENT

Farallon Principal Civil Engineer/Hydrogeologist Thaddeus Cline will serve as the Farallon Project Manager whose primary role is to ensure compliance with the requirements of this SAP. The Project Manager will have a direct line of communication with City Investors, and is responsible for implementing activities described in the SAP. The Project Manager will provide overall program guidance to support staff, and will ensure that the documents, procedures, and project activities meet the objectives presented in the SAP.

2.2 FIELD COORDINATOR

Farallon Senior Project Manager Joe Rounds will serve as the Farallon Field Coordinator, responsible for directing Performance Monitoring field activities. The Field Coordinator will ensure that appropriate protocols for sample collection, preservation, and holding times are observed, and will submit or arrange for submittal of environmental samples to the designated laboratory for analysis for HVOCs.

2.3 QUALITY ASSURANCE/QUALITY CONTROL MANAGER

Farallon Associate Scientist Kim Magruder Carlton will serve as the Farallon QA/QC Manager, providing Performance Monitoring QA/QC observation related to field sampling and laboratory analysis. The QA/QC Manager will ensure that samples are collected and documented appropriately and that laboratory analytical data meet the project-specific data quality objectives.

2.4 DATA MANAGER

Farallon Environmental Data Manager Jeanette Mullin will serve as the Farallon Data Manager, and will compile field measurements and analytical data into a database, review the data for completeness and consistency, and append the database with assigned qualifiers based on results of the data quality assessment.

2.5 LABORATORY PROJECT MANAGER

David Baumeister of OnSite Environmental Inc. of Redmond, Washington (OnSite) will serve as the Laboratory Project Manager, overseeing laboratory operations associated with the receipt of environmental samples, chemical analyses, and laboratory report preparation for this project.

The analytical laboratory will be responsible for the following tasks:

- Performing the methods outlined in the SAP;

- Adhering to documentation, custody, and sample logbook procedures;
- Meeting reporting and QA/QC requirements;
- Delivering electronic data files as specified in the SAP;
- Meeting turnaround times for deliverables as described in the SAP; and
- Allowing the Farallon QA/QC Manager to perform laboratory and data audits.

3.0 DATA QUALITY OBJECTIVES AND MEASUREMENT CRITERIA

Data quality objectives (DQOs) provide a qualitative and quantitative framework and series of planning steps based on the scientific method around which data collection programs are designed. The use of DQOs ensures that the objectives of Performance Monitoring are clearly defined; the type, quantity, and quality of environmental data used in decision making are appropriate for their intended application; and acceptable levels of decision error and performance goals are specified, such that the quantity and quality of data needed to support management decisions are provided.

The objective of the Performance Monitoring is to assess the effectiveness of the Interim Action system described in detail in Section 3.2 of the Interim Action Work Plan. Objectives specific to addressing the quality of environmental data obtained throughout Performance Monitoring, referred to as measurement quality indicators, are described below.

3.1 MEASUREMENT QUALITY INDICATORS

The overall QA/QC objective for this SAP is to develop and implement procedures that will ensure the collection of representative data of known and acceptable quality. Project-specific measurement quality objectives will be used to assess analytical laboratory performance.

Measurement quality indicators are generally defined in terms of five parameters:

- Precision;
- Accuracy (or bias);
- Representativeness;
- Comparability; and
- Completeness.

Each parameter is defined below. Table 1 presents laboratory HVOC data measurement quality indicators, sample handling details, and laboratory reporting limit requirements.

3.2 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. The goal is to maintain a level of analytical precision consistent with the objectives of the action. Work for this project will adhere to established protocols as presented in this SAP. Precision will be evaluated using the results of laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), matrix spikes (MSs) and matrix spike duplicates (MSDs), laboratory matrix duplicates, and matrix triplicates as applicable per the analytical methods. Analytical precision measurements may be carried out on project-specific samples at the discretion of the supervising environmental professional (i.e., the Farallon Project Manager or Farallon Field

Coordinator). Laboratory precision will be evaluated against project-required control limits specified in Table 1.

The equation used to evaluate precision is:

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

where:
RPD = relative percent difference
A = Analytical result from one of two duplicate measurements
B = Analytical result from the second measurement

3.3 ACCURACY

Accuracy (or bias) is an expression of the degree to which a measured value conforms to the reference value. MSs, laboratory blanks, LCSs, and surrogate standards will be used to evaluate the bias of the analytical data. Accuracy measurements will be carried out at a minimum frequency of 1 per 20 samples per matrix analyzed. Because MSs and MSDs measure the effects of potential matrix interferences for a specific matrix, the laboratory will report MSs and/or MSDs with each batch of samples. MS/MSDs may be carried out on project-specific samples at the discretion of the supervising environmental professional. If project-specific MS/MSD samples are requested, additional sample volume will be submitted to the laboratory.

Laboratory accuracy will be evaluated against project-specific measurement quality objectives outlined in Table 1. Accuracy can be expressed as a percentage of the true or reference value, or as percent recovery in analyses where reference materials are not available and spiked samples are analyzed.

The equation used to determine percent recovery for spiked samples is:

$$Percent\ Recovery = \frac{A-X}{B} \; x \; 100\%$$

where:
A = Value measured in spiked sample or standard
X = Value measured in original sample
B = True value of amount added to sample or true value of standard

The equation used to determine percent recovery for LCS or reference materials is:

$$Percent\ Recovery = \frac{A}{B} \; x \; 100\%$$

where:
A = Value measured in control or reference sample
B = Established concentration of the control or reference sample

Method blanks and field equipment blanks can reflect systematic bias resulting from contamination of samples during collection or laboratory analysis. Method blanks will be analyzed by the analytical laboratory at the frequency specified in the analytical method. Field equipment blanks will be prepared and analyzed for the first Sampling event, with additional blanks prepared and analyzed at the discretion of the supervising environmental professional. Any detected values will be evaluated.

Trip blanks will be used to check for procedural contamination, cross-contamination, and contamination during shipment and storage of samples collected for analysis for volatile organic compounds (VOCs). One trip blank, filled with analyte-free deionized water and preserved with hydrochloric acid, will be submitted to the project laboratory for each cooler containing water samples for analysis for VOCs. After their preparation, the sample containers will not be opened until they have been returned to the laboratory. Up to three trip blanks will be analyzed by the analytical laboratory throughout the Performance Monitoring period.

3.4 REPRESENTATIVENESS

Representativeness is the degree to which sample data accurately and precisely represent conditions in the project area. Representativeness is dependent on sampling and analytical variability and the variability of environmental media. The sampling design, collection techniques, sample handling protocols, analytical methods, and data review procedures have been developed to ensure that the results obtained are representative of conditions at the site.

3.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability will be maintained through consistent use of the sampling and analytical methodologies and through the use of established QA/QC procedures and appropriately trained personnel. In addition, the use of standard methods and procedures for both sample collection and laboratory analysis will make the data collected comparable to internal and other data generated.

3.6 COMPLETENESS

Completeness is defined as a measure of the amount of valid data obtained from an event or investigation compared to the total amount of data obtained. Completeness (C) will be calculated as follows:

$$C = \frac{[(\text{number of acceptable data points}) \text{ x } 100]}{(\text{total number of data points collected})}$$

The measurement quality objective for completeness for all components of this project is 95 percent, as indicated in Table 1. Data that have been qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that have been qualified as rejected will not be considered valid for the purpose of assessing completeness.

4.0 SPECIAL TRAINING AND CERTIFICATION

Field personnel will be fully trained in the collection and processing of the types of samples, decontamination protocols, and chain-of-custody procedures to successfully complete the activities described in this SAP. Field personnel, including subcontractors, who perform project field activities will be required to have completed the 40-Hour Hazardous Waste Operations and Emergency Response standard training course and annual 8-Hour refresher courses. Training and certifications for field personnel are documented in the personnel files at Farallon. Subcontractors are responsible for ensuring the required training and medical monitoring has been completed for their personnel prior to field work. Documentation of subcontractor training and certification will be provided to Farallon upon request.

The analytical laboratory will be certified through the Washington State Department of Ecology (Ecology) and National Environmental Laboratory Accreditation Program for the analytical methods performed (Attachment 1). Laboratory personnel training and certification requirements are provided in the laboratory QA Manual (Attachment 2). Laboratory and personnel certifications will remain current for the duration of the project.

5.0 DOCUMENTATION AND RECORD KEEPING

Procedures, observations, and test results will be documented for sample collection, laboratory analysis and reporting, and data quality assessment activities. Procedures for documentation of these activities are described in this section.

5.1 FIELD RECORDS AND SAMPLE LABELING

Documentation of field activities will be provided on the following field documentation included in Attachment 3: Field Report form, Low Flow Well Purging and Sampling Data form, Groundwater Level Measurement Summary Form, sample label, Chain of Custody form, waste material label, and Waste Inventory Tracking Sheet. Documentation generated during the field program will be retained in the project file and included in the reports generated, as appropriate.

5.1.1 Field Report Form

Field personnel will be required to keep a daily field log on a Field Report form during each field event, including Logging, Gauging, and Sampling. Field notes will be as descriptive and inclusive as possible, enabling independent parties to reconstruct the field activities during Gauging and Sampling from the recorded information. Language will be objective, factual, and free of inappropriate terminology. A summary of each day's events will be provided on the Field Report form. At a minimum, field documentation will include the date, job number, project identification and location, weather conditions, sample collection data, personnel present and responsibilities, field equipment used, and any activities performed in a manner other than as specified in the SAP. In addition, if other forms or documents such as well-head surveys or maps are completed or used, they will be cited in and attached to the Field Report form. Field personnel will sign the completed Field Report form.

5.1.2 Low Flow Well Purging and Sampling Data Form

A Low Flow Well Purging and Sampling Data form will be used to record data during a groundwater sampling event, including depth to groundwater, well purging information, and other pertinent hydrologic measurements and supplementary information collected during Sampling at each monitoring well. The form will be completed by the Field Scientist at the time of sample collection. These forms will be maintained in the project files.

5.1.3 Groundwater Level Measurement Summary Form

A Groundwater Level Measurement Summary form will be used to specifically record the depth to groundwater at a monitoring well during a Gauging event. The form will be completed by the Field Scientist at the time of groundwater level measurement. These forms will be maintained in the project files.

5.1.4 Sample Label and Sample Designation

During Sampling events, a sample label will be filled out and affixed to the sample container(s) appropriate for the required laboratory analysis. Sample labels will be filled out in indelible ink and affixed to appropriate containers immediately prior to sample collection. In addition to the sample identifier and number, the sample labels will include the client name, project name and number, date and time of sample collection, sampler's initials, analytical method, and analyte preservative(s).

The groundwater samples collected from monitoring wells will be assigned a unique sample identifier that will include the monitoring well or sampling port identification. For example, a wastewater sample collected from a sampling port at the inflow to the wastewater treatment system during a Sampling event on January 10, 2017, would be numbered IAWW-INF-011017. The sample identifier will be indicated on the sample label, Field Report form, and Chain-of-Custody form.

Field equipment rinsate samples and associated blanks from a Sampling event would be labeled with the prefix "EQUIP" and "Blank," respectively, and the date. Information pertaining to the field equipment rinsate and field blanks will be recorded on the Field Report form.

5.1.5 Chain-of-Custody Form

The written procedures that are followed whenever samples are collected, transferred, stored, analyzed, or destroyed are designed to create an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. This written record, the Chain of Custody form, will be filled out by field sampling personnel at the time a sample is obtained.

All samples submitted to the laboratory are accompanied by the Chain of Custody form. This form is checked for accuracy and completeness, signed, and dated by the laboratory sample custodian accepting the sample. At the laboratory, each sample is assigned a unique, sequential laboratory identification number that is stamped or written on the Chain of Custody form.

All samples are held under internal chain of custody in the sample control room under the appropriate storage conditions (e.g., ambient, refrigeration, frozen). The laboratory Project Manager assigned to a particular client is responsible for tracking the status of the samples throughout the laboratory. Samples are signed out of the sample control room in a sample control logbook by the analyst who will prepare the samples for analysis.

The Chain of Custody form includes the client name, project name and number, date and time sampled, sample identifier, sampler's initials, analysis, and analyte preservative(s), if any.

5.1.6 Waste Material Label

If purge water will be stored on the site overnight, a waste material label will be filled out and affixed to the appropriate waste container immediately upon filling. The label is filled out in indelible ink and includes the job number and name, the address where the waste was generated, container contents, date, consultant's name and phone number, sampler's initials, and any other information that may assist with identification or characterization of wastes.

5.1.7 Waste Inventory Tracking Sheet

Should purge wastewater generated during field activities need to be temporarily stored on the site overnight, a Waste Inventory Tracking Sheet will be used to document and track the waste. The form will include information on the waste container, the origin of the waste, the type of waste, the date generated, the date removed from the site, the transporter or name of the individual disposing of the waste in the on-site wastewater treatment system, and the disposal location.

5.2 LABORATORY DATA REPORTS

Activities and results associated with analysis of the samples submitted to the analytical laboratory will be documented at the analytical laboratory. Laboratory documentation procedures are described in the laboratory QA Manual, provided as Attachment 2.

The analytical laboratory will provide analytical results and associated documentation for each sample in a data package for each sample delivery group or analytical batch. Data packages will be comparable in content to a complete U.S. Environmental Protection Agency (EPA) Contract Laboratory Program package (often referred to as a Level IV data package), although the format may differ from Contract Laboratory Program requirements. Each data package will contain the information required for a complete QA review, including the following:

- **Project Narrative.** This summary, presented in a cover letter, will discuss problems (including deviations from applicable laboratory Standard Operating Procedures [SOPs] and this SAP), if any, encountered during analysis. This summary will discuss but not be limited to QC, sample shipment, sample storage, and analytical difficulties. Any actual or perceived problems identified and their resolutions will be documented with as much detail as appropriate.
- **Chain-of-Custody Records.** Legible copies of the Chain of Custody forms will be provided as part of the data package. This documentation will include the time of receipt and the condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory also will be documented.
- **Sample Results.** The data package will summarize the results for each sample analyzed. The summary will include the following information, where applicable:
  - Field sample identification and the corresponding laboratory sample identification;
  - Sample matrix;
  - Date of sample extraction;

- Date and time of analysis;
- Weight and/or volume used for analysis;
- Final dilution volume or concentration factor for the sample;
- The instrument used for analysis;
- Method detection limits;
- Method reporting limits;
- Analytical results with units identified; and
- Data qualifiers and their definitions.

- **QC Summaries.** This section will contain the results of the laboratory QC procedures. Each QC sample analysis will be documented with the same information required for the sample results (see above). No recovery or blank corrections will be made by the laboratory. The required summaries are listed below; additional information may be requested.
- **Calibration Data Summary.** This summary will report the concentrations of the initial calibration and daily calibration standards, and the date and time of analysis. The response factor, percent relative standard deviation, percent difference, r-value, and retention time for each analyte will be listed, as appropriate. Results for standards to indicate instrument sensitivity will be documented.
- **Method Blank Analysis.** The method blank analyses associated with each sample and the concentrations of all compounds of interest will be reported.
- **Surrogate Spike Recovery.** Surrogate spike recovery data for organic compounds will be reported. The names of compounds added, percent recoveries, and range of acceptable recoveries will be listed.
- **Matrix Spike Recovery.** Matrix spike recovery data for applicable analyses will be reported. The names and concentrations of compounds added, percent recoveries, and range of acceptable recoveries will be listed. The relative percent difference (RPD) for MSD analyses will be included.
- **Matrix Duplicate.** RPD values for matrix duplicate analyses will be reported.
- **Laboratory Control Sample.** LCS recovery data will be reported. The names and concentrations of compounds added, percent recoveries, and range of acceptable recoveries will be listed. The RPD for LCSD analyses will be included.
- **Relative Retention Time.** The relative retention time of each analyte detected in the samples will be reported for both primary and confirmational analyses.

- **Original Data.** A PDF of legible copies of original data generated by the laboratory will include:
  - Sample extraction, preparation, and cleanup logs;
  - Instrument specifications and analysis logs for instruments used on days of calibration and analysis;
  - Reconstructed ion chromatograms for samples, standards, blanks, calibrations, spikes, replicates, and reference materials;
  - The spectra of detected compounds, with associated best-match spectra for each sample;
  - Printouts and quantitation reports for each instrument used, including reports for samples, standards, blanks, calibrations, spikes, replicates, and reference materials;
  - Original data quantification reports for each sample; and
  - Original data for blanks and samples not reported.

The data from this project will be stored electronically in Farallon's project files. In addition to the PDF laboratory report, including the elements in the bulleted list above, the laboratory will provide results electronically in Farallon's project database format.

6.0 SAMPLE COLLECTION AND FIELD MEASUREMENTS

This section provides procedures for Gauging and Sampling according to Farallon Standard Operating Procedures provided as Attachment 4.

6.1 SAMPLING PROCEDURES

The field sampling procedures and sample handling protocols for Gauging and Sampling are discussed below. All field sampling data will be documented as described in Section 5, Documentation and Record Keeping. All field personnel will comply with the Interim Action Well Monitoring Health and Safety Plan provided as Attachment 5.

6.1.1 Groundwater Elevation Measurements and Groundwater Sampling

Groundwater elevations will be measured during Gauging in accordance with SOP GW-03, Groundwater Level Measurements in Monitoring Wells, included in Attachment 4.

Groundwater samples collected from monitoring wells will be collected in accordance with SOP GW-04, Low-Flow Groundwater Sampling Procedures, included in Attachment 4, and will be consistent with EPA low-flow sampling guidance (EPA 1996a) and ambient water sampling guidance (EPA 1996b). Farallon will record the depth to groundwater, monitoring well purging information, and other pertinent hydrologic measurements and supplementary information collected during Sampling at each monitoring well.

6.1.2 Influent Wastewater Sampling

The wastewater treatment system will be equipped with a sampling port for collection of influent wastewater samples. Influent wastewater samples will be collected as follows:

- Place a 5-gallon waste bucket below the sampling port.
- Open the sampling port and remove enough wastewater from the plumbing to flush approximately 1 gallon through the sampling port, taking care to collect all waste water for disposal;
- Measure water quality parameters in accordance with SOP GW-04.
- When filling the laboratory-supplied pre-preserved sample containers, set the sampling port at a low enough flow rate to prevent over-filling of the container and subsequent loss of preservative.
- When filling the sample containers, hold the cap in hand to minimize contamination, and direct the flow from the sampling port discharge down the side of the sample container to minimize aeration. Fill all sample containers to the top, ensuring a positive meniscus when the cap is screwed down on the container. Tap the filled sample container, and invert several times to ensure no air bubbles are present in the sample container. If an air bubble is present, carefully remove the sample container lid and add a few drops of

sample, ensuring a positive meniscus, and screw the cap down, inverting several times to ensure there are no air bubbles present. If air bubbles are still present, the VOC sample must be recollected using a fresh VOC sample container.

- Immediately after collection, wrap the sample containers in bubble wrap, place in a resealable plastic bag, and place upright in a cooler on ice as described in Section 7, Sample Handling and Chain-of-Custody Procedures.

6.2 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Field QC samples will be used to evaluate the efficiency of field decontamination and processing procedures, and to verify proper sample storage conditions. Field QC samples will be documented in the Field Report forms. Field QC samples include equipment rinsate blanks, water blanks, and trip blanks. Additional sample volume may be collected to accommodate batch-specific laboratory QC sample analyses. Field QC sample collection procedures are described below.

6.2.1 Equipment Rinsate and Water Blanks

Equipment rinsates and water blanks provide a QC check on the cleanliness of the dedicated tubing used for the collection of groundwater samples from the monitoring wells. The equipment rinsate sample consists of collecting laboratory-provided VOC-free water using the same type of dedicated sampling equipment used to collect groundwater from the monitoring wells using low-flow collection methods. The equipment rinsate blank will be recorded on the Field Report form.

The water blank is an unadulterated sample of the VOC-free water used to create the equipment rinsate blank, and is analyzed to ensure no contaminants are present in the rinse water.

One equipment rinsate blank and one water blank will be collected during the first groundwater Sampling event. Additional equipment rinsate blanks and water blanks may be collected throughout the Performance Monitoring period at the discretion of the supervising environmental professional.

6.2.2 Trip Blanks

Analysis of trip blanks is performed to evaluate outside contributions of HVOCs during transport of the containers to and/or from the laboratory. A trip blank will be prepared by the laboratory and included in each sample cooler containing samples for analysis for HVOCs. Up to three trip blanks will be analyzed by the analytical laboratory throughout the Performance Monitoring period. Additional trip blanks may be collected throughout the Performance Monitoring period at the discretion of the supervising environmental professional.

6.2.3 Additional Sample Volume for Laboratory Quality Control

At the discretion of the supervising environmental professional at the site, field QC samples collected during groundwater Sampling may include the collection of additional sample volume to run batch-specific laboratory QC samples for analysis for HVOCs. Additional sample volume required for laboratory QC samples involves collecting two additional sample container sets, for a total of three sets of containers for the selected sample location. The laboratory will specify volume requirements for batch-specific laboratory QC samples.

7.0 SAMPLE HANDLING AND CHAIN-OF-CUSTODY PROCEDURES

This section discusses the sample handling methods to be used. The protocols discussed include sample containers, preservation procedures, hold times, sample packaging and shipment, and chain-of-custody procedures.

7.1 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Groundwater samples will be placed into standard 40-milliliter, septum-sealed, threaded screw-capped glass vials containing a laboratory-provided preservative. Once sealed, the containers will be stored in a cooler at approximately 4 degrees Celsius. All samples will be submitted to the analytical laboratory within 48 hours of collection. The typical hold time for this type of preserved sample chilled to 4 degrees Celsius is 14 days. Sample handling is summarized in Table 1.

7.2 SAMPLE PACKAGING AND SHIPMENT

All samples shipped for laboratory analysis will be packaged according to applicable regulations and the recommendations of the laboratory performing the analysis. Samples will be expeditiously transported to the analytical laboratory after being sealed in coolers.

The following procedures (representing the minimum shipping and handling requirements) will be used for sample packaging:

- Bubble-wrap bags or an equivalent will be used to protect glass sample containers.
- Sample containers will be placed in resealable plastic bags to prevent cross-contamination.
- Sample containers will be placed upright into a cooler and checked against the Chain-of-Custody form to ensure that all samples are listed and are placed into the correct cooler.
- One copy of the Chain-of-Custody form will be detached and retained by the Farallon Field Scientist.
- Remaining paperwork will be sealed in a resealable plastic bag and taped to the inside of the cooler lid.
- One to three resealable bags will be filled with ice and/or chemical equivalent and included in the cooler. All ice will be double-bagged in heavy-duty bags.
- The cooler will be sealed with a chain-of-custody seal.
- The cooler will be taped shut using strapping tape.
- The laboratory address will be affixed to the cooler if not delivered directly to the laboratory by Farallon personnel.

- Extraneous stickers will be removed from the cooler.
- The cooler will be examined to ensure that Farallon's return address is affixed.

7.3 CHAIN-OF-CUSTODY PROCEDURES

An important component of data collection is the ability to demonstrate that samples were obtained from the stated locations and that samples reached the laboratory or archive location without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal or archive must be properly documented. Documentation will be accomplished through a Chain of Custody form that documents each sample and identifies the individuals responsible for sample collection, shipment, and receipt. A sample is considered in one's custody if at least one of the following criteria is met:

- The sample is in a person's actual possession or view;
- The sample is placed in a container and secured with an official seal (signed and dated by the custodian) such that the sample cannot be reached without the seal being broken;
- The sample is locked and only accessible by the custodian after having been in the person's actual possession; or
- The sample is in a secured area, restricted to authorized personnel (e.g., laboratory).

A laboratory typically will not accept samples for analysis without a correctly prepared Chain of Custody form. The Chain of Custody form must be signed by each individual who has the sample in his/her custody. A Chain of Custody form is to be prepared for each sample shipped to a laboratory for analysis. Information on this form correlates with other supporting documentation, including sample labels and sample collection logs.

The Chain of Custody form accounts for the elapsed time and custodians of the sample from the time of its collection. The individuals who have physically handled the sample or witnessed initial sample collection and packaging (e.g., a sample team member) must be identified on the form. A sample team member relinquishes the sample by signing the Chain of Custody form. Individuals who either relinquish or receive samples must include their complete names, company affiliation, and the date and time the samples were relinquished and received. The times that the samples are relinquished and received by the next custodian should coincide, with the exception of transfer by commercial carriers. Commercial carriers will not be required to sign the Chain of Custody form; however, the waybill or shipment tracking number must be included on the Chain of Custody form, as described below.

If a sample is to be stored for a period of time (e.g., overnight), measures are to be taken to secure the sample container in a manner that provides only the custodian of record with access. If samples are relinquished to a commercial carrier (e.g., UPS, Federal Express), the carrier waybill number will be recorded and a copy of the waybill will be attached to the Chain of

Custody form. These documents are maintained with other field documentation. The original Chain of Custody form will be sealed inside the shipping container with the samples.

If a correction is made to the Chain of Custody form, the correction should be made by the originator of the change, who will draw a single line through the error, initial and date the correction, and, if necessary, provide an explanation of the change. The documentation should have sufficient detail to clearly document the change to a third-party reviewer.

8.0 WASTE MANAGEMENT

Field-generated waste will be handled in accordance with SOP WM-01, Field Handling of Investigation-Derived Waste, included in Attachment 4, and local and State regulations. A summary of field-generated waste and handling procedures is provided below:

- Used disposable sampling materials and disposable equipment used in sample processing (e.g., disposable coveralls, gloves, tubing) will be placed in heavyweight garbage bags or other appropriate containers. Disposable materials will be placed in an on-site refuse container for disposal at a solid waste landfill.
- Monitoring well purge water will be temporarily placed in labeled 5-gallon buckets and will be treated with the wastewater treatment system immediately after completing sampling activities at the given location. If purge water is to be stored on the site overnight, the labeled container will be documented on a waste inventory sheet and will be treated with the wastewater treatment system at the earliest opportunity.

9.0 SAMPLE ANALYSIS

This section summarizes analytical laboratory methodology. OnSite has been selected as the analytical laboratory for this project. OnSite is Ecology-certified and meets Ecology and EPA QA/QC requirements.

9.1 ANALYTICAL METHOD

Groundwater samples collected will be submitted to the analytical laboratory for analysis for HVOCs by EPA Method 8260C.

9.2 ANALYTICAL LABORATORY QUALITY CONTROL CHECKS

The analytical laboratory QA Manual is provided as Attachment 2.

Internal laboratory QC checks will be used to monitor data integrity. These checks will include method blanks, MSs, MSDs, LCSs, LCSDs, internal standards, surrogate standards, and calibration standards. Project-required control limits will be used to evaluate MS, MSD, LCS, and LCSD percent recoveries and RPD values. Surrogate recoveries will be evaluated using laboratory control limits. Laboratory control charts will be used to determine long-term instrument trends.

Results of QC samples from each sample group will be reviewed by the laboratory immediately following sample group analysis. The QC sample results will then be evaluated to determine whether control limits have been exceeded. If control limits are grossly exceeded in the sample group, the Farallon QA/QC Manager will be contacted immediately, and corrective action (e.g., method modifications followed by reprocessing of the affected samples) will be initiated prior to processing a subsequent group of samples.

The primary chemical standards and standard solutions used in this project will be traceable to the National Institute of Standards and Technology, Environmental Resource Associates, National Research Council of Canada, or other documented, reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities found in a standard will be documented.

9.2.1 Method Blanks

Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. The method blank for analyses must be less than the method reporting limit of any single target analyte or compound. If a laboratory method blank exceeds this criterion for any analyte or compound and the concentration of the analyte or compound in the samples is less than 5 times the concentration found in the blank (10 times for common contaminants), analysis must stop, and the source of contamination must be eliminated or reduced.

9.2.2 Laboratory Control Samples

LCSs are prepared and analyzed to assess possible laboratory bias at all stages of sample preparation and analysis. The LCS is a matrix-dependent spiked sample prepared at the time of sample preparation along with the preparation of samples, method blanks, and MSs. The LCS provides information on the accuracy of the analytical process and, when analyzed in duplicate, also provides precision information.

9.2.3 Matrix Spikes and Matrix Spike Duplicates

MSs and MSDs will be performed on project-specific samples at a frequency of 5 percent, or one per analytical batch, whichever is more frequent. Analysis of MS samples provides information on the preparation and/or analytical efficiency of the method for the sample matrix. By performing duplicate MS analyses, information on the precision of the method also is provided.

9.2.4 Surrogate Spikes

Surrogates are compounds that are unlikely to occur under natural conditions and have properties similar to the analytes of interest. Surrogates are added to the samples prior to purging or extraction and are used primarily for organic samples analyzed by gas chromatography and/or mass spectrometry methods. The surrogate spike provides broader insight into the proficiency and efficiency of an analytical method on a sample-specific basis. This control reflects analytical conditions that may not be attributable to the sample matrix. The project samples and associated sample QC to be analyzed by organic methods will be spiked with appropriate surrogate compounds as defined in the analytical methods.

9.2.5 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide information regarding instrument stability, and the validity of instrument calibration. The analytical frequency of calibration check standards is specified by the analytical method.

10.0 INSTRUMENT AND EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Equipment and instruments will be tested and inspected prior to each Sampling event and each laboratory analysis. Field equipment that is faulty or not functioning properly will not be used for sampling.

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call to the manufacturer. An instrument malfunction that may impact the project's turnaround time will be communicated to the Farallon QA/QC Manager as soon as the malfunction is discovered, and contingencies for analysis will be coordinated.

Maintenance schedules for laboratory equipment will adhere to manufacturer recommendations. Maintenance records will reflect the complete history of each instrument and specify the time frame for future maintenance. Major repairs or maintenance procedures will be performed through service contracts with manufacturers or by qualified contractors. Paperwork associated with service calls and preventive maintenance calls will be kept on file by the laboratory.

Laboratory systems managers are responsible for the routine maintenance of instruments used in a particular laboratory. Routine preventive maintenance is logged in appropriate logbooks. Routine and non-routine maintenance schedules and procedures will be performed in accordance with the laboratory QA Manual, provided as Attachment 2.

Major instruments will be backed up by equivalent or comparable instrument systems in the event of unscheduled downtime. An inventory of spare parts will be available to minimize equipment and instrument downtime.

11.0 INSTRUMENT AND EQUIPMENT CALIBRATION PROCEDURES AND FREQUENCY

When analyses are conducted according to EPA methods, the calibration procedures and frequencies specified in the applicable method will be followed. For analyses governed by SOPs, the appropriate laboratory SOP will be used for required calibration procedures and frequencies. Records of calibrations will be filed and maintained by the laboratory and field staff, as appropriate. These records may be subject to a QA audit.

The standards used in the calibration of equipment will be directly or indirectly traceable to the National Institute of Standards and Technology, Environmental Resource Associates, National Research Council of Canada, or other documented, reliable commercial sources. The standards received will be logged into standard receipt logs maintained by the individual analytical groups. Each group will maintain a standards log that tracks the preparation of standards used for calibration and QC purposes.

12.0 INSPECTION AND ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Equipment in contact with the samples throughout collection, laboratory processing, and analysis must be sufficiently clean to prevent detectable contamination. Inspection and acceptance of field supplies, including laboratory-prepared sample containers, will be conducted by the Farallon Field Coordinator.

Primary chemical standards and standard solutions used in this project in either the field or the laboratory will be traceable to documented, reliable commercial sources. Details for acceptance requirements for supplies and consumables at the analytical laboratory are provided in Attachment 2. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities found in the standard will be documented.

13.0 ASSESSMENTS AND RESPONSE ACTIONS

Prior to field sampling, the Farallon Field Coordinator will verify the following:

- Field equipment is ready for use;
- Field personnel and subcontractors have met the appropriate training and certification requirements;
- Contracts for subcontractors have been signed by both parties; and
- Field personnel and subcontractors have been briefed on the work to be performed.

13.1 CORRECTIVE ACTION PROCEDURES

The following sections describe corrective action procedures for field and laboratory procedures.

13.1.1 Corrective Action for Field Sampling

The Farallon Field Coordinator will be responsible for correcting equipment malfunctions during the field program. The Farallon QA/QC Manager will be responsible for resolving situations in the field that may result in noncompliance with the SAP. Corrective measures will be immediately documented in the Field Report forms.

13.1.2 Corrective Action for Laboratory Analyses

The laboratory is required to comply with its SOPs, and submit copies of its SOPs to the Farallon QA/QC Manager. The laboratory Project Manager is responsible for ensuring that appropriate corrective actions are initiated as required for compliance with the SAP. Laboratory personnel are responsible for reporting problems that may compromise data quality.

If QC results exceed laboratory control limits, the analyst will identify and correct the anomaly prior to continuing with sample analyses, if possible. If the QC exceedance cannot be overcome with standard corrective action (e.g., re-preparation and/or re-analysis), the cause(s) of the exceedance and the steps taken to overcome it will be discussed by the laboratory Project Manager in the data package narrative. If the exceedance is gross or widespread, the Farallon QA/QC Manager will be notified immediately, and the appropriate corrective action will be determined.

14.0 DATA REVIEW, VERIFICATION, AND QUALITY ASSESSMENT

Once the data have been received from the laboratory, a number of QC procedures will be followed to evaluate data quality and assess data precision, accuracy, and completeness.

14.1 LABORATORY DATA QUALITY CONTROL REVIEW

Chemistry data will be subject to multilevel review by the selected analytical laboratory. The group leader will review data reports prior to their release for final data report generation. The laboratory QA Manager will review the final data reports, and the laboratory Project Manager will review a cross-section of the final data reports prior to delivery to Farallon.

If discrepancies or deficiencies are identified in the analytical results, corrective action will be taken, as discussed in Section 13.1.2, Corrective Action for Laboratory Analyses.

14.2 FARALLON DATA VERIFICATION AND QUALITY ASSESSMENT

Data reports will be reviewed and verified by the Farallon QA/QC Manager to ensure that all analyses were completed and all analytes of interest were reported. Any problems will be discussed with the laboratory to correct errors. Each laboratory data report will undergo a compliance screening level data quality assessment in which the data package will be evaluated with respect to the project measurement quality indicators, as described in Section 3, Data Quality Objectives and Measurement Data Criteria, for completeness, sample chain of custody, sample preservation, analytical holding times, blank contamination, precision (replicate analyses), accuracy (compound recovery), and detection limits.

15.0 DATA REPORTING

A presentation and evaluation of data collected during the project will be included in a report documenting the completion of the Interim Action.

16.0 REFERENCES

U.S. Environmental Protection Agency (EPA). 1996a. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.* EPA Document No. 540/S-95/504. April.

———. 1996b. *Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*. Prepared by the Office of Water, Engineering and Analysis Division. July.

TABLE

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

Table 1
HVOC Data Measurement Quality Indicators, Sample Handling, and Laboratory Reporting Limits
South Lake Union Properties
Seattle, Washington
Farallon PN: 397-044

Measurement Quality Indicators	
Precision (LCS/LCSD and MS/MSD)	± 35% RPD
Percent Recovery Goals For Evaluation of Accuracy	60 to 140% R
Completeness	95%
Sample Handling	
Sample Containers	3 x 40-mL glass vials with PTFE-lined septum caps
Preservative	Cool 0 - 6°C; no headspace; HCl to pH < 2
Holding Time	14 days (preserved)
Laboratory Reporting Limits for HVOCs	
cis-1,2-Dichloroethene	0.20 µg/l
trans-1,2-Dichloroethene	0.20 µg/l
Tetrachloroethene (PCE)	0.20 µg/l
Trichloroethene (TCE)	0.20 µg/l
Vinyl Chloride	0.20 µg/l

NOTES:
°C = degrees Celsius
HCl = hydrochloric acid
HVOCs = halogenated volatile organic compounds
LCS/LCSD = laboratory control sample/laboratory control sample duplicate
µg/l = microgram per liter
mL = milliliter
MS/MSD = matrix spike/matrix spike duplicate
PTFE = polytetrafluoroethylene
R = Recovery
RPD = relative percent difference

ATTACHMENT 1
ONSITE ENVIRONMENTAL INC. CERTIFICATIONS

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

The State of Washington
Department of Ecology

OnSite Environmental, Inc.
Redmond, WA

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective July 27, 2016 and shall expire July 26, 2017.

Witnessed under my hand on October 19, 2016

Alan D. Rue
Lab Accreditation Unit Supervisor

Laboratory ID
C591

WASHINGTON STATE DEPARTMENT OF ECOLOGY

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

SCOPE OF ACCREDITATION

OnSite Environmental, Inc.

Redmond, WA

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. Accreditation for U.S. Environmental Protection Agency (EPA) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) is for the latest version of the method. SM refers to EPA approved editions of "Standard Methods for the Examination of Water and Wastewater." ASTM is the American Society for Testing and Materials. Other references are described in notes.

Matrix/Analyte	Method	Notes
Drinking Water		
Barium	EPA 200.7_4.4_1994	
Chromium	EPA 200.7_4.4_1994	
Copper	EPA 200.7_4.4_1994	
Iron	EPA 200.7_4.4_1994	
Manganese	EPA 200.7_4.4_1994	
Silica	EPA 200.7_4.4_1994	
Silver	EPA 200.7_4.4_1994	
Zinc	EPA 200.7_4.4_1994	
Aluminum	EPA 200.8_5.4_1994	
Antimony	EPA 200.8_5.4_1994	
Arsenic	EPA 200.8_5.4_1994	
Barium	EPA 200.8_5.4_1994	
Beryllium	EPA 200.8_5.4_1994	
Cadmium	EPA 200.8_5.4_1994	
Chromium	EPA 200.8_5.4_1994	
Copper	EPA 200.8_5.4_1994	
Lead	EPA 200.8_5.4_1994	
Manganese	EPA 200.8_5.4_1994	
Mercury	EPA 200.8_5.4_1994	
Nickel	EPA 200.8_5.4_1994	
Selenium	EPA 200.8_5.4_1994	
Silver	EPA 200.8_5.4_1994	

Matrix/Analyte	Method	Notes
Thallium	EPA 200.8_5.4_1994	
Zinc	EPA 200.8_5.4_1994	
Non-Potable Water		
Sulfate	ASTM D516-07	
non-Polar Extractable Material (TPH)	EPA 1664A (SGT-HEM)	
n-Hexane Extractable Material (O&G)	EPA 1664A_1_1999	
Turbidity	EPA 180.1_2_1993	
Alkalinity	EPA 310.2_1974	
Nitrate	EPA 353.2_2_1993	
Nitrate + Nitrite	EPA 353.2_2_1993	
Nitrite	EPA 353.2_2_1993	
Orthophosphate	EPA 365.1_2_1993	
Phosphorus, total	EPA 365.1_2_1993	
Alkalinity	SM 2320 B-97	1
Hardness (calc.)	SM 2340 B-97	
Hardness, Calcium (as CaCO3)	SM 2340 B-97	3
Specific Conductance	SM 2510 B-97	
Solids, Total Dissolved	SM 2540 C-97	
Solids, Total Suspended	SM 2540 D-97	
Solids, Settleable	SM 2540 F-97	
Chromium, Hexavalent	SM 3500-Cr B-09	
Chloride	SM 4500-Cl¯ E-97	
Fluoride	SM 4500-F¯ C-97	
Ammonia	SM 4500-NH3 D-97	1
Nitrite	SM 4500-NO2¯ B-00	
Total organic carbon	SM 5310 B-00	
Aluminum	EPA 200.7_4.4_1994	
Antimony	EPA 200.7_4.4_1994	
Arsenic	EPA 200.7_4.4_1994	
Barium	EPA 200.7_4.4_1994	
Beryllium	EPA 200.7_4.4_1994	
Boron	EPA 200.7_4.4_1994	
Cadmium	EPA 200.7_4.4_1994	
Calcium	EPA 200.7_4.4_1994	
Chromium	EPA 200.7_4.4_1994	
Cobalt	EPA 200.7_4.4_1994	

Matrix/Analyte	Method	Notes
Copper	EPA 200.7_4.4_1994	
Iron	EPA 200.7_4.4_1994	
Lead	EPA 200.7_4.4_1994	
Magnesium	EPA 200.7_4.4_1994	
Manganese	EPA 200.7_4.4_1994	
Molybdenum	EPA 200.7_4.4_1994	
Nickel	EPA 200.7_4.4_1994	
Potassium	EPA 200.7_4.4_1994	
Selenium	EPA 200.7_4.4_1994	
Silica	EPA 200.7_4.4_1994	
Silver	EPA 200.7_4.4_1994	
Sodium	EPA 200.7_4.4_1994	
Strontium	EPA 200.7_4.4_1994	
Thallium	EPA 200.7_4.4_1994	
Tin	EPA 200.7_4.4_1994	
Titanium	EPA 200.7_4.4_1994	1
Vanadium	EPA 200.7_4.4_1994	
Zinc	EPA 200.7_4.4_1994	
Aluminum	EPA 200.8_5.4_1994	
Antimony	EPA 200.8_5.4_1994	
Arsenic	EPA 200.8_5.4_1994	
Barium	EPA 200.8_5.4_1994	
Beryllium	EPA 200.8_5.4_1994	
Boron	EPA 200.8_5.4_1994	
Cadmium	EPA 200.8_5.4_1994	
Calcium	EPA 200.8_5.4_1994	1
Chromium	EPA 200.8_5.4_1994	
Cobalt	EPA 200.8_5.4_1994	
Copper	EPA 200.8_5.4_1994	
Iron	EPA 200.8_5.4_1994	
Lead	EPA 200.8_5.4_1994	
Magnesium	EPA 200.8_5.4_1994	
Manganese	EPA 200.8_5.4_1994	
Mercury	EPA 200.8_5.4_1994	
Molybdenum	EPA 200.8_5.4_1994	
Nickel	EPA 200.8_5.4_1994	

Matrix/Analyte	Method	Notes
Potassium	EPA 200.8_5.4_1994	
Selenium	EPA 200.8_5.4_1994	
Silica	EPA 200.8_5.4_1994	
Silver	EPA 200.8_5.4_1994	
Sodium	EPA 200.8_5.4_1994	
Thallium	EPA 200.8_5.4_1994	
Tin	EPA 200.8_5.4_1994	
Titanium	EPA 200.8_5.4_1994	
Vanadium	EPA 200.8_5.4_1994	
Zinc	EPA 200.8_5.4_1994	
Mercury	EPA 245.1_3_1994	
Acetylene	EPA RSK-175	
Ethane	EPA RSK-175	
Ethene	EPA RSK-175	
Methane	EPA RSK-175	
n-Butane	EPA RSK-175	
n-Propane	EPA RSK-175	
Solid and Chemical Materials		
Sulfate	ASTM D516-07	
Nitrate	EPA 353.2_2_1993	
Nitrate + Nitrite	EPA 353.2_2_1993	
Nitrite	EPA 353.2_2_1993	
Orthophosphate	EPA 365.1_2_1993	
Phosphorus, total	EPA 365.1_2_1993	
Chromium, Hexavalent	EPA 7196A_1_1992	
pH	EPA 9045D_2002	
Total organic carbon	EPA 9060A_1_2004	
Solids, Total, Fixed and Volatile	SM 2540 G-97	
Chloride	SM 4500-Cl¯ E-97	
Fluoride	SM 4500-F¯ C-97	
Aluminum	EPA 6010D	3
Antimony	EPA 6010D	3
Arsenic	EPA 6010D	3
Barium	EPA 6010D	3
Beryllium	EPA 6010D	3
Boron	EPA 6010D	3

Matrix/Analyte	Method	Notes
Cadmium	EPA 6010D	3
Calcium	EPA 6010D	3
Chromium	EPA 6010D	3
Cobalt	EPA 6010D	3
Copper	EPA 6010D	3
Iron	EPA 6010D	3
Lead	EPA 6010D	3
Magnesium	EPA 6010D	3
Manganese	EPA 6010D	3
Molybdenum	EPA 6010D	3
Nickel	EPA 6010D	3
Potassium	EPA 6010D	3
Selenium	EPA 6010D	3
Silver	EPA 6010D	3
Sodium	EPA 6010D	3
Thallium	EPA 6010D	3
Tin	EPA 6010D	3
Vanadium	EPA 6010D	3
Zinc	EPA 6010D	3
Aluminum	EPA 6020B_(7/14)	3
Antimony	EPA 6020B_(7/14)	3
Arsenic	EPA 6020B_(7/14)	3
Barium	EPA 6020B_(7/14)	3
Beryllium	EPA 6020B_(7/14)	3
Boron	EPA 6020B_(7/14)	3
Cadmium	EPA 6020B_(7/14)	3
Chromium	EPA 6020B_(7/14)	3
Cobalt	EPA 6020B_(7/14)	3
Copper	EPA 6020B_(7/14)	3
Iron	EPA 6020B_(7/14)	3
Lead	EPA 6020B_(7/14)	3
Magnesium	EPA 6020B_(7/14)	3
Manganese	EPA 6020B_(7/14)	3
Molybdenum	EPA 6020B_(7/14)	3
Nickel	EPA 6020B_(7/14)	3
Potassium	EPA 6020B_(7/14)	3

Matrix/Analyte	Method	Notes
Selenium	EPA 6020B_(7/14)	3
Silver	EPA 6020B_(7/14)	3
Sodium	EPA 6020B_(7/14)	3
Thallium	EPA 6020B_(7/14)	3
Tin	EPA 6020B_(7/14)	3
Vanadium	EPA 6020B_(7/14)	3
Zinc	EPA 6020B_(7/14)	3
Mercury	EPA 7470A_1_1994	2
Mercury	EPA 7471B_(1/98)	1
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8011-94	2
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8011-94	2
Diesel range organics (DRO)	EPA 8015D_4_(6/03)	3,5
Gasoline range organics (GRO)	EPA 8015D_4_(6/03)	3,5
Benzene	EPA 8021B_2_(12/96)	
Ethylbenzene	EPA 8021B_2_(12/96)	
m+p-xylene	EPA 8021B_2_(12/96)	
o-Xylene	EPA 8021B_2_(12/96)	
Toluene	EPA 8021B_2_(12/96)	
Xylene (total)	EPA 8021B_2_(12/96)	
4,4'-DDD	EPA 8081B_(2/07)	
4,4'-DDE	EPA 8081B_(2/07)	
4,4'-DDT	EPA 8081B_(2/07)	
Alachlor	EPA 8081B_(2/07)	
Aldrin	EPA 8081B_(2/07)	
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081B_(2/07)	
alpha-Chlordane	EPA 8081B_(2/07)	
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081B_(2/07)	
Captafol	EPA 8081B_(2/07)	
Chlordane (tech.)	EPA 8081B_(2/07)	
Chlorobenzilate	EPA 8081B_(2/07)	
Chloroneb	EPA 8081B_(2/07)	
Chloropropylate	EPA 8081B_(2/07)	
Chlorothalonil	EPA 8081B_(2/07)	
Dacthal (DCPA)	EPA 8081B_(2/07)	
delta-BHC	EPA 8081B_(2/07)	
Diallate	EPA 8081B_(2/07)	

Matrix/Analyte	Method	Notes
Dichlone	EPA 8081B_(2/07)	
Dicofol	EPA 8081B_(2/07)	
Dieldrin	EPA 8081B_(2/07)	
Endosulfan I	EPA 8081B_(2/07)	
Endosulfan II	EPA 8081B_(2/07)	
Endosulfan sulfate	EPA 8081B_(2/07)	
Endrin	EPA 8081B_(2/07)	
Endrin aldehyde	EPA 8081B_(2/07)	
Endrin ketone	EPA 8081B_(2/07)	
Etridiazole	EPA 8081B_(2/07)	
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B_(2/07)	
gamma-Chlordane	EPA 8081B_(2/07)	
Halowax-1000	EPA 8081B_(2/07)	
Halowax-1001	EPA 8081B_(2/07)	
Halowax-1013	EPA 8081B_(2/07)	
Halowax-1014	EPA 8081B_(2/07)	
Halowax-1051	EPA 8081B_(2/07)	
Halowax-1099	EPA 8081B_(2/07)	
Heptachlor	EPA 8081B_(2/07)	
Heptachlor epoxide	EPA 8081B_(2/07)	
Hexachlorobenzene	EPA 8081B_(2/07)	
Hexachlorocyclopentadiene	EPA 8081B_(2/07)	
Isodrin	EPA 8081B_(2/07)	
Methoxychlor	EPA 8081B_(2/07)	
Mirex	EPA 8081B_(2/07)	
Nitrofen	EPA 8081B_(2/07)	
Permethrin (total)	EPA 8081B_(2/07)	
Perthane	EPA 8081B_(2/07)	
Propachlor (Ramrod)	EPA 8081B_(2/07)	
Strobane	EPA 8081B_(2/07)	
Toxaphene (Chlorinated camphene)	EPA 8081B_(2/07)	
trans-Nonachlor	EPA 8081B_(2/07)	
Trifluralin (Treflan)	EPA 8081B_(2/07)	
Aroclor-1016 (PCB-1016)	EPA 8082A_(2/07)	
Aroclor-1221 (PCB-1221)	EPA 8082A_(2/07)	
Aroclor-1232 (PCB-1232)	EPA 8082A_(2/07)	

Matrix/Analyte	Method	Notes
Aroclor-1242 (PCB-1242)	EPA 8082A_(2/07)	
Aroclor-1248 (PCB-1248)	EPA 8082A_(2/07)	
Aroclor-1254 (PCB-1254)	EPA 8082A_(2/07)	
Aroclor-1260 (PCB-1260)	EPA 8082A_(2/07)	
2,4,5-T	EPA 8151A_(1/98)	
2,4-D	EPA 8151A_(1/98)	
2,4-DB	EPA 8151A_(1/98)	
3,5-Dichlorobenzoic acid	EPA 8151A_(1/98)	
4-Nitrophenol	EPA 8151A_(1/98)	
5-Hydroxydicamba	EPA 8151A_(1/98)	
Acifluorfen	EPA 8151A_(1/98)	
Bentazon	EPA 8151A_(1/98)	
Chloramben	EPA 8151A_(1/98)	
Dacthal (DCPA)	EPA 8151A_(1/98)	
Dalapon	EPA 8151A_(1/98)	
DCPA di acid degradate	EPA 8151A_(1/98)	
Dicamba	EPA 8151A_(1/98)	
Dichloroprop (Dichlorprop)	EPA 8151A_(1/98)	
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151A_(1/98)	
MCPA	EPA 8151A_(1/98)	
MCPP	EPA 8151A_(1/98)	
Pentachlorophenol	EPA 8151A_(1/98)	
Picloram	EPA 8151A_(1/98)	
Silvex (2,4,5-TP)	EPA 8151A_(1/98)	
Diesel range organics (DRO)	WDOE NWTPH-Dx_(1997)	
Gasoline range organics (GRO)	WDOE NWTPH-Gx_(1997)	
C8-C10 Aromatic VPH	WDOE VPH_(1997)	
C5-C6 Aliphatic VPH	WDOE VPH_(1997)	
>C10-C12 Aliphatic VPH	WDOE VPH_(1997)	
>C10-C12 Aromatic VPH	WDOE VPH_(1997)	
>C12-C13 Aromatic VPH	WDOE VPH_(1997)	
>C6-C8 Aliphatic VPH	WDOE VPH_(1997)	
>C8-C10 Aliphatic VPH	WDOE VPH_(1997)	1
1,1,1,2-Tetrachloroethane	EPA 8260C_(8/06)	
1,1,1-Trichloro-2,2,2-trifluoroethane	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
1,1,1-Trichloro-2-propanone	EPA 8260C_(8/06)	
1,1,1-Trichloroethane	EPA 8260C_(8/06)	
1,1,2,2-Tetrachloroethane	EPA 8260C_(8/06)	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260C_(8/06)	
1,1,2-Trichloroethane	EPA 8260C_(8/06)	
1,1,2-Trichlorofluoroethane	EPA 8260C_(8/06)	
1,1-Dichloro-1-fluoroethane	EPA 8260C_(8/06)	
1,1-Dichloroethane	EPA 8260C_(8/06)	
1,1-Dichloroethylene	EPA 8260C_(8/06)	
1,1-Dichloropropene	EPA 8260C_(8/06)	
1,2,3,4-Diepoxybutane	EPA 8260C_(8/06)	
1,2,3-Trichlorobenzene	EPA 8260C_(8/06)	
1,2,3-Trichloropropane	EPA 8260C_(8/06)	
1,2,3-Trimethylbenzene	EPA 8260C_(8/06)	
1,2,4-Trichlorobenzene	EPA 8260C_(8/06)	
1,2,4-Trimethylbenzene	EPA 8260C_(8/06)	
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260C_(8/06)	
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260C_(8/06)	
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon 114)	EPA 8260C_(8/06)	
1,2-Dichloro-1,1,2-trifluoroethane	EPA 8260C_(8/06)	
1,2-Dichlorobenzene	EPA 8260C_(8/06)	
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260C_(8/06)	
1,2-Dichloropropane	EPA 8260C_(8/06)	
1,2-Dimethoxyethane	EPA 8260C_(8/06)	
1,3,5-Trimethylbenzene	EPA 8260C_(8/06)	
1,3-Butanediol	EPA 8260C_(8/06)	
1,3-Dichloro-2-propanol	EPA 8260C_(8/06)	
1,3-Dichlorobenzene	EPA 8260C_(8/06)	
1,3-Dichloropropane	EPA 8260C_(8/06)	
1,3-Dichloropropene	EPA 8260C_(8/06)	
1,4-Butanediol	EPA 8260C_(8/06)	
1,4-Dichloro-2-butene	EPA 8260C_(8/06)	
1,4-Dichlorobenzene	EPA 8260C_(8/06)	
1,4-Difluorobenzene	EPA 8260C_(8/06)	
1,4-Dioxane (1,4- Diethyleneoxide)	EPA 8260C_(8/06)	
1-Butene	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
1-Chloro-1,2,2-trifluoroethane (Freon 133)	EPA 8260C_(8/06)	
1-Chlorobutane	EPA 8260C_(8/06)	
1-Chlorohexane	EPA 8260C_(8/06)	
1-Heptene	EPA 8260C_(8/06)	
1-Hexene	EPA 8260C_(8/06)	
1-Methyl-2-n-propylbenzene	EPA 8260C_(8/06)	
1-Propene	EPA 8260C_(8/06)	
2,2,4-Trimethylpentane	EPA 8260C_(8/06)	
2,2-Dichloro-1,1,1-trifluoroethane (Freon 123)	EPA 8260C_(8/06)	
2,2-Dichloropropane	EPA 8260C_(8/06)	
2,2-Dimethylbutane	EPA 8260C_(8/06)	
2,2'-Oxybis(1-chloropropane)	EPA 8260C_(8/06)	
2,3,4-Trimethylpentane	EPA 8260C_(8/06)	
2,3-Dichloropropene	EPA 8260C_(8/06)	
2,3-Dimethylbutane	EPA 8260C_(8/06)	
2,3-Dimethylpentane	EPA 8260C_(8/06)	
2,4-Dimethylpentane	EPA 8260C_(8/06)	
2-Bromofluorobenzene	EPA 8260C_(8/06)	
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260C_(8/06)	1
2-Chloro-2-methybutane (tert-Amyl chloride)	EPA 8260C_(8/06)	
2-Chloroethanol	EPA 8260C_(8/06)	
2-Chloroethyl vinyl ether	EPA 8260C_(8/06)	
2-Chlorotoluene	EPA 8260C_(8/06)	
2-Ethylhexanol (2-Ethyl-1-hexanol)	EPA 8260C_(8/06)	
2-Ethyltoluene	EPA 8260C_(8/06)	
2-Hexanone	EPA 8260C_(8/06)	
2-Hexene	EPA 8260C_(8/06)	
2-Hydroxypropionitrile	EPA 8260C_(8/06)	
2-Methoxyethanol (Methyl cellosolve)	EPA 8260C_(8/06)	
2-Methyl-1,3-dioxolane	EPA 8260C_(8/06)	
2-Methyl-2-Butene	EPA 8260C_(8/06)	
2-Methylaniline (o-Toluidine)	EPA 8260C_(8/06)	
2-Methylbutadiene (Isoprene)	EPA 8260C_(8/06)	
2-Methylbutane (Isopentane)	EPA 8260C_(8/06)	
2-Methylheptane	EPA 8260C_(8/06)	
2-Methylhexane	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
2-Methylpentane (Isohexane)	EPA 8260C_(8/06)	
2-methylpropane (Isobutane)	EPA 8260C_(8/06)	
2-Nitropropane	EPA 8260C_(8/06)	
2-Pentanone	EPA 8260C_(8/06)	
2-Picoline (2-Methylpyridine)	EPA 8260C_(8/06)	
3-Bromofluorobenzene	EPA 8260C_(8/06)	
3-Butene-1-ol	EPA 8260C_(8/06)	
3-Chloropropionitrile	EPA 8260C_(8/06)	
3-Ethyltoluene	EPA 8260C_(8/06)	
3-Methyl-1-Butene	EPA 8260C_(8/06)	
3-Methylheptane	EPA 8260C_(8/06)	
3-Methylhexane	EPA 8260C_(8/06)	
3-Methylpentane	EPA 8260C_(8/06)	
4-Bromofluorobenzene	EPA 8260C_(8/06)	
4-Chlorotoluene	EPA 8260C_(8/06)	
4-Ethyltoluene	EPA 8260C_(8/06)	
4-Isopropyltoluene (p-Cymene)	EPA 8260C_(8/06)	
4-Methyl-1-Pentene	EPA 8260C_(8/06)	
4-Methyl-2-pentanone (MIBK)	EPA 8260C_(8/06)	
4-Methylaniline (p-Toluidine)	EPA 8260C_(8/06)	
Acetamide	EPA 8260C_(8/06)	
Acetone	EPA 8260C_(8/06)	1
Acetonitrile	EPA 8260C_(8/06)	
Acetylene	EPA 8260C_(8/06)	
Acrolein (Propenal)	EPA 8260C_(8/06)	
Acrylamide	EPA 8260C_(8/06)	
Acrylic acid	EPA 8260C_(8/06)	
Acrylonitrile	EPA 8260C_(8/06)	
Adsorbable Organic Halides (AOX)	EPA 8260C_(8/06)	
Allyl alcohol	EPA 8260C_(8/06)	
Allyl chloride (3-Chloropropene)	EPA 8260C_(8/06)	
alpha-Methylstyrene	EPA 8260C_(8/06)	
Benzene	EPA 8260C_(8/06)	
beta-Propiolactone	EPA 8260C_(8/06)	
bis(2-Chloroethyl) sulfide	EPA 8260C_(8/06)	
bis(Chloromethyl)ether	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Bromoacetone	EPA 8260C_(8/06)	
Bromobenzene	EPA 8260C_(8/06)	
Bromochloromethane	EPA 8260C_(8/06)	
Bromodichloromethane	EPA 8260C_(8/06)	
Bromoethane (Ethyl Bromide)	EPA 8260C_(8/06)	
Bromoethene	EPA 8260C_(8/06)	
Bromoform	EPA 8260C_(8/06)	
Butyl acetate	EPA 8260C_(8/06)	
Carbon disulfide	EPA 8260C_(8/06)	
Carbon tetrachloride	EPA 8260C_(8/06)	
Chloral hydrate	EPA 8260C_(8/06)	
Chloroacetonitrile	EPA 8260C_(8/06)	
Chlorobenzene	EPA 8260C_(8/06)	
Chlorodibromomethane	EPA 8260C_(8/06)	
Chlorodifluoromethane (Freon-22)	EPA 8260C_(8/06)	
Chloroethane (Ethyl chloride)	EPA 8260C_(8/06)	
Chloroform	EPA 8260C_(8/06)	
Chloromethyl methyl ether	EPA 8260C_(8/06)	
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260C_(8/06)	
cis & trans-1,2-Dichloroethene	EPA 8260C_(8/06)	
cis-1,2-Dichloroethylene	EPA 8260C_(8/06)	
cis-1,3-Dichloropropene	EPA 8260C_(8/06)	
cis-1,4-Dichloro-2-butene	EPA 8260C_(8/06)	
cis-2-Butene	EPA 8260C_(8/06)	
cis-2-Hexene	EPA 8260C_(8/06)	
cis-2-pentene	EPA 8260C_(8/06)	
Cycloate	EPA 8260C_(8/06)	
Cyclohexane	EPA 8260C_(8/06)	
Cyclohexanol	EPA 8260C_(8/06)	
Cyclohexanone	EPA 8260C_(8/06)	
Cyclopentane	EPA 8260C_(8/06)	
Cyclopentene	EPA 8260C_(8/06)	
Decanal	EPA 8260C_(8/06)	
Dibromochloropropane	EPA 8260C_(8/06)	
Dibromofluoromethane	EPA 8260C_(8/06)	
Dibromomethane	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Dichlorodifluoromethane (Freon-12)	EPA 8260C_(8/06)	
Dichlorofluoromethane (Freon 21)	EPA 8260C_(8/06)	
Dichlorotetrafluoroethane	EPA 8260C_(8/06)	
Dicyclopentadiene	EPA 8260C_(8/06)	
Diethyl ether	EPA 8260C_(8/06)	
Diethylamine	EPA 8260C_(8/06)	
Diethylene glycol	EPA 8260C_(8/06)	
Dimethyl disulfide	EPA 8260C_(8/06)	
Dimethyl sulfoxide	EPA 8260C_(8/06)	
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	EPA 8260C_(8/06)	
Ethane	EPA 8260C_(8/06)	
Ethanol	EPA 8260C_(8/06)	
Ethene	EPA 8260C_(8/06)	
Ethyl acetate	EPA 8260C_(8/06)	
Ethyl acrylate	EPA 8260C_(8/06)	
Ethyl methacrylate	EPA 8260C_(8/06)	
Ethyl tert-Butyl alcohol	EPA 8260C_(8/06)	
Ethylbenzene	EPA 8260C_(8/06)	
Ethylene glycol	EPA 8260C_(8/06)	
Ethylene oxide	EPA 8260C_(8/06)	
Ethylene thiourea	EPA 8260C_(8/06)	
Ethyleneimine	EPA 8260C_(8/06)	
Ethyl-t-butylether (ETBE)	EPA 8260C_(8/06)	
Fluorobenzene	EPA 8260C_(8/06)	
Fluoromethane (Freon 41)	EPA 8260C_(8/06)	
Heptanal	EPA 8260C_(8/06)	
Hexachlorobutadiene	EPA 8260C_(8/06)	
Hexachloroethane	EPA 8260C_(8/06)	
Iodomethane (Methyl iodide)	EPA 8260C_(8/06)	
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260C_(8/06)	
Isopropyl acetate	EPA 8260C_(8/06)	
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260C_(8/06)	
Isopropylbenzene	EPA 8260C_(8/06)	
m+p-xylene	EPA 8260C_(8/06)	
m+p-xylene	EPA 8260C_(8/06)	
Malononitrile	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Methacrylonitrile	EPA 8260C_(8/06)	
Methane	EPA 8260C_(8/06)	
Methanol	EPA 8260C_(8/06)	
Methyl acetate	EPA 8260C_(8/06)	
Methyl acrylate	EPA 8260C_(8/06)	
Methyl bromide (Bromomethane)	EPA 8260C_(8/06)	
Methyl chloride (Chloromethane)	EPA 8260C_(8/06)	
Methyl formate	EPA 8260C_(8/06)	
Methyl methacrylate	EPA 8260C_(8/06)	
Methyl tert-butyl ether (MTBE)	EPA 8260C_(8/06)	
Methylcyclohexane	EPA 8260C_(8/06)	
Methylcyclopentane	EPA 8260C_(8/06)	
Methylene chloride (Dichloromethane)	EPA 8260C_(8/06)	
n, n-Dimethylformamide	EPA 8260C_(8/06)	
n-Amyl acetate	EPA 8260C_(8/06)	
n-Amyl alcohol	EPA 8260C_(8/06)	
Naphthalene	EPA 8260C_(8/06)	
n-Butane	EPA 8260C_(8/06)	
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260C_(8/06)	
n-Butylbenzene	EPA 8260C_(8/06)	
n-Butylcyclopentane	EPA 8260C_(8/06)	
n-Heptane	EPA 8260C_(8/06)	
n-Hexane	EPA 8260C_(8/06)	
Nitrobenzene	EPA 8260C_(8/06)	
N-Nitroso-di-n-butylamine	EPA 8260C_(8/06)	
n-Nonane	EPA 8260C_(8/06)	
n-Octane	EPA 8260C_(8/06)	
n-Pentane	EPA 8260C_(8/06)	
n-Propane	EPA 8260C_(8/06)	
n-Propanol (1-Propanol)	EPA 8260C_(8/06)	
n-Propylamine	EPA 8260C_(8/06)	
n-Propylbenzene	EPA 8260C_(8/06)	
o-Xylene	EPA 8260C_(8/06)	
p-Diethylbenzene	EPA 8260C_(8/06)	
Pentachloroethane	EPA 8260C_(8/06)	
Pentafluorobenzene	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Propargyl alcohol	EPA 8260C_(8/06)	
Propionitrile (Ethyl cyanide)	EPA 8260C_(8/06)	
Propyne	EPA 8260C_(8/06)	
Pyridine	EPA 8260C_(8/06)	
Sec-Amyl Alcohol (2-Pentanol)	EPA 8260C_(8/06)	
sec-Butylbenzene	EPA 8260C_(8/06)	
S-Methyl thioacetate (S-Methyl etanethioate)	EPA 8260C_(8/06)	
Styrene	EPA 8260C_(8/06)	
tert-Amyl alcohol (TAA)	EPA 8260C_(8/06)	
tert-Amyl ethyl ether (TAEE)	EPA 8260C_(8/06)	
tert-amylmethylether (TAME)	EPA 8260C_(8/06)	
tert-Butyl alcohol	EPA 8260C_(8/06)	
tert-Butylbenzene	EPA 8260C_(8/06)	
Tetrachloroethylene (Perchloroethylene)	EPA 8260C_(8/06)	
Tetrahydrofuran (THF)	EPA 8260C_(8/06)	
Toluene	EPA 8260C_(8/06)	
trans-1,2-Dichloroethylene	EPA 8260C_(8/06)	
trans-1,3-Dichloropropylene	EPA 8260C_(8/06)	
trans-1,4-Dichloro-2-butene	EPA 8260C_(8/06)	
trans-2-Butene	EPA 8260C_(8/06)	
trans-2-Hexene	EPA 8260C_(8/06)	
trans-2-pentene	EPA 8260C_(8/06)	
Trichloroethene (Trichloroethylene)	EPA 8260C_(8/06)	
Trichlorofluoromethane (Freon 11)	EPA 8260C_(8/06)	
Triethylamine	EPA 8260C_(8/06)	
Trifluoromethane (Freon 23)	EPA 8260C_(8/06)	
Vinyl acetate	EPA 8260C_(8/06)	
Vinyl bromide	EPA 8260C_(8/06)	
Vinyl chloride	EPA 8260C_(8/06)	
Xylene (total)	EPA 8260C_(8/06)	
1,2,4,5-Tetrachlorobenzene	EPA 8270D_(2/07)	
1,2,4-Trichlorobenzene	EPA 8270D_(2/07)	
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8270D_(2/07)	
1,2-Dichlorobenzene	EPA 8270D_(2/07)	
1,2-Dinitrobenzene	EPA 8270D_(2/07)	
1,2-Diphenylhydrazine	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270D_(2/07)	
1,3-Dichlorobenzene	EPA 8270D_(2/07)	
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270D_(2/07)	
1,4-Dichlorobenzene	EPA 8270D_(2/07)	
1,4-Dinitrobenzene	EPA 8270D_(2/07)	
1,4-Naphthoquinone	EPA 8270D_(2/07)	
1,4-Phenylenediamine	EPA 8270D_(2/07)	
1-Acetyl-2-thiourea	EPA 8270D_(2/07)	
1-Chloronaphthalene	EPA 8270D_(2/07)	
1-Methylnaphthalene	EPA 8270D_(2/07)	
1-Naphthylamine	EPA 8270D_(2/07)	
2,3,4,6-Tetrachlorophenol	EPA 8270D_(2/07)	
2,4,5-Trichlorophenol	EPA 8270D_(2/07)	
2,4,5-Trimethylaniline	EPA 8270D_(2/07)	
2,4,6-Trichlorophenol	EPA 8270D_(2/07)	
2,4-Diaminotoluene	EPA 8270D_(2/07)	
2,4-Dichlorophenol	EPA 8270D_(2/07)	
2,4-Dimethylphenol	EPA 8270D_(2/07)	
2,4-Dinitrophenol	EPA 8270D_(2/07)	
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D_(2/07)	
2,6-Dichlorophenol	EPA 8270D_(2/07)	
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D_(2/07)	
2-Acetylaminofluorene	EPA 8270D_(2/07)	
2-Aminoanthraquinone	EPA 8270D_(2/07)	
2-Chloronaphthalene	EPA 8270D_(2/07)	
2-Chlorophenol	EPA 8270D_(2/07)	
2-Cyclohexyl-4,6-dinitrophenol	EPA 8270D_(2/07)	
2-Methylaniline (o-Toluidine)	EPA 8270D_(2/07)	
2-Methylnaphthalene	EPA 8270D_(2/07)	
2-Methylphenol (o-Cresol)	EPA 8270D_(2/07)	
2-Naphthylamine	EPA 8270D_(2/07)	
2-Nitroaniline	EPA 8270D_(2/07)	
2-Nitrophenol	EPA 8270D_(2/07)	
2-Picoline (2-Methylpyridine)	EPA 8270D_(2/07)	
3-(Chloromethyl) pyridine hydrochloride	EPA 8270D_(2/07)	
3,3'-Dichlorobenzidine	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
3,3'-Dimethoxybenzidine	EPA 8270D_(2/07)	
3,3'-Dimethylbenzidine	EPA 8270D_(2/07)	
3-Amino-9-ethylcarbazole	EPA 8270D_(2/07)	
3-Methylcholanthrene	EPA 8270D_(2/07)	
3-Nitroaniline	EPA 8270D_(2/07)	
4,4'-DDD	EPA 8270D_(2/07)	
4,4'-DDE	EPA 8270D_(2/07)	
4,4'-DDT	EPA 8270D_(2/07)	
4,4'-Methylenebis(2-chloroaniline)	EPA 8270D_(2/07)	
4,4'-Methylenebis(n, n-dimethylaniline)	EPA 8270D_(2/07)	
4,4'-Oxydianiline	EPA 8270D_(2/07)	
4,6-Dinitro-2-methylphenol	EPA 8270D_(2/07)	
4-Aminobiphenyl	EPA 8270D_(2/07)	
4-Bromophenyl phenyl ether (BDE-3)	EPA 8270D_(2/07)	
4-Chloro-1,2-phenylenediamine	EPA 8270D_(2/07)	
4-Chloro-1,3-phenylenediamine	EPA 8270D_(2/07)	
4-Chloro-3-methylphenol	EPA 8270D_(2/07)	
4-Chloroaniline	EPA 8270D_(2/07)	
4-Chlorophenol	EPA 8270D_(2/07)	
4-Chlorophenyl phenylether	EPA 8270D_(2/07)	
4-Dimethyl aminoazobenzene	EPA 8270D_(2/07)	
4-Nitroaniline	EPA 8270D_(2/07)	
4-Nitrobiphenyl	EPA 8270D_(2/07)	
4-Nitrophenol	EPA 8270D_(2/07)	
5,5-Diphenylhydantoin	EPA 8270D_(2/07)	
5-Chloro-2-methylaniline	EPA 8270D_(2/07)	
5-Nitroacenaphthene	EPA 8270D_(2/07)	
5-Nitro-o-anisidine	EPA 8270D_(2/07)	
5-Nitro-o-toluidine	EPA 8270D_(2/07)	
7,12-Dimethylbenz(a) anthracene	EPA 8270D_(2/07)	
a,a-Dimethylphenethylamine	EPA 8270D_(2/07)	
Acenaphthene	EPA 8270D_(2/07)	
Acenaphthylene	EPA 8270D_(2/07)	
Acetophenone	EPA 8270D_(2/07)	
Aldrin	EPA 8270D_(2/07)	
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
alpha-Terpineol	EPA 8270D_(2/07)	
Aminoazobenzene	EPA 8270D_(2/07)	
Anilazine	EPA 8270D_(2/07)	
Aniline	EPA 8270D_(2/07)	
Anthracene	EPA 8270D_(2/07)	
Aramite	EPA 8270D_(2/07)	
Aroclor-1016 (PCB-1016)	EPA 8270D_(2/07)	1
Aroclor-1221 (PCB-1221)	EPA 8270D_(2/07)	1
Aroclor-1232 (PCB-1232)	EPA 8270D_(2/07)	1
Aroclor-1242 (PCB-1242)	EPA 8270D_(2/07)	1
Aroclor-1248 (PCB-1248)	EPA 8270D_(2/07)	1
Aroclor-1254 (PCB-1254)	EPA 8270D_(2/07)	1
Aroclor-1260 (PCB-1260)	EPA 8270D_(2/07)	1
Atrazine desethyl	EPA 8270D_(2/07)	
Azinphos-methyl (Guthion)	EPA 8270D_(2/07)	
Barban	EPA 8270D_(2/07)	
Benzidine	EPA 8270D_(2/07)	
Benzo(a)anthracene	EPA 8270D_(2/07)	
Benzo(a)pyrene	EPA 8270D_(2/07)	
Benzo(g,h,i)perylene	EPA 8270D_(2/07)	
Benzo(k)fluoranthene	EPA 8270D_(2/07)	
Benzo[b]fluoranthene	EPA 8270D_(2/07)	
Benzoic acid	EPA 8270D_(2/07)	
Benzyl alcohol	EPA 8270D_(2/07)	
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8270D_(2/07)	
Biphenyl	EPA 8270D_(2/07)	
bis(2-Chloroethoxy)methane	EPA 8270D_(2/07)	
bis(2-Chloroethyl) ether	EPA 8270D_(2/07)	
bis(2-Chloroisopropyl) ether	EPA 8270D_(2/07)	
Bromoxynil octanate	EPA 8270D_(2/07)	
Butyl benzyl phthalate	EPA 8270D_(2/07)	
Captafol	EPA 8270D_(2/07)	
Captan	EPA 8270D_(2/07)	
Carbaryl (Sevin)	EPA 8270D_(2/07)	
Carbazole	EPA 8270D_(2/07)	1
Carbofuran (Furaden)	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Carbophenothion	EPA 8270D_(2/07)	
Chlordane (tech.)	EPA 8270D_(2/07)	
Chlorfenvinphos	EPA 8270D_(2/07)	
Chlorobenzilate	EPA 8270D_(2/07)	
Chlorpyrifos	EPA 8270D_(2/07)	
Chrysene	EPA 8270D_(2/07)	
Coumaphos	EPA 8270D_(2/07)	
Crotoxyphos	EPA 8270D_(2/07)	
delta-BHC	EPA 8270D_(2/07)	
Demeton	EPA 8270D_(2/07)	
Demeton-o	EPA 8270D_(2/07)	
Demeton-s	EPA 8270D_(2/07)	
Di(2-ethylhexyl)adipate	EPA 8270D_(2/07)	
Di(2-ethylhexyl)phthalate	EPA 8270D_(2/07)	
Diallate	EPA 8270D_(2/07)	
Dibenz(a,h) acridine	EPA 8270D_(2/07)	
Dibenz(a,h) anthracene	EPA 8270D_(2/07)	
Dibenz(a,j) acridine	EPA 8270D_(2/07)	
Dibenzo(a,e) pyrene	EPA 8270D_(2/07)	
Dibenzofuran	EPA 8270D_(2/07)	
Dibenzothiophene	EPA 8270D_(2/07)	
Dichlone	EPA 8270D_(2/07)	
Dichlorovos (DDVP, Dichlorvos)	EPA 8270D_(2/07)	
Dicrotophos	EPA 8270D_(2/07)	
Dieldrin	EPA 8270D_(2/07)	
Diethyl phthalate	EPA 8270D_(2/07)	
Diethyl sulfate	EPA 8270D_(2/07)	
Diethylstilbestrol	EPA 8270D_(2/07)	
Dihydrosafrole	EPA 8270D_(2/07)	
Dimethoate	EPA 8270D_(2/07)	
Dimethyl phthalate	EPA 8270D_(2/07)	
Di-n-butyl phthalate	EPA 8270D_(2/07)	
Dinocap	EPA 8270D_(2/07)	
Di-n-octyl phthalate	EPA 8270D_(2/07)	
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270D_(2/07)	
Diphenylamine	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Disulfoton	EPA 8270D_(2/07)	
Endosulfan I	EPA 8270D_(2/07)	
Endosulfan II	EPA 8270D_(2/07)	
Endosulfan sulfate	EPA 8270D_(2/07)	
Endrin	EPA 8270D_(2/07)	
Endrin aldehyde	EPA 8270D_(2/07)	
Endrin ketone	EPA 8270D_(2/07)	
EPN	EPA 8270D_(2/07)	
Ethion	EPA 8270D_(2/07)	
Ethyl carbamate (Urethane)	EPA 8270D_(2/07)	
Ethyl methanesulfonate	EPA 8270D_(2/07)	
Famphur	EPA 8270D_(2/07)	
Fensulfothion	EPA 8270D_(2/07)	
Fenthion	EPA 8270D_(2/07)	
Fluchloralin	EPA 8270D_(2/07)	
Fluoranthene	EPA 8270D_(2/07)	
Fluorene	EPA 8270D_(2/07)	
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8270D_(2/07)	
Heptachlor	EPA 8270D_(2/07)	
Heptachlor epoxide	EPA 8270D_(2/07)	
Hexachlorobenzene	EPA 8270D_(2/07)	
Hexachlorobutadiene	EPA 8270D_(2/07)	
Hexachlorocyclopentadiene	EPA 8270D_(2/07)	
Hexachloroethane	EPA 8270D_(2/07)	
Hexachlorophene	EPA 8270D_(2/07)	
Hexachloropropene	EPA 8270D_(2/07)	
Hexamethylphosphoramide (HMPA)	EPA 8270D_(2/07)	
Hydroquinone	EPA 8270D_(2/07)	
Indeno(1,2,3-cd) pyrene	EPA 8270D_(2/07)	
Isodrin	EPA 8270D_(2/07)	
Isophorone	EPA 8270D_(2/07)	
Isosafrole	EPA 8270D_(2/07)	
Kepone	EPA 8270D_(2/07)	
Leptophos	EPA 8270D_(2/07)	
m+p Cresol	EPA 8270D_(2/07)	
Malathion	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Maleic anhydride	EPA 8270D_(2/07)	
Mestranol	EPA 8270D_(2/07)	
Methapyrilene	EPA 8270D_(2/07)	
Methoxychlor	EPA 8270D_(2/07)	
Methyl methanesulfonate	EPA 8270D_(2/07)	
Methyl parathion (Parathion, methyl)	EPA 8270D_(2/07)	
Mevinphos	EPA 8270D_(2/07)	
Mexacarbate	EPA 8270D_(2/07)	
Mirex	EPA 8270D_(2/07)	
Monocrotophos	EPA 8270D_(2/07)	
Naled	EPA 8270D_(2/07)	
Naphthalene	EPA 8270D_(2/07)	
n-Hexadecane	EPA 8270D_(2/07)	
Nicotine	EPA 8270D_(2/07)	
Nitrobenzene	EPA 8270D_(2/07)	
Nitrofen	EPA 8270D_(2/07)	
Nitroquinoline-1-oxide	EPA 8270D_(2/07)	
N-Nitrosodiethylamine	EPA 8270D_(2/07)	
N-Nitrosodimethylamine	EPA 8270D_(2/07)	
N-Nitroso-di-n-butylamine	EPA 8270D_(2/07)	
N-Nitroso-di-n-propylamine	EPA 8270D_(2/07)	
N-Nitrosodiphenylamine	EPA 8270D_(2/07)	
N-Nitrosomethylethalamine	EPA 8270D_(2/07)	
N-Nitrosomorpholine	EPA 8270D_(2/07)	
N-Nitrosopiperidine	EPA 8270D_(2/07)	
N-Nitrosopyrrolidine	EPA 8270D_(2/07)	
n-Tetradecane	EPA 8270D_(2/07)	
o,o,o-Triethyl phosphorothioate	EPA 8270D_(2/07)	
o-Anisidine	EPA 8270D_(2/07)	
Octamethyl pyrophosphoramide	EPA 8270D_(2/07)	
Parathion	EPA 8270D_(2/07)	
p-Benzoquinone	EPA 8270D_(2/07)	
p-Cresidine	EPA 8270D_(2/07)	
Pentachlorobenzene	EPA 8270D_(2/07)	
Pentachloronitrobenzene	EPA 8270D_(2/07)	
Pentachlorophenol	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Phenacetin	EPA 8270D_(2/07)	
Phenanthrene	EPA 8270D_(2/07)	
Phenobarbital	EPA 8270D_(2/07)	
Phenol	EPA 8270D_(2/07)	
Phorate	EPA 8270D_(2/07)	
Phosalone	EPA 8270D_(2/07)	
Phosmet (Imidan)	EPA 8270D_(2/07)	
Phosphamidon	EPA 8270D_(2/07)	
Phthalic anhydride	EPA 8270D_(2/07)	
Piperonyl sulfoxide	EPA 8270D_(2/07)	
Pronamide (Kerb)	EPA 8270D_(2/07)	
Propylthiouracil	EPA 8270D_(2/07)	
Pyrene	EPA 8270D_(2/07)	
Pyridine	EPA 8270D_(2/07)	
Resorcinol	EPA 8270D_(2/07)	
Safrole	EPA 8270D_(2/07)	
Strychnine	EPA 8270D_(2/07)	
Sulfallate	EPA 8270D_(2/07)	
Terbufos	EPA 8270D_(2/07)	
Tetrachlorvinphos (Stirophos, Gardona)	EPA 8270D_(2/07)	
Tetraethyl dithiopyrophosphate	EPA 8270D_(2/07)	
Tetraethyl pyrophosphate (TEPP)	EPA 8270D_(2/07)	
Thionazin (Zinophos)	EPA 8270D_(2/07)	
Thiophenol (Benzenethiol)	EPA 8270D_(2/07)	
Toluene diisocyanate	EPA 8270D_(2/07)	
Toxaphene (Chlorinated camphene)	EPA 8270D_(2/07)	
Trifluralin (Treflan)	EPA 8270D_(2/07)	
Trimethyl phosphate	EPA 8270D_(2/07)	
Tri-p-tolyl phosphate	EPA 8270D_(2/07)	
tris-(2,3-Dibromopropyl) phosphate (tris-BP)	EPA 8270D_(2/07)	
Gasoline range organics (GRO)	WDOE NWTPH-Gx_(1997)	4
Ignitability	EPA 1010A - 2004	

Matrix/Analyte	Method	Notes

Accredited Parameter Note Detail

(1) Provisional accreditation pending submittal of acceptable Proficiency Testing (PT) results (WAC 173-50-110). (2) Accrediltation is limited to liquid matrix only. (3) Provisional accreditation pending submittal of supporting documentation. (4) Modified to use MS detection. (5) EPA Method 8015 is not approved for State of Washington Model Toxics Control Act testing.

08/22/2016

Authentication Signature
Alan D. Rue, Lab Accreditation Unit Supervisor

Date

ATTACHMENT 2
ONSITE ENVIRONMENTAL INC. QUALITY ASSURANCE MANUAL

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

QUALITY ASSURANCE MANUAL

Revision No. 9.4
July 24, 2015

OnSite Environmental Inc.
14648 NE 95th Street
Redmond, Washington 98052
(425) 883-3881

Approved By: Stacey Duran — 11-30-16

Stacey Duran
Laboratory QA/QC Officer — Date

Approved By: 11-30-16

Karl Hornyik
Laboratory Director — Date

Issued To: FARALLON CONSULTING

Date Issued: 11/30/16

Revision History

Origination Date: **Unknown**

Revisions 1.0 through 8.0
The status of the electronic files and originals of these versions is unknown.

Revision 8.1 (February 26, 2002)
A copy of this revision is filed in the QA/QC files. The electronic copy is on the server and has been backed up.

Revision 9.0 (August 28, 2003)
The Quality Assurance Manual underwent significant major upgrade in response to an EPA review, which noted many deficiencies in the document. The NELAC Manual was used to insure the Quality Assurance Manual more fully addressed the issues that regulators and clients would be looking for in our Quality Assurance Manual and to anticipate possibly getting accredited under NELAC in the near future.

Revision 9.1 (January 28, 2004)
The Quality Assurance Manual underwent the annual review. The organization chart, instrument list, and SOP list were updated to reflect changes since the last revision.

Revision 9.2 (November 19, 2008)
The Quality Assurance Manual underwent the annual review. The organization chart, instrument list, and SOP list were updated to reflect changes since the last revision.

Revision 9.3 (August 3, 2012)
The Quality Assurance Manual was revised as follows:
- Added a Data Integrity Policy
- Added a Data Integrity and Ethics Training section
- Updated instrumentation
- Updated maintenance SOP list
- Updated organizational chart
- Update floor plan
- Updated Appendix A
- Updated Appendix B

Revision 9.4 (July 24, 2015)
The Quality Assurance Manual was revised as follows:
- Annual Review
- Grammatical and spelling corrections
- Updated organizational chart
- Updated equipment list
- Updated maintenance SOP list
- Updated sample preparation SOP list
- Updated Appendix B

Table of Contents

Appendices

1.0 Quality Assurance Policy and Objectives

1.1 Mission Statement

OnSite Environmental Inc. provides high quality and timely chemical analyses to environmental, engineering and industrial clients.

1.2 Core Values

At OnSite Environmental Inc. we hold the following principles and values to be the most important, and we consider these values in making decisions in our business:

- Honesty
- Safety of our employees and community
- Good science
- Fairness
- Quality

1.3 Data Integrity and Ethics Policy

It is the policy of OnSite Environmental Inc. that appropriate and adequate Quality Assurance activities shall be implemented to document that all environmental data generated, stored, reported, or used is of known and adequate statistical quantity and quality to fulfill the needs of the primary data user.

Data shall be accurate, precise, complete, representative, comparable and, when required, legally defensible. This policy is intended to embrace both internal data, generated by internal Department monitoring and testing activities, and external data arising from regulated activities, contracts, grants, and cooperative agreements.

Ethics is a set of moral principles, a code of right and wrong, or behavior that conforms to accepted professional practices.

Fraud is an intentional act of deceit that may result in legal prosecution. Unethical actions become fraudulent when a law is violated. For example, it is unethical to change the acquisition date of a file for a chromatogram to meet holding times. It becomes fraud when the results are mailed or faxed to the client (wire fraud or mail fraud).

All employees at all times shall conduct themselves in an honest and ethical manner. Compliance with this policy will be strictly enforced. Unethical behavior is grounds for immediate termination.

Examples of unethical behavior include, but are not limited to the following:

- Artificially fabricating results
- Misrepresenting data such as peak integration, calibration, tuning, or system suitability
- Improper clock settings to meet holding times
- Intentional deletion of non-compliant data
- Improper manipulation of data or software
- Improper handling of data errors, non-compliant data, or QC outliers
- Lack of reporting unethical behavior by others

OnSite Environmental Inc. is committed to ensuring the integrity of our data, incorporating the highest appropriate standard of quality in all of our analytical programs.

Personnel shall not condone any accidental or intentional reporting of deceptive or misleading data.

If management requests personnel to engage in an activity that compromises data integrity, they have the right to refuse compliance with the request and to appeal the action through the Quality Assurance Officer.

Management shall not instruct subordinates to perform any practices that would violate this policy, nor will management discourage, intimidate or inhibit a staff member who may choose to appeal instruction under this agreement and will not retaliate against those who do so.

An employee must report any suspected unethical behavior or fraudulent activities to one of the following management representatives:

- Robert Wallace, Laboratory Director
- Karl Hornyik, Laboratory Manager, or
- Stacey Duran, Laboratory QA/QC Officer

If an employee wishes to remain anonymous, they may choose to describe the situation in an unsigned note to one of the above representatives. If the facts of the case are not clear after an investigation, a committee of senior employees may be asked to investigate the situation further and offer an opinion to the owners of the corporation.

1.4 Standards of Conduct

Our standards are those generally expected of employees in any professional business organization. Employees engaged in any of the following activities, or others deemed equally serious, will forfeit all benefits of employment:

- Theft or embezzlement
- Willful violation of safety or security regulations
- Conviction of a felony
- Working for a competitor
- Establishing a competing business
- Being intoxicated or under the influence of drugs or alcohol while at work
- Possession of drugs on the job
- Falsification of records
- Abuse, destruction, waste or unauthorized use of equipment, facilities or materials
- Gambling while on premises
- Chronic tardiness or absenteeism
- Breach of company or client confidentiality

This list of offenses is to highlight general company expectations and standards and does not include all possible offenses or types of conduct that will result in discipline or discharge. Management reserves the absolute right to determine the appropriate degree of discipline, including discharge, warranted in individual cases.

There may be no alcoholic beverages on the company premises, other than at times designated as company functions. At such times, non-alcoholic beverages will be provided as well.

Company policy requires employees to have no relationships or engage in any activities that might impair their independence or judgment. Employees must not accept gifts, benefits or hospitality that might tend to influence them in the performance of their duties. It is expected that there will be no employment by any competing company or any employment by any outside interest or engaging in any outside activity that might impair an employee's ability to render full time service to OnSite Environmental Inc.

1.5 Data Integrity and Ethics Training

Data integrity and ethics procedures in the laboratory include training, signed and dated integrity documentation for all laboratory employees, periodic monitoring of data integrity, and documented data integrity procedures.

Section managers uphold the spirit and intent by supporting integrity procedures, by enforcing data integrity procedures, and by signing and dating the data integrity procedure training forms.

Data integrity training is provided for all employees initially upon hire and annually thereafter.

Attendance at an initial data integrity training (part of new employee orientation) and the annual refresher training is recorded with a signature attendance sheet.

Specific integrity procedures for analyses involving chromatography (i.e. GC, GC/MS, etc.) are identified in SOP 1.12 Manual Integration. Training on this SOP is provided to all staff that performs chromatographic analyses.

Employees shall report all violations to management or Quality Assurance Officer.

Failure to report an integrity violation is an act of condoning the activity and is equivalent to having actually committed the violation.

The mechanism for confidential reporting of ethics and data integrity issues is:

- Unrestricted access to senior management or Quality Assurance Officer.
- An assurance that personnel will not be treated unfairly for reporting instances of ethics and data integrity breaches.
- Anonymous reporting.

Any potential data integrity issue is handled confidentially, to the extent possible, until a follow-up evaluation, full investigation, or other appropriate actions have been completed and the issues clarified. Inappropriate activities are documented, including disciplinary actions, corrective actions, and notifications of clients, if applicable. The documents are maintained for a minimum of 5 years.

Data integrity procedures are reviewed as part of the internal yearly audit and periodically monitored through in-depth data review of audit trails or records review as a part of internal monthly audits.

1.6 Confidentiality

During the course of business, employees are privy to data or information considered confidential or proprietary by our clients. This information includes, but is not limited to, test results, origin of samples, business relationship with client, any procedures and processes that they conduct or investigate, information about their business, our own laboratory procedures, and clients. All such information is kept strictly confidential and discussed only with corporate officers for the client's company. **The information will not be discussed with anyone**, even those within the client's company not designated as a contact, without prior permission from the client.

We are often contacted by government agencies or consultants hired by our clients. Without express permission, we only discuss the test methods or QC limits, and then solely if it is obvious from the conversation that the caller has a copy of the original report. Any discussion of the information listed in the above paragraph requires written permission from the designated contact. Permission by the designated contact may be granted by phone and should be followed in writing.

1.7 Complaint Resolution

Anytime a serious complaint is received, it is recorded in a permanent record so it can be tracked to insure resolution and brought to the attention of management.

A serious complaint is one that questions the validity of our results. Standard Operating Procedure 1.13 addresses the steps taken to document and resolve the complaint. In general, the nature of the complaint is documented and then given to the Laboratory Director. Someone is assigned to resolve the issues. The progress of the complaint is tracked during weekly staff meetings. Finally, after resolution, the complaint is fully documented and kept in the Laboratory QA/QC Officer's files for future reference.

1.8 Objectives

The overall objective of the quality assurance program for OnSite Environmental Inc. is to provide legally defensible analytical data that meet or exceed customer and regulatory requirements. To accomplish this, the following are performed:

- Maintain appropriate chain of custody of samples submitted to the laboratory.
- Maintain an effective, on-going quality control program to measure and verify laboratory performance.
- Monitor daily operational performance of the laboratory and provide timely corrective action for out of control events.
- Track corrective actions for resolution and appropriateness.
- Meet data requirements for accuracy, precision and completeness.
- Maintain traceability of measurements.
- Maintain complete records of data and reports generated by the laboratory.
- Provide sufficient flexibility to allow controlled changes in routine methods and Standard Operating Procedures to meet specific client data quality objectives.
- Maintain a data review process.
- Train employees in good analytical technique and in requirements of Standard Operating Procedures they are responsible to perform.

OnSite Environmental Inc. uses four controlled types of documents to establish the steps necessary to achieve these objectives.

Quality Assurance Manual (QAM) -- The primary Quality Control/Quality Assurance document for the laboratory is the Quality Assurance Manual. This manual provides an overview of the entire quality assurance program for OnSite Environmental Inc. The Laboratory Director, Laboratory Manager and Laboratory QA/QC Officer must approve the Quality Assurance Manual. The Quality Assurance Manual will be reviewed and revised, if necessary, at least annually.

Standard Operating Procedures (SOP) – Standard Operating Procedures document in sufficient detail the steps necessary to reproduce specific tasks within the laboratory. They are written to insure consistency from employee to employee and from day to day. They also serve as excellent training and reference documents for new employees. The author of the SOP, the Laboratory Manager and the Laboratory QA/QC Officer must approve Standard Operating Procedures. Each SOP will be reviewed and revised, if necessary, at least annually.

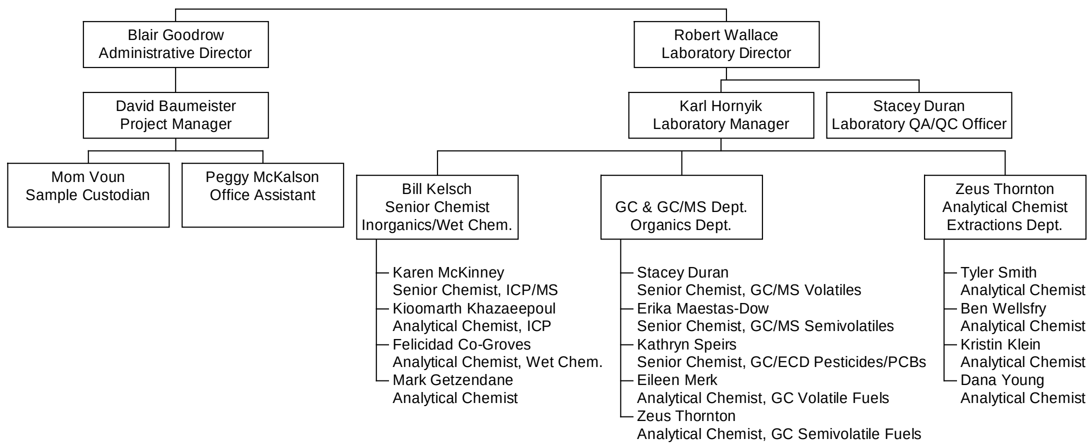
Laboratory Notebooks – Laboratory notebooks are used to document critical measurements and information such as sample weights, sample volumes, extract final volumes, dilutions, standard preparations, instrument maintenance, refrigerator, pipet and balance calibration and verification activities, etc. These bound notebooks are controlled documents that are tracked by the Laboratory QA/QC Officer. The procedure for controlling, maintaining and reviewing Laboratory Notebooks can be found in Standard Operating Procedure 1.01.

Quality Assurance Project Plans (QAPP) – These documents are typically created and provided by our clients. These documents may detail specific data quality objectives that are to be met for a specific client project. Since these data quality objectives may differ from what is internally defined by OnSite Environmental Inc.'s QA/QC program, it is absolutely required that the QAPP be submitted to OnSite Environmental Inc. for approval before work is started at the laboratory so that we can determine if the data quality objectives can be met and what, if any, changes need to be made in our Standard Operating Procedures, QA/QC program or reporting process to achieve these data quality objectives. OnSite Environmental Inc. will not be responsible for external data quality objectives that are not achieved unless we have approved a written QAPP prior to the beginning of the project. **Clients that submit work to us without an approved written QAPP specifically agree to the data quality objectives specified by OnSite Environmental Inc.'s internal QA/QC program.**

2.0 Organization and Personnel

2.1 Organization

The organization of the laboratory personnel is as follows:



2.2 Job Descriptions and Quality Assurance Responsibilities

The following positions are presently defined at OnSite Environmental Inc. Resumes of the key management positions can be found in Appendix A. Although the minimum requirements are desirable, equivalent education, experience or demonstrated transferable skills may be substituted for the requirements at the discretion of the Laboratory Director.

Laboratory Director

Position requires a minimum of a BA or BS in chemistry or related scientific field and at least eight years of laboratory experience. Management experience is highly desirable.

The Laboratory Director is ultimately responsible for the entire laboratory and the implementation of the quality assurance program.

The Laboratory Director shall certify that personnel with appropriate educational and/or technical background perform all tests for which the laboratory is accredited. Such information shall be documented.

Administrative Director

Position requires a minimum of a BA or BS, preferably in chemistry or other scientific field, and at least three years of management experience.

The Administrative Director is responsible for the front office activities, which include:

- Client services
- Payroll
- Personnel
- Purchasing
- Accounts payable
- Accounts receivable
- Contract administration

Laboratory Manager

Position requires a minimum of a BA or BS in chemistry or related scientific field and at least five years of laboratory experience at the analyst level. Management experience is highly desirable. The Laboratory Manager reports directly to the Laboratory Director.

The Laboratory Manager is responsible for:

- Managing and helping laboratory staff with production issues such as work schedules, workloads, instrument troubleshooting, and reporting of data
- Implementing and supervising the quality assurance program
- Supervising and maintaining the data review processes
- Performing Tier II data reviews
- Training staff

Laboratory QA/QC Officer

Position requires a minimum of a BA or BS in chemistry or related scientific field and at least four years of laboratory experience at the analyst level. Experience in data validation, statistics or previous QA/QC experience is highly desirable. The Laboratory QA/QC Officer reports directly to the Laboratory Director.

The Laboratory QA/QC Officer shall:

- Serve as the focal point for QA/QC and be responsible for the oversight and review of quality control data
- Be able to evaluate data objectively and perform assessments without outside (e.g., managerial) influence
- Have documented training and experience in QA/QC procedures
- Have a general knowledge of the analytical test methods for which data review is performed
- Arrange internal laboratory audits at least annually
- Arrange for performance evaluations and maintaining accreditations
- Notify laboratory management of deficiencies in the quality assurance program and monitor corrective action
- Maintain QA/QC documents and reports
- Monitor complaints and corrective actions for resolution
- Assist Laboratory Manager with Tier II data reviews

Project Manager

Position requires a minimum of a BA or BS, preferably in chemistry or other scientific field, and at least one year of laboratory experience at the analyst level. The Project Manager reports directly to the Administrative Director except for technical issues, which should be directed to the Laboratory Director, Laboratory Manager and/or Laboratory QA/QC Officer as appropriate.

Typical duties of the Project Manager include:

- Working with clients on establishing the analytical scope of each client project
- Reviewing client data quality objectives to make sure we can meet them
- Initiating specialized work plans for projects under QAPP guidance
- Supervising the purchasing, preservation and shipment of bottles and containers for client projects

- Supervising the Sample Custodian in receiving and maintaining proper chain of custody procedures of incoming samples
- Coordinating sample testing within holding time and turn around time restrictions within the laboratory
- Coordinating subcontracting of analytical work to other laboratories
- Performing Tier III data reviews
- Coordinating preparation of preliminary and final reports and electronic data deliverables

Senior Chemist

Position requires a minimum of a BA or BS, preferably in chemistry or other scientific field, and at least three years of laboratory experience at the analyst level. Experience and training may be substituted for educational requirements. Senior Chemists report directly to the department supervisor or the Laboratory Manager.

Senior Chemists duties include:

- Helping extract or digest samples
- Maintaining and calibrating instruments
- Preparing and analyzing samples
- Processing and reporting data
- Documenting non-conformances
- Performing Tier I and Tier II data reviews
- Troubleshooting and repairing analytical equipment
- Developing new methods

Analytical Chemist

Position requires a minimum of a BA or BS, preferably in chemistry or other scientific field, and at least one year of laboratory experience. Experience and training may be substituted for educational requirements. Analytical Chemists report to their department supervisor or to the Laboratory Manager in the absence of a department supervisor.

Analytical Chemists duties include:

- Helping extract or digest samples
- Maintaining and calibrating instruments
- Preparing and analyzing samples
- Processing and reporting data
- Performing Tier I data reviews
- Documenting non-conformances

Chemist

Position requires a minimum of a high school diploma and preferably at least one year of college chemistry. Chemists report to the department supervisor or to the Laboratory Manager in absence of a department supervisor.

Chemist duties typically include:

- Extracting or digesting samples
- Maintaining and calibrating instruments

- Preparing and analyzing samples
- Processing and reporting data
- Performing Tier I data reviews
- Documenting non-conformances

<u>Sample Custodian</u>

Position requires a minimum of a high school diploma. The Project Manager supervises the Sample Custodian.

Sample Custodian duties include:

- Logging in samples maintaining proper chain of custody protocols
- Documenting non-conformances
- Maintaining sample storage facilities
- Coordinating sample disposal
- Packing and shipping sample containers to clients
- Assisting Project Manager and Administrative Director in their duties

<u>Office Assistant</u>

Position requires a minimum of a high school diploma. The Project Manager supervises the Office Assistant.

Office Assistant duties include:

- Creating reports from submitted sample data
- Assisting Project Manager and Administrative Director in their duties

2.3 Personnel Training

OnSite Environmental Inc. has a formal training program covered in Standard Operating Procedure 1.06. In general, employees are familiarized with the Quality Assurance Manual, the Health and Safety Manual, the Employee Manual, and the Standard Operating Procedures they are expected to perform. A tour of the laboratory is given with attention given to the safety features of the laboratory such as fire extinguishers, first aid kits, eye wash stations, spill kits, evacuation routes, etc.

Training in first aid and CPR is offered to the employees every two years to make sure most employees have current certifications.

A training record is kept for each employee documenting when and what training has been received by the employee and by whom the training was given.

Each chemist must also pass a Demonstration of Capability procedure to document that they can achieve acceptable precision and accuracy from their technique with each of the technical Standard Operating Procedures they perform.

Employees are encouraged to attend external training courses to further their knowledge of analytical chemistry. Employees should contact the Laboratory Director for what steps they need to take to coordinate time off and reimbursement if the suggestion is approved.

2.4 Quality Assurance Document Control, Distribution and Revision

The Quality Assurance Manual, Standard Operating Procedures and Laboratory Notebooks are controlled documents. The revision history and distribution of these documents must be recorded using the Standard Operating Procedure 1.07 used to control documents. The Laboratory QA/QC Officer is responsible for document control.

Uncontrolled versions of these documents are acceptable but the distribution and revision distributed must also be documented as discussed in SOP 1.07. Only the Laboratory Director, Laboratory Manager and Laboratory QA/QC Officer may authorize the release of controlled documents.

Standard Operating Procedure 1.00 details the process required to create, review, revise, promulgate, retire and archive Standard Operating Procedures.

Standard Operating Procedure 1.01 details the process required to create, promulgate and archive Laboratory Notebooks and to do a QA/QC review of their contents.

The Quality Assurance Manual and appropriate Standard Operating Procedures are distributed by the Laboratory QA/QC Officer to each department for access by all employees.

2.5 Quality Assurance Assessments

2.5.1 Internal Audits

The Laboratory QA/QC Officer manages internal audits at two levels. A QC review meeting takes place once a month, and a lab-wide audit is performed once a year using Standard Operating Procedure 1.15.

In general, the monthly QC meeting consists of a review of any major QA/QC events or trends that may have occurred in the preceding month, as well as any applicable corrective measures taken to resolve these issues. In addition, random spot checks of data may be performed in order to assure compliance with standard laboratory operating procedures, including but not limited to:

- Check in and acceptance of sample into laboratory
- Storage temperature and location of client samples
- Sample extraction SOPs followed correctly
- Samples analyzed using correct SOP procedures
- Initial Calibration, Initial Calibration Verification and Continuing Calibration Verifications performed properly
- Quality Control limits met for precision and accuracy
- Non-conformances documented properly
- Corrective actions on non-conformances appropriate
- Data review process followed
- Raw and electronic data properly documented, gathered and archived
- Report generated correctly and without transcription errors
- Case narrative included and adequately addresses any issues with data

The annual audit is a more thorough look at all QA/QC operations for the laboratory. This audit is to occur in January of each year following Standard Operating Procedure 1.15. Following the audit, the Laboratory QA/QC Officer shall prepare a report summarizing the results of the annual audit and the monthly audits from the previous year. The report will be presented to management for the management review process.

2.5.2 **Managerial Review**

In February of each year, the Laboratory Director, Administrative Director, Laboratory Manager, Laboratory QA/QC Officer and Project Manager will hold a meeting to conduct a review of its quality system and its testing and calibration activities to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements in the quality system and laboratory operations. The review shall take into account the outcome of recent internal audits, performance audits, any changes in the volume and type of work undertaken, feedback from clients, corrective actions and other relevant factors. This procedure is covered in more detail in Standard Operating Procedure 1.16. The results from this meeting shall be documented and a copy of the report shall be kept in the Laboratory QA/QC Officer's files. The Laboratory Manager is required to address and document the resolution of any deficiencies.

2.5.3 **Performance Audit**

Performance audits are typically performed as part of the accreditation process. The audit can include three different activities including performance evaluation samples, reviews of QA/QC documents such as the Quality Assurance Manual and Standard Operating Procedures and onsite audits by the accrediting authority. The Laboratory Director, Laboratory Manager or Laboratory QA/QC Officer may also order a single blind or double blind performance evaluation if they feel it would be helpful in identifying QA/QC problems within the laboratory. The performance audit process is covered in Standard Operating Procedure 1.17. The report of any performance audits shall be kept in the QA/QC Officer's files and the Laboratory Manager is required to address and document the resolution of any deficiencies.

2.5.4 **Audit Review/Corrective Actions**

The review and corrective action process is included as part of the Internal Audit, Management Review and Performance Audit Standard Operating Procedures 1.15, 1.16 and 1.17. Standard Operating Procedure 1.18 details the process for documenting non-conformances and the associated corrective action.

3.0 Facilities and Equipment

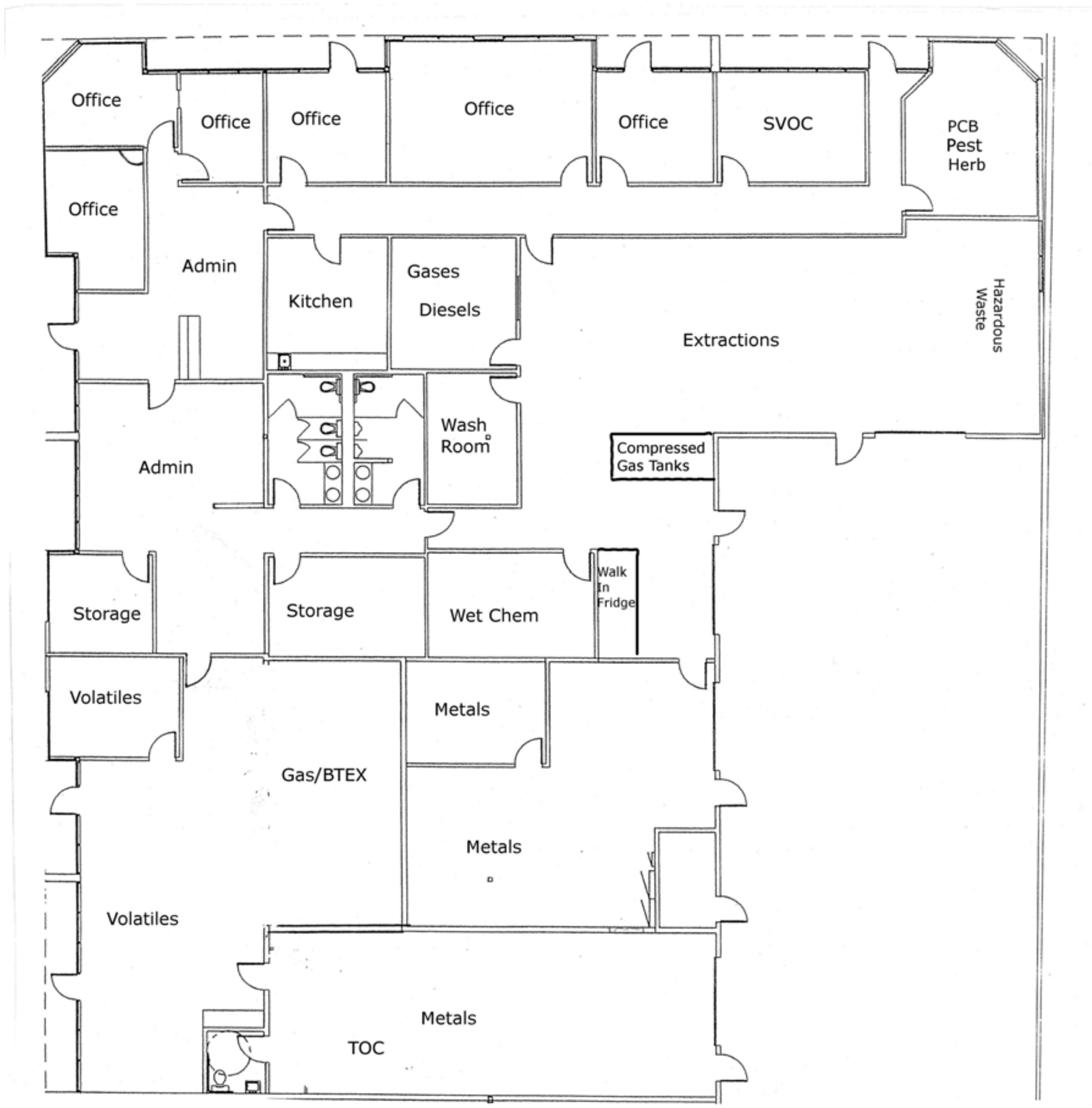
3.1 **Facility Description**

OnSite Environmental Inc. is located at 14648 NE 95th Street, Redmond, Washington 98052. This facility supports all normal laboratory operations.

The volatiles department has its own HVAC system that is independent from the extractions lab, semivolatiles labs and inorganics lab.

Zoned heating and air-conditioning maintain temperature within the laboratory. Temperature is generally set for employee comfort at normal room temperature of 68-72 °F. If a specific test method requires a controlled temperature, humidity or other environmental control, such controls can be found in the individual test Standard Operating Procedure.

Floorplan



Office
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Pest
Herb
Office
Admin
Kitchen
Gases
Diesels
Extractions
Hazardous
Waste
Wash
Room
Compressed
Gas Tanks
Admin
Walk
In
Fridge
Storage
Storage
Wet Chem
Volatiles
Metals
Gas/BTEX
Metals
Volatiles
Metals
TOC

3.2 **Instrumentation and backup alternatives**

All GC and GC/MS departments have back-up instrumentation. The metals department uses the ICP/MS to backup all functions of the ICP. The ICP can partially backup the ICP/MS; however, it cannot achieve the ultra low detection limits of this instrument.

GC Volatiles

Daryl:	GC Serial #3235A46317 Hewlett Packard 5890 Series II GC/PID/FID Tekmar/Hewlett Packard 2032 Automatic Liquid Sampler Tekmar Liquid Sample Concentrator 2000
Hope:	GC Serial #3203A40474 Hewlett Packard 5890A Series II GC/PID Varian Archon Autosampler Tekmar Liquid Sample Concentrator 2000

GC/MS Volatiles

Albert:	GC Serial #3336A57367 MS Serial #3440A02022 Hewlett Packard 5890 Series II plus Gas Chromatograph Hewlett Packard 5972A Mass Spectrometer Varian Archon Autosampler Hewlett Packard Liquid Sample Concentrator
Jessie:	GC Serial #US00033566 MS Serial #US94260049 Hewlett Packard 6890A Gas Chromatograph Hewlett Packard 5973N Mass Spectrometer Varian Archon Autosampler Tekmar/Dohrmann Liquid Sample Concentrator 3100
Morris:	GC Serial #CN10745114 MS Serial #US74828211 Agilent Technologies 7890A Gas Chromatograph Agilent Technologies 5975C Mass Spectrometer Teledyne Tekmar SOLATek 72 Autosampler Teledyne Tekmar Stratum Concentrator
Waldo:	GC Serial #CN10391147 MS Serial #US10402603 Agilent Technologies 7890A Gas Chromatograph Agilent Technologies 5975C Mass Spectrometer EST Analytical Centurion Autosampler EST Analytical Encon Evolution Concentrator

GC Semivolatiles

Isaac:	GC Serial #2728A13937 Hewlett Packard 5890 GC/FID/FID Dual Hewlett Packard Autosamplers
Teri:	GC Serial #US10403046 Agilent Technologies 6890N GC/FID/FID

	Dual Agilent Technologies Autosamplers
Vigo:	GC Serial #CN10741091 Agilent Technologies 7890A GC/FID/FID Dual Agilent Technologies Autosamplers

GC/MS Semivolatiles

Ralph:	GC Serial #3336A55281 MS Serial #3434A01677 Hewlett Packard 5890 Series II plus Gas Chromatograph Hewlett Packard 5972 Mass Spectrometer Hewlett Packard Autosampler
Corey:	GC Serial #US00007773 MS Serial #US82321650 Hewlett Packard 6890 Gas Chromatograph Hewlett Packard 5973 Mass Spectrometer Hewlett Packard Autosampler

GC/ECD

George:	GC Serial #3140A39359 Hewlett Packard 5890 Series II Gas GC/ECD/ECD Hewlett Packard Autosampler
Frank:	GC Serial #US92305459 Hewlett Packard 6890 plus GC/ECD/ECD Hewlett Packard Autosampler
Ulysses:	GC Serial #CN10741076 Agilent Technologies 7890A GC/ECD/ECD Agilent Technologies Autosampler

Inorganics/Wet Chemistry

Precious (ICP)	ICP Serial #ELO3068480 Varian Vista-MPX Varian SPS-5 Autosampler
Xavier (ICP/MS)	ICP/MS Serial #81DN3093002 Perkin Elmer NexION 300D ICP/MS Elemental Scientific Inc. SC2 DX Autosampler
Yogi	Mercury Analyzer Serial #040503QTA CETAC Quick Trace Mercury Analyzer M-7500 CETAC ASX-520 Autosampler
Olympia	UV/VIS Spectrophotometer Serial #AQA 113606 Thermo Spectronic Helios Aquamate
Koi	Wet Chemistry Analyzer Serial #090588 AQ2 Discrete Analyzer, SEAL
Nemo	Total Organic Carbon Analyzer Serial #H51104635289CS Shimadzu TOC-UCSH Analyzer

Shimadzu Solid Sample Module SSM-5000A
Shimadzu TOC Autosampler ASI-V

3.3 Maintenance Activities

Preventative maintenance is an important part of a Quality Assurance Program. Maintenance activities are all described in their respective Standard Operating Procedures for the following equipment:

Refrigerator Maintenance	8.01
Calibration of Volumetric Pipets	8.03
Thermometer Calibration	8.04
Balance Calibration	8.05
Sonicator Calibration	8.08
Microwave Calibration	8.09
Maintenance of High Purity Water System	8.10
Laboratory Maintenance	8.13
Glassware Cleaning and Washing	8.14
Oven Maintenance	8.15
Fume Hood Maintenance	8.16
DryVap Procedure and Maintenance	3.11
RapidVap N2 Procedure and Maintenance	3.12
Centrifuge Procedure and Maintenance	3.13
Speed-Vap Procedure and Maintenance	3.14

4.0 Sample Processing

4.1 Sample Receiving and Storage

When samples arrive in the laboratory, the Sample Custodian logs the samples into the laboratory using Standard Operating Procedure 1.02. The Sample Custodian works closely with the Project Manager to make sure the analysis plan meets the customer requirements and that any special requirements detailed in a client quality assurance project plan are met and conveyed to the rest of the laboratory. This procedure includes the following steps:

- Verify samples for damage and proper preservation and temperature
- Verify samples arrived within acceptable holding time
- Verify the sample labels match the chain of custody
- Verify that the samples meet the acceptance policy of the laboratory
- Assign a project number to the sample group
- Assign a sample identification number to each sample and label each sample
- Log the required information into a sample notebook for record keeping
- Complete and sign the chain of custody and create a project file
- Document any non-conformances found
- Store samples in the proper refrigerators
- Complete and distribute the paperwork required for each testing protocol
- Prepare documents and shipments of samples to be subcontracted

Evidence of collection, shipment, receipt and laboratory custody until disposal must be documented. Documentation is accomplished by means of a chain of custody record that records each sample and the individuals responsible for sample collection, shipment and receipt. A sample is considered to be in custody if it is:

- In a person's actual possession
- In view after being in a person's actual possession
- Locked or sealed to prevent tampering
- In a secured area accessible only to authorized personnel

OnSite Environmental Inc. refrigerators and laboratory space are considered a secured area, thus chain of custody is considered to be maintained the entire time they are stored and processed while at our facility. This procedure is adequate and acceptable for the vast majority of our clients.

Some quality assurance project plans require a much stricter custody procedure. In such cases, the samples will be stored in locked refrigerators maintained by assigned sample custodians. Employees will have to obtain the samples from the sample custodian and sign for the samples. The employee will return the sample to the sample custodian immediately after using the sample unless it is to be consumed in analysis. Sample extracts will also be kept in locked refrigerators and the sample custodian will release them to the chemist when they are ready to analyze the sample extract. This procedure is detailed in Standard Operating Procedure 1.03.

4.2 Sample Preparation

The actual sample preparation steps are provided in the Standard Operating Procedure for each analytical method. The extraction and digestion departments also are careful to document proper chain of custody and non-conformances as the samples are being processed. The organic extraction and inorganic digestion departments maintain the following Standard Operating Procedures to maintain consistency in the actual practices they use to prepare samples:

Organic Extraction Department

♦ Separatory Funnel Water Extractions	Method 3510	SOP 3.08
♦ Solid Phase Extraction	Method 3535	SOP 3.10
♦ Ultrasonic Soil Extractions	Method 3550	SOP 3.07
♦ Microscale Solvent Extraction	Method 3570	SOP 3.15
♦ Microwave Extraction	Method 3546	SOP 3.16
♦ Waste Dilution	Method 3580	SOP 3.06
♦ Acid Cleanup	Method 3665	SOP 3.00
♦ Silica Gel Cleanup	Method 3630	SOP 3.03
♦ Florisil Cleanup	Method 3620	SOP 3.01
♦ Alumina Cleanup	Method 3611	SOP 3.02
♦ Sulfur Cleanup		SOP 3.05
♦ BOND ELUT SAX Cleanup		SOP 3.04
♦ Sonicator Calibration		SOP 8.08
♦ DryVap Procedure		SOP 3.11
♦ RapidVap Procedure		SOP 3.12
♦ Diazomethane Generation		SOP 3.09
♦ Centrifuge Procedure		SOP 3.13
♦ SpeedVap Procedure		SOP 3.14
♦ Glassware Washing and Cleaning		SOP 8.14

Inorganic Digestion Department

♦ Dissolved Metals Water Preparation	Method 3005	SOP 6.02
♦ Hotplate Water Digestion	Method 3010	SOP 6.03
♦ Hotplate Soil Digestion	Method 3050	SOP 6.06
♦ Microwave Assisted Water Digestion	Method 3015	SOP 6.04

♦	MARS Microwave Water Digestion	Method 3015	SOP 6.10
♦	Microwave Assisted Soil Digestion	Method 3051	SOP 6.07
♦	MARS Microwave Soil Digestion	Method 3051	SOP 6.11
♦	Water Extraction for Hex. Chromium		SOP 6.08
♦	Alkaline Digestion for Hex. Chromium	Method 3060	SOP 6.09
♦	Calibration of Microwave		SOP 8.09
♦	TCLP Preparation	Method 1311	SOP 6.00
♦	SPLP Preparation	Method 1312	SOP 6.01
♦	Glassware Washing and Cleaning		SOP 8.14

4.3 Sample Analysis & Data Generation

The sample analysis and data generation procedures for sample holding time, sample preparation, instrument tuning and calibration, quality control requirements and data reduction e.g. are detailed in the Standard Operating Procedure for each method. See Appendix B for a list of tests and the associated Standard Operating Procedure number for which OnSite Environmental Inc. currently maintains accreditation.

4.3.1 Manual Integrations

The initials of the analyst and the date of any manual integrations are required on all raw data. Standard Operating Procedure 1.12 gives examples of proper and improper integrations for different situations and how to document any manual integrations that are performed to correct for improper auto-integration.

4.3.2 Traceability of Standards and Calibrations

It is important to be able to trace and document the standards we purchase, prepare and use to calibrate and verify the calibration of our instruments. Standards and neat chemicals used to make analytical standards and spiking solutions internally are tracked by lot number and are assigned internal identification numbers as they are recorded in laboratory notebooks upon receipt from the vendor. Calibration standards and spiking solutions prepared from these materials are also tracked in laboratory notebooks and assigned identification numbers so they can be tracked during sample preparation and sample analysis. Standard Operating Procedure 1.11 details this procedure.

4.3.3 Initial Calibration Verification

It is OnSite Environmental Inc. policy that all initial calibrations for SW-846 methods must be verified with initial calibration verification (ICV) standards. This standard should be near the midpoint of the calibration curve and is typically the same concentration as the continuing calibration verification standard. The ICV should be from a different manufacturer unless this is not feasible. In this case, a standard with a different lot number may be selected from the same manufacturer.

The ICV requirement can be useful to identify the following issues:

- Manufacturer incorrectly made the standard
- Standard has degraded and needs to be replaced
- Errors in standard preparation by the analyst
- Identifying poor (non-linear) calibration curves

4.4 Data Review

OnSite Environmental Inc. employs a three-tiered data review process. Checklists are used to document each level of review. In general, the chemist performs the Tier I review. The chemist then submits the data to a senior chemist, the Laboratory Manager, the Laboratory QA/QC Officer, or the Laboratory Director for a Tier II review. If corrections need to be made after the Tier II review, then the data is given back to the chemist to correct and resubmit to the Tier II process. Otherwise, the data is submitted to the Project Manager who coordinates the generation of the report and performs the final Tier III review before signing off on the data and submitting it to the client. Any changes in the data found during a Tier III review need technical agreement by the Laboratory Director, Laboratory Manager or Laboratory QA/QC Officer. Preliminary data submitted to the client must pass through the Tier II level and be clearly marked as preliminary data. The data can then be reviewed again at a later time before the final report is submitted to the client. This review procedure is detailed in Standard Operating Procedure 1.04.

4.5 Data Reporting and Electronic Data Deliverables

The Administrative Director and Project Manager coordinate report generation with assistance from the Office Assistant. The reporting requirements and the process to generate reports are described in Standard Operating Procedure 1.19. OnSite Environmental Inc. makes a concerted effort, whenever possible, to reduce the amount of hand entering of data to avoid transcription errors. Results from the instruments are electronically processed into a report using software or macros (typically Microsoft Excel). The results are then cut and pasted into the final report (Microsoft Word) with the help of macros so that data that is entered by hand is minimized.

The Laboratory Manager coordinates Electronic Data Deliverables (EDDs). Since each client requires their own format, Standard Operating Procedure 1.19 only addresses how to verify the EDD to insure its accuracy and agreement with the final report.

4.6 Back up of Electronic Data and Archiving of Data

The file server is backed up once a month. The data backed up includes all analytical data files, final reports and any other documents generated by the front office. A redundant back up copy is also made and stored at an off-site location.

The hardcopy of all the raw data and reports are kept on file for several months so staff has easy access to the data or reports. When the files begin to get full, the excess data is archived into file boxes, labeled and sent to a secure, third party, off-site archival company where the data can be accessed upon request. Data is maintained for a minimum of five years.

The back up and archival procedures are detailed in Standard Operating Procedure 1.05.

4.7 Sample and Waste Disposal

It is OnSite Environmental Inc. policy to store samples for 30 days following date collected for follow-up analyses and to give the client time to request that the samples be archived, returned or disposed. Clients are typically not charged for sample disposal unless the material is extremely hazardous and could not be disposed of in our normal waste streams. If the client wishes us to return the samples, the client can either pick them up at the laboratory or pay for us to ship them back under chain of custody. If the client selects to archive the samples, a small fee per sample per month is assessed. The procedures for sample return, archival and disposal are addressed in Standard Operating Procedure 1.08.

Organic sample extracts are kept, at a minimum, until the holding time specified by the method expires (typically 45 days or less). Inorganic sample digestates are kept, at a minimum, for 30 days.

When samples are scheduled for disposal, employees follow Standard Operating Procedure 1.08, which specifies that the samples be segregated into the following waste streams:

- Solid wastes (predominately hydrocarbon contaminated soils)
- Acidified aqueous wastes (predominately hydrochloric, nitric & sulfuric acid)
- Solvent wastes (predominately hexane, methylene chloride and acetone)
- PCB contaminated oils

Samples that do not fit these waste streams are set aside and handled on a case-by-case basis.

5.0 Quality Control

5.1 Definition of a Batch

Samples from different projects and clients may be batched together for quality control purposes unless a quality assurance project plan specifies that the quality control samples must be selected from that particular project. A batch can consist of up to twenty client samples in addition to any quality control samples that are required. The samples must be extracted, digested or otherwise prepared for analysis within a twelve-hour window. If more than twenty samples are to be extracted, a second batch of quality control samples must be generated. The types of quality control samples can differ depending on the method. Accuracy is assessed with any surrogates that are used and the spike blank and any matrix spike samples that are required by the method. Precision is assessed with any sample duplicates or matrix spike duplicates that are required by the method.

5.2 Method Blanks

Method blanks are used to make sure that the extraction and analysis procedures did not contribute contamination to the analysis.

5.3 Spike Blanks

Spike blanks are used to make sure that the analytes of interest can be accurately recovered from a blank matrix.

5.4 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike samples are used to make sure the analytes of interest can be accurately recovered from the sample matrix. The matrix spike duplicate is also used to make sure the analytes can be repeatedly recovered in an accurate and precise manner.

5.5 Duplicate Samples

Duplicate samples are used to make sure that sample results can be reproduced in a precise manner.

5.6 Surrogates

Surrogate compounds are compounds similar to the analytes of interest that are added to the sample at known concentration in order to track the accuracy of the sample extraction and analysis.

5.7 Standard Reference Materials

Standard Reference Materials are typically soil or sediment samples obtained from third party sources that have been extensively tested and have certified concentrations or concentration ranges of analytes of interest. Some quality assurance project plans require us to process a standard reference material while processing their samples as an accuracy check on our extraction and analysis procedures. OnSite Environmental Inc. currently analyzes standard reference material only if required by a client's quality assurance project plan.

Clients are responsible for the cost of purchasing or providing standard reference materials if required by their project.

5.8 Trip and Storage Blanks

Trip and storage blanks are useful in tracking potential contamination issues with sample shipping and storage. These types of blanks are analyzed only if specified or submitted by the client or quality assurance project plan. Clients are typically charged for these samples.

5.9 Method Detection Limit Studies

Method detection limit studies are conducted annually for all accredited test methods. Standard Operating Procedure 1.20 specifies how this procedure is to be handled.

5.10 Demonstration of Capability

New methods must undergo a Demonstration of Capability (initial precision and accuracy study) to verify that the method is performing adequately. Standard Operating Procedure 1.21 specifies how this test is to be done. Each sample preparation technician and chemist as part of our training program also conducts these studies.

5.11 Solvent and Chemical Lot Checks

Each new lot of solvents, acids and bulk chemicals used to extract or digest samples is checked for interferences and contamination before it is used in the laboratory. Standard Operating Procedure 1.10 details how this is done.

6.0 Quality Assurance

6.1 Accuracy

Accuracy is generally expressed as percent recovery, which is calculated as:

$$\text{Percent Recovery}\,(\%\text{R}) = \frac{X_s}{C_t} * 100$$

Where: X_s is the observed concentration of the analyte, and
C_t is the true concentration of the analyte

The acceptable range for accuracy is determined by the method or by control charting of actual laboratory samples. The analyst is responsible for verifying that the surrogate, spike blank and MS/MSD percent recoveries meet the quality control limits. A non-conformance form and corrective action must be initiated if the analyte does not fall within the appropriate quality control limits.

6.2 Precision

Precision is generally expressed as relative percent difference, which is calculated as:

$$\text{Relative Percent Difference (RPD)} = \frac{|X_1 - X_2|}{\left[\frac{X_1 + X_2}{2}\right]} * 100$$

Where: X_1 is the concentration from the first replicate sample, and
X_2 is the concentration from the second replicate sample

The acceptable range for precision is determined by the method or by control charting of actual laboratory samples. The analyst is responsible for verifying that the duplicate or MS/MSD recoveries meet the quality control limits. A non-conformance form and corrective action must be initiated if the analyte does not fall within the appropriate quality control limits.

6.3 Completeness

Completeness is expressed as the percentage of data quality objectives that are expected to be met by OnSite Environmental Inc. This requirement is generally specified as part of a quality assurance project plan. Although OnSite does not track this information routinely or have a specific limit that we internally specify must be met, we strive to achieve 100% at all times.

6.4 Representativeness

In order that the reported results are representative of the sample received, OnSite Environmental Inc. makes a reasonable effort to assure that the samples are adequately homogenized prior to sampling for analysis. OnSite Environmental Inc. cannot control factors in the field affecting sample representativeness; thus, it is ultimately the client's responsibility to ensure that the sample submitted is well homogenized prior to submitting it to the laboratory.

6.5 Control Charting & Control Limits

OnSite Environmental Inc. routinely tracks and control charts surrogate percent recoveries, spike blank percent recoveries, MS/MSD percent recoveries and the relative percent difference of MS/MSD samples for all methods that require these quality control samples. The chemist is responsible for recording this information.

Control limits are derived from the control charts and are updated at least once a year. The control limit is established as three standard deviations from the mean of the data set. Standard Operating Procedure 1.22 provides additional guidance on generating and maintaining control charts and quality control limits.

6.6 Non-conformances & Corrective Action

Non-conformances are generated throughout the laboratory by sample receiving, the extractions/digestion departments, the different analytical groups, the Tier I/II/III review process, the front office, and from internal audits. In order to make sure that each non-conformance is documented and that a resolution was implemented, the non-conformance procedure is governed under Standard Operating Procedure 1.18.

The non-conformances and corrective actions that are generated during third party audits, internal audits, management reviews and through non-conformance forms are summarized each month for the monthly quality assurance meeting as part of SOP 1.14. The progress for each item is tracked at the following monthly meeting until the item is finally resolved.

Appendix A

Resumes

Blair Goodrow ***Administrative Director***

Key Qualifications: Blair has twenty-three years of experience in managing an analytical environmental laboratory. Prior to this, Blair acquired over six years of experience as a CPA at a public accounting firm. He brings to the position of administrative director and financial manager a varied background in business and finance.

Education: Certified Public Accountant, certified 1986

Post Graduate Studies, Accounting, San Jose State University, 1982

Bachelor of Arts, Business-Economics, University of California, Santa Barbara, 1980

Employment:

- **OnSite Environmental, Inc.**, Redmond, WA, 1992 - Present
Administrative Director/Financial Manager. Responsible for the marketing of the company. Also responsible for the financial and administrative functions of the company.

- **Analytical Services, Inc.**, Kirkland, WA, 1989-1992
Controller. Responsible for all financial, banking, and administrative functions of the company. Set-up and maintained a computerized accounting system. Prepared monthly financial statements and all required tax reports.

- **Clothier and Head, PS.**, Seattle, WA, 1983-1989
Senior Accountant. Reviewed and compiled financial statements and projections. Prepared and reviewed corporate, partnership and individual tax returns. Supervised and trained staff accountants.

Karl P. Hornyik *Laboratory Director*

Key Qualifications:

Karl has over twenty years of experience in environmental chemistry. He is experienced in analytical support of projects involving UST management services, remediation of contaminated sites, site assessments, groundwater monitoring, and waste characterization. Specializing in organic chemistry, Karl has served as an analyst in all sections of the laboratory and so has a comprehensive knowledge of individual analytical techniques as well as how they function together as a whole.

Education:

Bachelor of Science, Pre-Medicine, University of Oregon, 1990

Employment:

- **OnSite Environmental, Inc.**, Redmond, WA, 1995 – Present
Laboratory Manager. Responsible for supervising all areas of laboratory operations, including extractions and analyses. Perform final data review for organic analyses. Ensure that all analytical equipment is properly operating and maintained. Responsible for development and management of laboratory data systems including custom hard copy and electronic data sets to meet specific client requirements.

- **OnSite Environmental, Inc.**, Redmond, WA, 1993 – 1995
QA/QC Officer. Responsible for the implementation and improvement of the laboratory's quality assurance/quality control program. Develop, monitor and maintain laboratory standard operating procedures. Maintain certifications with state accrediting authorities. Oversee analysis of performance evaluation samples and conduct in-house performance audits.

- **Laucks Testing Laboratories**, Seattle, WA, 1991 – 1993
GC Chemist. Extracted and analyzed soil, water and waste samples for volatiles and semivolatiles constituents.

Project Experience:

- **Tulalip Landfill Superfund Site**. Project involved analytical testing of pre-construction fill prior to the principal remedial action. Contaminants of concern were volatile organics, semivolatile organics, PCBs, pesticides, herbicides, and metals.

- **EPA Superfund Technical Assessment and Response Team (START)**.
Projects typically involve analytical testing of hazardous materials for characterization prior to determining remedial actions. Contaminants that are typically analyzed for are volatile organics, semivolatile organics, PCBs, pesticides, herbicides, and metals. The project requires adherence to specific reporting and deliverable requirements that include CLP type deliverables and electronic data deliverables (SEDD 2A).

- **Port of Seattle**. Environmental Analytical Laboratory Services Contract. Projects typically involve analytical testing of soil and groundwater contaminated with total petroleum hydrocarbons (TPH). Additional contaminants of concern are volatile organics, semivolatile organics, PCBs, pesticides, herbicides, and metals. The project requires adherence to specific quality control, reporting and deliverable requirements.

David Baumeister *Project Manager*

Key Qualifications:

David has over twenty years of experience in environmental chemistry and environmental regulations. Prior to project management, David acquired over seven years of experience as a GC chemist and extractions supervisor. He brings to the position of project manager a solid and varied background in environmental chemistry. He has a thorough understanding of applicable analytical methods, limitations and reporting limits involved with all of the departments found in our laboratory.

Education:

Bachelor of Arts, Biology, Emory University, 1990.

Employment:

- **OnSite Environmental, Inc.**, Redmond, WA, 1999 - Present
Project Manager. Coordinates and manages complex analytical projects from inception to completion. Serves as a liaison between laboratory personnel and clients.

- **OnSite Environmental, Inc.**, Redmond, WA, 1994-1998
GC Chemist-Extractions Supervisor. Analyzed environmental samples by GC methods. Supervised extractions of all laboratory samples.

- **Alden Technologies Inc.**, Seattle, WA, 1993-1994
Extractions Supervisor. Supervised staff of chemists performing extractions of all laboratory samples. Coordinated daily operations of group. Method development.

- **Analytical Technologies, Inc.,** Tukwila, WA, 1992-1993
Extractions Technician. Performed extractions on laboratory samples. Responsible for chemical inventory.

- **Weyerhaeuser**, Federal Way, WA, 1991-1992
Physical Chemist. Analyzed paper products for quality control. Established QA/QC guidelines for various products.

Project Experience:

- **King County Department of Health**. Soils investigation involving the support and development of a database of environmental information regarding the extent of contamination from the Tacoma metal smelter.

- **Port of Seattle**. Environmental Analytical Laboratory Services Contract. Mr. Baumeister manages the environmental chemistry support for this contract. Projects typically involve analytical testing of soil and groundwater contaminated with total petroleum hydrocarbons (TPH). Additional contaminants of concern are volatile organics, semivolatile organics, PCBs, pesticides, herbicides, and metals. The project requires adherence to specific quality control, reporting and deliverable requirements.

- **Ecology and Environment, Inc.** Superfund Technical Assessment and Response Team (START). Mr. Baumeister manages the environmental chemistry support for this contract. The projects under this contract typically involve analytical testing of hazardous materials for characterization prior to determining remedial actions. Contaminants that are typically analyzed for are metals, pesticides, herbicides, PCBs, volatile organics, semivolatile organics, and TPH. Mr. Baumeister coordinates project specific quality control requirements and deliverables that included CLP type deliverables and electronic data deliverables (SEDD 2A).

- **Sound Transit Environmental Assessment Services.** Mr. Baumeister managed the environmental chemistry support for this project. The project involved testing of soil and groundwater in support of Phase 1 and Phase 2 Environmental Assessments for dozens of properties involving several different consultants. Contaminants of concern were total petroleum hydrocarbons (TPH), volatile organics, semivolatile organics, PCBs, pesticides, and metals. The project, at times, required expedited turnaround of analysis.

Stacey Duran *Laboratory QA/QC Officer*

Key Qualifications: Stacey has over sixteen years of experience in environmental chemistry. Stacey has training and/or experience in all organic sections of the laboratory. She brings to the position of Laboratory QA/QC Officer not only a varied background in environmental chemistry, but also a legal background.

Education: Bachelor of Science, Pre-Medicine, The Evergreen State College, 1996.

Employment:

- **OnSite Environmental, Inc.**, Redmond, WA, 2006 - Present

Laboratory QA/QC Officer. Responsible for the monitoring and improvement of the laboratory's quality assurance/quality control program

- **OnSite Environmental, Inc.**, Redmond, WA, 2004 - Present

GC/MS Chemist. Extract and analyze environmental samples for Volatile Organic Compounds by GC/MS methods.

- **OnSite Environmental, Inc.**, Redmond, WA, 1999 - 2004

GC Chemist. Extracted and analyzed environmental samples for gasoline, BTEX, and VPH by GC methods. Created SOPs.

Health and Safety Officer. Maintained MSDS's and OSHA and WISHA guide books; updated safety manual; conducted safety training; maintained injury reports; officiated monthly meetings; ordered safety related supplies; and scheduled yearly physicals, Hazmat training, air quality testing, CPR/first aid training, and fire extinguisher maintenance. Created cost estimate.

Hazardous Waste Administrator. Monitored collection and disposal of lab-produced hazardous waste and wrote yearly reports for DOE.

- **OnSite Environmental, Inc.**, Redmond, WA, 1998 - 1999

Organic Extraction Technician. Performed organic extractions of environmental samples; analyzed FOG samples on IR; and ran clean-up methods on samples when necessary.

- **Friedman & Bruya, Inc.**, Seattle, WA, 1998

Laboratory Assistant. Cleaned glassware; performed organic extractions on environmental samples; and performed shipping and receiving duties.

- **The Office of the Attorney General,** Olympia, WA, 1988 - 1998

Legal Secretary. Handled garnishment action; transcribed tapes; created case files; completed agreements; prepared and filed legal documents; authored correspondence; scheduled depositions; computed attorneys' time sheets; handled quarterly case status reports for office; trained secretaries in specialty areas; archived documents; worked with the Washington State Patrol, Internal Affairs Unit, on a confidential document production project including hiring, training, and supervising of additional employees; scanning hard copies of death penalty cases using a new imaging system into a computer while mitigating any problems along the way.

Appendix B

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ATTACHMENT 3
FIELD SAMPLING FORMS

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

FIELD SAMPLING FORMS

1. Field Report Form
2. Low Flow Well Purging and Sampling Form
3. Water Level Form
4. Sample Label
5. Chain-of-Custody Form
6. Waste Material Label
7. Waste Inventory Tracking Sheet

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California
Oakland | Sacramento | Irvine

FIELD REPORT

Page ___ of ___

Date: _____________ **Project #:** ___________________________________ **Task #:**_______________

Project: ______________________________________ **Site Address:** ______________________________________

Client: ______________________________________ **Contractor:** ______________________________________

Weather: ______________________________________ **Temp:** ____________

Equipment Used: ____

Hours: ________ _________ **Mileage:** _________ **Project Manager:** ______________________________

Contractor *Staff*

Prepared By: _________________________________ **Reviewed By:** ______________________________

Comments:

G:\Forms and Templates\Field Forms\Field Rpt Form.docx

FIELD REPORT (continued)

Page ___ of ___

Project: ______________________________ **Date:** ____________ **Project #:** _____________ **Task #:**_______

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LOW FLOW WELL PURGING AND SAMPLING DATA

		WELL NO:
DATE:	PROJECT NAME:	PROJECT NO:

WEATHER CONDITIONS:

WELL DIAMETER (IN.) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ OTHER ________________

SAMPLE TYPE: ☐ GROUNDWATER ☐ WASTEWATER ☐ SURFACE WATER ☐ OTHER

WELL DEPTH (TOC)	FT.	DEPTH TO WATER BEFORE PURGING (TOC)	FT.
LENGTH OF WATER	FT.	CALCULATED ONE WELL VOLUME[1]:	GAL.
DEPTH OF SAMPLE POINT	FT.	ESTIMATED VOLUME PURGED	GAL.

EQUIP. DECON. ☐ ALCONOX WASH ☐ LIQUINOX WASH ☐ DIST/DEION 1 RINSE ☐ DIST/DEION 2 RINSE ☐ OTHER

CONTAINER PRESERVATION: ☐ LAB PRESERVED ☐ FIELD PRESERVED

WATER ANALYZER:	PUMP TYPE:	TUBING:

ACTUAL TIME (min)	FLOW RATE (ml/min)	DEPTH TO WATER (feet)	TEMP ☐ °F ☐ °C	SPECIFIC CONDUCT.	pH	DISS. OXYGEN (mg/l)	TURBIDITY (NTU)	ORP (mV)	REMARKS
			(+/- 0.1°)	(+/- 3%)	(+/- 0.1)	(+/- 10%)	(NA)	(+/- 10 mV)	(EVIDENT ODOR, COLOR, PID)
	INITIAL		--	--	--	--	--	--	

DEPTH TO WATER AFTER PURGING (TOC) FT.	SAMPLE FILTERED ☐ YES ☐ NO SIZE ______
NOTES:	SAMPLE TIME: ID#
	DUPLICATE ☐ TIME: ID#:
	EQUIP. BLANK: ☐ TIME: ID#:
	PREPARED BY:

[1] A 1 FOOT LENGTH OF WATER = 0.05 GAL IN 1" DIA. PIPE 0.17 GAL IN 2" DIA PIPE 0.65 GAL IN 4" DIA PIPE 1.5 GAL IN 6" DIA PIPE

FARALLON
CONSULTING

Groundwater Level Measurement Summary Form

Date: **Project Name:**

Project Number: **Task:** **Project Location:**

Equipment Used: **Project Manager:**

Well Number	Time	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Total Well Depth (feet)	Comments

Prepared By:

14648 NE 95th Street
Redmond, WA 98052
(425) 883-3881

OnSite Environmental Inc.

Client ______________________

Project ______________________

Sample ID ______________________

Date ____________ Time ____________

Analysis ____________ Preservative ____________

Chain of Custody

Page ______ of ______

OnSite Environmental Inc.
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • Fax: (425) 885-4603

Company:

Project Number:

Project Name:

Project Manager:

Sampled by:

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Day ☐ 3 Day

☐ Standard (7 working days)

☐ ______ (other)

Laboratory Number:

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH					% Moisture

	Signature	Company	Date	Time	Comments/Special Instructions:
Relinquished by					
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by					
Reviewed by/Date		Reviewed by/Date			Chromatograms with final report ☐

DISTRIBUTION LEGEND: White - OnSite Copy Yellow - Report Copy Pink - Client Copy

NON-HAZARDOUS WASTE

OPTIONAL INFORMATION

Shipper ____________________

Address ____________________

City, State, Zip ____________

Contents __________________

NON-
HAZARDOUS
WASTE

WASTE INVENTORY TRACKING SHEET

Project Number: ________________

Project Name: ________________

Project Address: ________________

Field Work: ________________

Project Manager: ________________

Page of

Date:

Prepared By:

Date Removed:

Transporter:

Disposal Location:

Container ID	Fullness	**Contents** (soil-gw-decon water) / Origin (boring or well number)	Date(s) Accumulated	Labled (Y/N)	Sampled (Y/N)	Comments

NOTES: Contents should be specified and include identification of well/boring, media, souce, depth of soil (if applicable), and any other applicable information.

Location of Drums (sketch or describe):

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ATTACHMENT 4
STANDARD OPERATING PROCEDURES

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

STANDARD OPERATING PROCEDURES

1. GW-03
2. GW-04
3. WM-01

STANDARD OPERATING PROCEDURE GW-03

GROUNDWATER LEVEL MEASUREMENTS IN MONITORING WELLS

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field staff with an outline of the information needed to measure and document the depth to groundwater in monitoring wells.

The step-by-step guidelines provided in this SOP are to be followed by field staff to ensure consistent and representative measurements of depth to groundwater in monitoring wells. When multiple wells are present at a site, water level measurements typically are taken as quickly as possible to aid in the creation of potentiometric surface maps that are representative of a "single" point in time.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly measure the depth to groundwater in monitoring wells:

- A monitoring well key, a hand drill, a socket set, an Allen wrench, a speed handle, a padlock key, or other monitoring well-access equipment specific to the monitoring well monument cover plate;
- An electronic water meter (Solinst or equivalent) narrow enough to fit in the monitoring well, calibrated to 0.01 foot, with sufficient line to reach the bottom of the monitoring well;
- A disposable bailer (if a light nonaqueous-phase liquid [LNAPL] is known or suspected to be present);
- Materials necessary to provide required documentation, including Groundwater Level Measurement Summary and Field Report forms;
- Personal protective equipment (PPE) as described in the site Health and Safety Plan; and
- Decontamination equipment as specified in SOP EQ-01.

DECONTAMINATION

Equipment that will come into contact with groundwater is to be decontaminated before arrival at the site, upon relocation at the site, and upon demobilization from the site, in accordance with SOP EQ-01.

PROCEDURES

The instructions below are to be followed for measuring water levels at each monitoring well:

- Don appropriate PPE as described in the site Health and Safety Plan.
- Check the operation of the water-level meter by turning on the indicator switch and pressing the test button.
- Remove soil or vegetation from the monitoring well site.
- Open the monitoring well-head enclosure, and remove standing water inside the monitoring well monument using a bilge pump or cup prior to opening the monitoring well cap. Standing water can be disposed of to the ground surface.
- Open the monitoring well cap.
- Monitor air quality at the monitoring well-head if volatile contaminants are suspected to be present, or if it is unknown whether volatile contaminants are present.
- If the presence of LNAPL is suspected or if site conditions are unknown, check for the presence of LNAPL by using a new 3-foot-long disposable bailer attached to a nylon rope. Slowly lower the bailer until the bottom of the bailer is approximately 2 feet below the water surface. Slowly retrieve the bailer, and measure the product thickness using a tape measure; record the information on the Groundwater Level Measurement Summary Form. Dispose of the bailer and product or wastewater in accordance with SOP WM-01, Field Handling of Investigation-Derived Waste.
- Allow the water level to equilibrate with ambient atmospheric pressure for approximately 15 minutes before measuring.
- Before taking any measurements, carefully measure the length of the sonde to the nearest 0.01 foot. The additional 2 to 3 inches from the zero point of the sonde to the tip of the sonde **must** be discounted for all total depth measurements.
- Measure and record the depth to water using a water-level meter that has been decontaminated in accordance with SOP EQ-01. With the water-level meter turned on to a medium level of sensitivity, slowly lower the meter into the monitoring well casing until it reaches the groundwater table. The probe will beep when it reaches the interface of the groundwater table (when the electronic circuit is first completed). Stop lowering the probe, hold the graduated water-level cable to the notch or mark on the north side of the top of the monitoring well casing, and note the length measurement. Repeat this process to collect a second water-level measurement. If the two readings differ by more than 0.01 foot, repeat the measurements until the readings stabilize. Repeat the process until three stabilized readings have been measured consecutively. Record the water-level measurement **only** in relation to the probe being lowered into the monitoring well, *not* as it is raised out of the monitoring well. If you cannot see the top of the monitoring well casing when the water level beeps, grasp the tape with your thumb and index finger exactly at the measuring point

corresponding with the mark or notch at the top of the monitoring well casing. Slowly pull the cable out of the monitoring well and read the measurement. Repeat until readings stabilize.

- Remove the cable from the monitoring well, and record the stabilized depth-to-water measurement to the nearest 0.01 foot on the Groundwater Level Measurement Summary form.
- Measure the total monitoring well depth. **NOTE:** If groundwater samples are to be collected, measure total monitoring well depth **after** all groundwater samples have been collected, to avoid resuspension of settled solids in the monitoring well, impacting the samples. If the monitoring well does not have a dedicated pump, lower the water-level indicator probe to the bottom of the monitoring well to measure the total depth of the monitoring well. Gently bounce the probe on the monitoring well bottom and pull the slack in the cord to read the total monitoring well depth. Repeat three times to ensure that the monitoring well depth measurement is reproducible and is representative of the true depth. Note on the Groundwater Level Measurement Summary form whether the bottom of the monitoring well is hard or soft.
- Remove the cable from the monitoring well, and record the monitoring well depth measurement to the nearest 0.01 foot on the Groundwater Level Measurement Summary form.
- Decontaminate the water-level meter in accordance with SOP EQ-01.
- Close the monitoring well as appropriate based on monitoring well-head construction. Record any concerns about monitoring well integrity on the Field Report form and on the Groundwater Level Measurement Summary form.

DOCUMENTATION

Document monitoring well water-level measurements on the Groundwater Level Measurement Summary form. Additional information will be documented on the Field Report form.

REFERENCES

U.S. Environmental Protection Agency. 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance.* Office of Solid Waste. November.

STANDARD OPERATING PROCEDURE GW-04

LOW-FLOW GROUNDWATER SAMPLING PROCEDURES

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide groundwater sampling staff with the methodology for collection and documentation of groundwater samples from monitoring wells using U.S. Environmental Protection Agency (EPA) low-flow groundwater sampling procedures for chemical analysis to ensure consistent and representative sampling.

The step-by-step guidelines provided in this SOP are to be followed by the field staff conducting groundwater sampling.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly purge and sample a monitoring well:

- A monitoring well key, a hand drill, a socket set, a padlock key, or other monitoring well-access equipment.
- An electronic water-level meter long enough to reach the bottom of the monitoring well, calibrated to 0.01 foot.
- Monitoring well-purging and -sampling equipment:
  - A submersible pump (bladder or Grundfos): the pump, a control box, and a power source (typically a portable generator or a 12-volt battery); or
  - A peristaltic pump: the pump with pump head, silicone tubing, tubing connectors (as needed), and a power source (typically a 12-volt battery).
- Sample tubing of project- and site-specific type and length.
- A sufficient number of 55-gallon drums, including lids, gaskets, and fasteners, to contain all purge water unless other water-handling arrangements have been made.
- A flow-through water-quality meter(s) to measure temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity.
- Decontamination equipment and supplies (e.g., buckets, scrub brushes, deionized or distilled water, potable water, Liquinox detergent).
- Materials necessary to provide required documentation, (e.g., sample labels, Field Report forms, Low Flow Well Purging and Sampling Data form, Chain of Custody form, Waste Inventory Tracking Sheet).

- Sample containers with the chemical preservatives appropriate for the samples, as described in the project-specific plans or, at a minimum, as required by the analytical laboratory.
- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan.
- Sampling support equipment (e.g., sample coolers, ice, bubble wrap, clear tape, duct tape, resealable plastic bags, garbage bags, paper towels, distilled water, nitrile gloves, shipping supplies).
- A U.S. Department of Transportation-approved drum(s) for purge water unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (see SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

DECONTAMINATION

Reusable equipment that will come into contact with the monitoring well and/or be used to acquire samples is to be decontaminated before arrival at the site, upon relocation at the site, and upon demobilization from the site, in accordance with SOP EQ-01.

PROCEDURES FOR LOW-FLOW GROUNDWATER SAMPLING

Low-flow groundwater sampling procedures have been developed for monitoring wells with a dedicated pump (dedicated monitoring wells) and for monitoring wells without a dedicated pump (non-dedicated monitoring wells). The sections below present the procedures for setup, purging, sample collection, and post-sampling activities for dedicated and non-dedicated monitoring wells.

Set Up

Setup procedures differ slightly for dedicated versus non-dedicated monitoring wells. The instructions below are to be followed for the monitoring wells as indicated:

- Don appropriate PPE as described in the site-specific Health and Safety Plan (HASP), including nitrile gloves during possible groundwater- or equipment-contact activities. Change gloves between each monitoring well at a minimum, or when it is possible for potential contaminants to be introduced into a monitoring well or to decontaminated equipment.
- Brush away soil and/or vegetation, and pump standing water away from the monitoring well opening. If necessary, place a plastic drop cloth around the monitoring well-head to prevent sampling equipment from coming into contact with the ground surface.
- Inspect the condition of the monitoring well (e.g., locked monitoring well cap, tightness of monitoring well cap, well-marked measuring point on casing, disturbance of surface casing, straightness of monitoring well casing, condition of concrete pad). Indicate the monitoring well condition on the Low-Flow Well Purging and Sampling Data form.

- Open the monitoring well cap. If the site-specific HASP identifies organic compounds as potential contaminants of concern, screen the monitoring well headspace and breathing-zone headspace (if specified in the HASP) for organic vapors using the appropriate field monitoring instrument (e.g., photoionization detector, multi-gas meter).
- Measure and record the depth to water using a decontaminated water-level meter in accordance with SOP GW-03.
- If free-floating nonaqueous-phase liquid may be present (see site-specific plans), obtain a sample from the monitoring well using a bailer (if a dedicated pump is not in use), as specified in SOP GW-03. Alternatively, measure free-floating product thickness using an oil-water interface probe.
- Calculate the monitoring well casing volume as follows:

  Monitoring well casing volume in gallons = $(\pi * r^2) * h$(7.48 gallons/foot^3)

  Where:

  h = length of water column in the monitoring well casing (i.e., depth to bottom of monitoring well minus depth to water, both measured from mark at top of monitoring well casing) in feet

  r = radius of the inside of the monitoring well casing in feet
- Calibrate the water quality meter for the field parameters specified in the project-specific plans. At a minimum, collect temperature, pH, and specific conductivity during purging and prior to sampling. Record equipment calibration and maintenance performed on the Field Report forms. Decontaminate the water-quality meter between monitoring wells by rinsing with distilled or deionized water. Manage the rinsate water used for these measurements in the same manner as purge water, as defined in the project-specific plans and in accordance with SOP WM-01.
- <u>For monitoring wells with dedicated pumps and tubing</u>: Set up a flow-through cell in preparation for purging. Connect dedicated tubing from the monitoring well to the flow-through cell. Set tubing and/or pump to the correct water depth in accordance with the constituents being sampled for, as described in project-specific plans. **DO NOT IMMERSE water-quality probes or meters into purge water containing non-aqueous-phase liquids, which could damage the probes.** Turn the pump controller to its lowest setting, set the memory in the flow-through cell to record readings every 3 minutes, and turn on the pump. Begin purging slowly (i.e., less than 500 milliliters per minute [ml/min]) to prevent drawing down the water table.
- <u>For monitoring wells with non-dedicated pumps</u>: Connect dedicated silicon tubing to the peristaltic pump. Place the tubing intake at the midpoint of the screen, or at the depth pre-determined in the project-specific plans. If using a bladder pump, insert the bladder pump and attach the dedicated polyethylene tubing so that the pump intake is at the approximate

midpoint of the screened interval, or set the pump intake to the depth pre-determined in the project-specific plans.

Purging Procedures

The purging instructions below are to be followed for dedicated and non-dedicated monitoring wells:

- Begin purging, and initiate water-quality testing for temperature, pH, specific conductivity, dissolved oxygen, ORP, and turbidity. Purge monitoring wells using a peristaltic or bladder pump, and dedicated polyethylene and silicon tubing. Record water-quality parameters every 3 minutes.
- Record water levels every 3 minutes, as possible. It is imperative that the water level not drop by more than 0.33 foot during the low-flow purging process. If the water level drops more than 0.33 foot during purging, reduce the flow rate on the pump. Recommended purge rates generally are less than 500 ml/min. Actual purge rates will vary based on aquifer material and monitoring well construction.
- Record flow rates every 3 minutes. Ensure that the flow rate does not exceed 500 ml/min during the low-flow purging process.

Purging Requirements

Purging should continue at a constant rate until the water-quality parameters have stabilized for three successive measurements according to the stabilization criteria provided in the table below. One of the following requirements must be met before samples can be collected from each monitoring well:

- Drawdown is no greater than 0.33 foot for low-flow sampling, and water-quality parameters have stabilized according to the stability criterion specified below:

Water-Quality Parameter	Stability Criterion
Turbidity (if required)	{X} <5 NTU **or** RPD <10% for {X}>5 NTU
Dissolved oxygen	Δ ≤ 10%
Specific conductivity	RPD ≤ 3%
ORP	Δ <10 mV
pH	Δ ≤ 0.1 unit
Temperature	Δ ≤ 0.1ºCelsius

Notes:
Δ = maximum reading minus minimum reading
mg/l = milligrams per liter
mV = millivolt
NTU = nephelometric turbidity unit
ORP = oxidation-reduction potential

RPD = relative percent difference

Where: {X} = the last three water-quality readings

$$m = \text{mean} = \frac{\text{Max}\{X\}+\text{Min}\{X\}}{2}$$

$$\Delta = \text{Maximum}\{X\} - \text{Minimum}\{X\}$$

$$\text{RPD} = \Delta/m \times 100\%$$

Although a monitoring well may not stabilize according to the above criteria under some circumstances, the monitoring well can still be sampled if one of the following conditions exists:

- The monitoring well does not meet stability criteria due to an instrument accuracy issue. Instrument accuracy often limits the ability to achieve stabilization on a percentage basis. For example, if ORP consistently fluctuates between 1 and 15 mV, a change in concentrations of greater than 10 mV does not meet the stability criterion. However, because the accuracy of the instrument is ±20 mV, the stability criterion would be considered satisfied within the range of accuracy for the instrument. This consideration is particularly important when water-quality parameter values are low. Consult the instrument manual to determine its accuracy range.

- The water level drops below the minimum value using low-flow sampling procedures (i.e., the pump intake, or the top of the screen if the aquifer is confined) during purging. However, if a minimum of one monitoring well volume (including the tubing and pump) has been removed from the monitoring well, sample the monitoring well as soon as the water level has recovered sufficiently to allow collection of the volume of groundwater necessary for all samples. Use the following equation to determine the minimum volume of groundwater to remove before sampling:

  Minimum purge volume = 2*[500 milliliters + M*(length of tubing in feet)]

  Where: M is the volume (in milliliters) contained in a 1-foot length of tubing

  The value of M is provided below for the inner diameters of tubing listed:

Inner Diameter (inches)	M (milliliters)
0.125	2.4
0.25	9.7
0.5	39

- If one monitoring well volume of groundwater has been removed from the monitoring well; <u>or</u>

- The monitoring well runs dry twice during the purging procedure.

Record on the Field Report form and the Low Flow Well Purging and Sampling Data form if any monitoring well did not meet the stabilization and drawdown criteria, and explain the rationale for sampling the monitoring well at the time it was sampled.

Sample Collection

During low-flow sampling, do not stop pumping once the purging requirements have been met. Turn down the flow rate on the pump so the water flow is minimal, but maintaining sufficient pressure in the system to prevent water from the tubing or flow-through cell from flowing back into the monitoring well. Disconnect the pump discharge hose from the flow-through cell, or cut the tubing just before the connection to the flow-through cell. It is imperative not to lower the water table or disturb the water column. Fill pre-cleaned laboratory-supplied sample containers directly from the pump discharge tube into the proper sample container, and fill to capacity. Place a bucket beneath the sampling tube to catch any unsampled water between filling the sample jars. When collecting groundwater samples for multiple analyses, collect the samples in the following order, per the EPA groundwater guidance document:

- Volatile organic compounds (VOCs);
- Dissolved gases and total organic carbon (TOC);
- Semivolatile organic compounds (SVOCs);
- Metals and cyanide;
- Major water quality cations and anions;
- Radionuclides; and
- Dissolved (filtered) inorganics (if required).

When collecting samples for VOCs, the flow rate should be adjusted to as low a flow rate as possible without introducing air bubbles into the system. When filling the VOC containers, hold the cap in hand to minimize contamination, and direct the flow from the pump discharge tubing down the side of the sample container to minimize aeration. Fill all VOC sample containers to the top, ensuring there is a positive meniscus when the cap is screwed down on the container. Tap the filled VOC container, and invert several times to ensure no air bubbles are present in the sample container. If an air bubble is present, the VOC sample must be recollected using a fresh VOC sample container. If sampling for other analytes, the flow rate may be increased.

If dissolved inorganics are required, attach a new disposable 0.45 micrometer filter cartridge to the discharge line. Collect filtered samples last. Pre-rinse the disposable filter cartridges by running a minimum of 0.25 gallon of groundwater through them (collecting the groundwater into a waste bucket) prior to collecting the samples directly into the appropriate sample container. Alternate field filtration methods may be specified in the project-specific plans. Remove the pump and/or tubing from the monitoring well.

Post-Sampling

- Record the depth to water to determine whether the water level changed from the original reading.
- Close and lock the monitoring well or tap, and record any monitoring well integrity concerns on the Field Report form and the Low Flow Well Purging and Sampling Data form.
- Transfer purge, wash, and rinse water into a U.S. Department of Transportation-approved drum(s) and appropriately label. Separate drums will be needed for liquid and solid wastes, in accordance with SOP WM-01, Field Handling of Investigation-Derived Waste. Do not add liquid wastes to drums containing solid wastes.

PROCEDURES FOR RECONNAISSANCE SAMPLING

Reconnaissance groundwater samples are to be collected from reconnaissance borings using direct-push or hollow-stem auger drilling methods, and 0.75- or 2-inch-outside-diameter casing and 0.010-inch slotted screen. The instructions below are to be followed for reconnaissance groundwater sample collection:

- When the desired sampling depth has been reached, withdraw the drill casing so that the temporary monitoring well screen is exposed to water-bearing material.
- Insert disposable polyethylene tubing to the approximate midpoint of the temporary monitoring well screen. Attach an appropriate length of pre-cleaned disposable silicon tubing from the polyethylene tubing to connect with the peristaltic or bladder pump.
- Set up the peristaltic or bladder pump in preparation for purging. Turn the pump to its lowest setting, and turn on the pump. Begin purging slowly to prevent drawing down the water table.
- Purge each temporary monitoring well point using a peristaltic or bladder pump until the visual turbidity is as low as possible, or until the temporary monitoring well is purged dry of water.
- Purge a minimum of 1 to 2 liters before sample collection, if possible. If the temporary monitoring well is completely dewatered during purging, collect samples when sufficient recharge has occurred to allow filling of the sample containers.
- Slow the pumping rate to less than 500 ml/min to reduce the potential for volatilization of chemicals during sample collection.
- Collect the sample as described previously.
- If insufficient groundwater is available to collect a sample using a peristaltic or bladder pump (e.g., the boring pumps dry or cannot maintain a sufficient flow less than 100 ml/min) or if the depth to groundwater exceeds the maximum practicable limit for sampling using

a peristaltic or bladder pump, use a disposable polyethylene bailer lowered into the monitoring well screen to collect a water sample from the screened interval, if possible.

DOCUMENTATION

Document the monitoring well purging and sampling activities on the Low Flow Well Purging and Sampling Data form and on the Field Report form. Samples will also be tracked on a Chain of Custody form. Waste generated during groundwater sampling should be tracked on a Waste Inventory Tracking Sheet.

REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. *RCRA Groundwater Monitoring: Draft Technical Guidance*. Office of Solid Waste. November.

———. 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA Document No. EPA/540/5-95/504. April.

STANDARD OPERATING PROCEDURE WM-01

FIELD HANDLING OF INVESTIGATION-DERIVED WASTE

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field staff with the methodology for containerizing, labeling, and tracking investigation-derived waste (IDW) and communicating information regarding waste generated at a site to the Project Manager. IDW may include soil cuttings, purge water, development water, and decontamination water. This SOP has been developed in compliance with the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC), the Oregon Hazardous Waste Management Rules (Chapter 340, Division 100 of the Oregon Administrative Record), Environmental Health Standards for the Management of Hazardous Waste (California Code of Regulations, Title 22, Division 4.5), and the U.S. Environmental Protection Agency Resource Conservation and Recovery Act (Parts 239 through 282 of Title 40 of the Code of Federal Regulations).

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly containerize, label, and track IDW:

- A U.S. Department of Transportation-approved drum(s) constructed of a material that does not react with the contaminants of concern for the project. Farallon typically uses lined open-top steel drums. Polyethylene drums are used if a material is suspected to be corrosive.
- Labels appropriate to the characteristics of the IDW:
  - Non-Hazardous Waste Label: For IDW known to be nonhazardous based on previous data and waste profiles.
  - Hazardous Waste or Washington State Dangerous Waste Label: For IDW known to be hazardous/dangerous based on previous data and waste profiles.
  - On Hold Pending Analysis Label: For waste not previously characterized, pending receipt of analytical results. On Hold Pending Analysis labels are temporary, and should be replaced with the applicable waste label once the waste has been characterized.
  - Another waste label as indicated by the Project Manager.
- Waste Inventory Tracking Sheet.
- Grease marking pencil or paint pen.

- Indelible ink pen.
- Crescent wrench, socket wrench, or other hand tool to seal the drum(s).
- Sampling supplies, if needed, including:
  - Stainless steel or plastic bowls and spoons for homogenizing soil/solids samples, depending on the analyses to be performed;
  - A glass or stainless steel container for homogenizing liquid samples, depending on the analyses to be performed; and
  - A stainless steel hand-auger or a glass tube, depending on the medium being sampled (soil/solid or liquid).

PROCEDURES

The instructions below are to be followed by field staff:

- Inspect new drums brought to the site to ensure that lined or coated drums are being used. Uncoated drums may corrode and leak even if water or moisture within the drums have a pH near 7.
- Inspect other drums present at the site from previous project work; notify the Project Manager if any drums are leaking, damaged, or improperly labeled.
- Place soil/solids in separate drums from liquids such as purge water, development water, and decontamination water. Do not add liquid IDW to drums containing soil or solids. Do not fill drums containing liquid IDW above 85 percent capacity, particularly in areas known to reach freezing temperatures.
- Discuss with the Project Manager whether chlorinated solvents or other contaminants of concern from areas of the site that would cause the IDW from that area to be characterized as hazardous/dangerous waste should be drummed separately to minimize waste disposal costs and hazardous/dangerous-waste-generator status.
- Clearly mark the lid and the label of each drum with a unique identifier such as a number or a letter using a grease pencil/paint pen and indelible ink. Verify that no two drums have the same identifier marked on the lid or label, including drums present from previous project work.
- Inventory each Farallon-generated drum and its contents on a Waste Inventory Tracking Sheet.
- If waste is added to an existing drum(s), track any addition on a Waste Inventory Tracking Sheet.
- Label each drum with a complete Non-Hazardous Waste, Hazardous Waste/Washington State Dangerous Waste, On Hold Pending Analysis, or other appropriate waste label prior to demobilizing from the site. List the client's name as the Shipper or Generator, and the accumulation start date as the date when waste was first placed into the drum, or when the

waste was first designated as hazardous or dangerous based on analytical data. Consult the Project Manager with questions about the correct start date. **Use care** when drumming, labeling, and tracking IDW; mistakes in the disposal of waste can cause serious legal and financial repercussions for Farallon and the client.

DRUM SAMPLING

Sampling and analysis of wastes for hazardous/dangerous waste characterization purposes is to be conducted in accordance with U.S. Environmental Protection Agency Publication No. SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Discuss with the Project Manager the specific analyses to be performed. The instructions below are to be followed for drum sampling, using composite sampling techniques to sample soil, solids, and liquid wastes:

- Collect soil/solid samples from various locations and depths in the drum using a hand auger or other appropriate decontaminated apparatus.
- Homogenize the soil samples in a decontaminated stainless steel bowl using decontaminated stainless steel tools or in a plastic bowl using plastic spoons, depending on the analyses to be performed. Consult the Project Manager regarding which tools should be used.
- Place subsamples of the homogenized soil/solids into sample jars for analysis.
- Collect liquid samples from various locations and depths using a glass sampling tube.
- Homogenize the liquid samples in a decontaminated glass or stainless steel container, depending on the analyses to be performed. Consult the Project Manager regarding which tools should be used.
- Place subsamples of the homogenized liquid in sample jars for analysis.

Samples collected in California for hazardous waste characterization are to adhere to the requirements specified in California Code of Regulations Title 22, Sections 66261.21 to 66261.24, Characteristics of Hazardous Waste.

DRUM STORAGE

- Label and store the drums in an area approved by the client;
- Store hazardous/dangerous waste drums in a secured area; and
- Place hazardous/dangerous waste drums that are stored outside on secondary containment and under cover.

DOCUMENTATION

- Document IDW drums on the Waste Inventory Tracking Sheet as described above;
- Provide the original Waste Inventory Tracking Sheet and original field notes to the Project Manager; and

- Provide a copy of the completed Waste Inventory Tracking Sheet to the Project Assistant for tracking.

REFERENCES

U.S. Environmental Protection Agency. No Date. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Publication No. SW-846.

Attachments: Non-Hazardous Waste Label
Hazardous Waste Label
Dangerous Waste Label
On Hold Pending Analysis Label

ATTACHMENT 5
HEALTH AND SAFETY PLAN

SAMPLING AND ANALYSIS PLAN
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Bend | Baker City
California
Oakland | Sacramento | Irvine

HEALTH AND SAFETY PLAN

INTERIM ACTION WELL MONITORING
700 DEXTER HVOC PLUME
PORTION OF 700 DEXTER SITE
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 397-044

For:
City Investors XI LLC
505 5th Avenue South, Suite 900
Seattle, Washington 98104

December 2016

HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

Client: City Investors XI LLC	**Facility Name**: South Lake Union Properties – 700 Dexter HVOC Plume
Type of Work: Groundwater Sampling	**Project Number**: 397-044
Start Date: December 1, 2016	**End Date**: November 1, 2017

Plan Expiration Date: May 1, 2017 (Last day of expected field work or no longer than 6 months)

APPROVED BY:

Thaddeus Cline Project Manager	*Signature*	December 1, 2016 *Date*
Joe Rounds Health and Safety Coordinator	*Signature*	December 1, 2016 *Date*
Clifford T. Schmitt Principal-in-Charge	*Signature*	December 1, 2016 *Date*

This Health and Safety Plan (HASP) was written for the use of Farallon Consulting, L.L.C. (Farallon) and its employees. It may be used also by trained and experienced Farallon subcontractors as a guidance document. However, Farallon does not guarantee the health or safety of any person entering this site.

Due to the potentially hazardous nature of the site and the activities occurring thereon, it is not possible to discover, evaluate, or provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but does not eliminate, the potential for injury. The health and safety guidelines in this HASP were prepared specifically for this site, its conditions, purposes, dates of field work, and personnel, and must be amended if conditions change.

Farallon claims no responsibility for the use of this HASP by others. This HASP will provide useful information to subcontractors and will assist them in developing their own HASP, but it should not be construed as a substitute for their own HASP. Subcontractors should sign this HASP (see Attachment 1, *Health and Safety Plan Acknowledgment and Agreement Form*) as an acknowledgement of hazard information and as notice that this HASP does not satisfy their requirement to develop their own HASP.

CONTENTS

FIGURES

ATTACHMENTS

1.0 SITE-SPECIFIC INFORMATION

Farallon Consulting, L.L.C. (Farallon) has prepared this Health and Safety Plan (HASP) for the Block 37 property at 630 Westlake Avenue North in Seattle, Washington. Lakefront Investors 1 LLC and Lakefront Investors 2 LLC (collectively, Lakefront Investors) are planning to redevelop two properties in the South Lake Union area (Figure 1) with work scheduled to begin in December 2016. The two properties to be redeveloped are referred to herein as the Block 25 Property (609 Fairview Avenue North and 630 Boren Avenue North) and the Block 31 Property (625 Boren Avenue North), and collectively as the Blocks 25 and 31 Properties (Figure 2). Construction at the Blocks 25 and 31 Properties requires dewatering for a period of up to 10 months scheduled to begin in January 2017. Farallon has prepared this HASP to support monitoring activities described in the sampling and analysis plan associated with the *Interim Action Work Plan, 700 Dexter HVOC Plume, Portion of 700 Dexter Site, South Lake Union Properties, Seattle, Washington* dated December 1, 2016, prepared by Farallon (Interim Action Work Plan) .

1.1 BACKGROUND INFORMATION

Groundwater in the South Lake Union area is impacted by tetrachloroethene and its degradation compounds trichloroethene, isomers of dichloroethene, and vinyl chloride (collectively referred to as HVOCs) released at and from a former dry cleaner facility at 700 Dexter Avenue North (700 Dexter Property), known as American Linen Supply Co (American Linen) (Figure 2) currently owned by 700 Dexter, LLC. HVOCs have migrated through groundwater to the northeast, east, and south of the former American Linen facility and comprise a regional plume of unknown extent; however, based on empirical data, the regional plume (700 Dexter HVOC Plume) is known to extend as far east as the middle of Block 37 Property (Figure 2 of the Interim Action Work Plan) but not as far east as the Block 31 Property.

The purpose of the Interim Action is to prevent further migration of the 700 Dexter HVOC Plume and manage contaminated groundwater by extraction and treatment at the Block 37 Property to avoid potential impacts to the down-gradient Blocks 25 and 31 Properties during construction dewatering.

1.2 SCOPE OF WORK

This HASP was prepared for the use of Farallon personnel while performing the following tasks at the Site in accordance with the *Interim Action Work Plan, 700 Dexter HVOC Plume, Portion of 700 Dexter Site, South Lake Union Properties, Seattle, Washington* dated December 1, 2016, prepared by Farallon (Interim Action Work Plan):

- Farallon will manually gauge groundwater level elevations so that the groundwater flow gradient and flow direction may be inferred over time and over distance from pumping wells and to corroborate logging data (Gauging).
- Farallon will collect groundwater and wastewater sampling for analysis for HVOCs at specific locations and times (Sampling). Sampling applies only to monitoring wells

FMW-131 and FMW-3D and to influent of the wastewater treatment system. Monitoring wells FMW-131 and FMW-3D will be sampled using low-flow sampling techniques and influent samples will be collected from sampling ports directly into sample vials.

The tasks will be conducted in a manner consistent with the methods and assumptions outlined in the Interim Action Work Plan and associated Sampling and Analysis Plan.

1.3 SITE-SPECIFIC SAFETY CONCERNS

This phase of the project involves the collection of groundwater samples from monitoring wells, influent from the Interim Action interception well wastewater treatment system, and groundwater elevations levels from observation wells. Specific hazards that the field employee(s) will encounter on this project include, but are not limited to:

- Working around heavy equipment;
- Working with hand tools and small mechanical equipment;
- Truck traffic;
- Slips, trips, and falls;
- Loud noise;
- Exposure to pedestrian and vehicular traffic
- Chemical exposure related to contaminated soil and windblown dust; and
- Environmental hazards, including exposure to sun, heat, and cold.

2.0 DRUG AND ALCOHOL POLICY

It is Farallon's policy to maintain a drug-free workplace. Farallon has a responsibility to all of its staff members to provide a safe and inoffensive work environment, and a responsibility to its clients to provide accurate and consistent service. For these reasons, Farallon prohibits the following behavior by staff members in the field:

- Use of tobacco in any form by any person at any time in sensitive or hazardous areas that may pose a health and safety or environmental risk. The Site Health and Safety Officer (SHSO) may designate an area away from hazards that is safe for tobacco use.
- Possession or consumption of alcohol and/or marijuana, or being under the influence of alcohol and/or marijuana during field activities.
- Abuse of prescription and/or over-the-counter drugs in such a manner as to negatively impact performance or field safety.
- Possession, use, sale, or being under the influence of illicit drugs while in the field or during any work hours.

Violation of any of the above codes of conduct is grounds for immediate removal from the project Site and discipline in accordance with Farallon company policy. If an incident occurs as a result of an employee's actions, drug and alcohol testing will be performed in accordance with Farallon company policy.

3.0 WEAPONS POLICY

Farallon employees, contractors, subcontractors, and their employees working at the Site are to ensure that they do not bring weapons onto the work site. Weapons include but are not limited to guns, knives, and explosives. Tools that are used during the course of field events, including but not limited to box knives, are exempt from this weapons policy. All vehicles and persons can be subjected to search while working at the property.

Failure to comply with the weapons policy can result in disciplinary action for the individual(s) involved in accordance with Farallon company policy.

4.0 INCIDENT PREPAREDNESS AND RESPONSE

Farallon employees and subcontractors working at the Site must be prepared to respond appropriately to an incident involving injury, illness, death, spills, or utility breaches. This section outlines the degree of preparedness required for employees at a work site, and describes the actions to be taken in the event of a health and safety incident.

4.1 HEALTH AND SAFETY PREPAREDNESS

All individuals working at the Site are required to be familiar with the contents of this HASP. Additionally, the items on the following health and safety preparedness list should be reviewed prior to the commencement of work and during daily health and safety meetings:

- The directions to the hospital (provided in Attachment 2);
- The locations of first aid kits, personal eye washes, and fire extinguishers (located in Site vehicles);
- The locations of the keys to Site vehicles; and
- Hand sign language providing for the immediate stoppage of work (such as a horizontal hand movement in front of the neck).

Additional topics for daily health and safety meetings are included in Attachment 3, Potential Topics for Daily Health and Safety Meeting. Participation in daily health and safety meetings should be documented in Attachment 4, Daily Health and Safety Briefing Log.

4.2 INJURY OR ILLNESS

If an injury or illness occurs, the following actions should be taken, regardless of the severity of the injury or illness:

- Stop work.
- Determine whether emergency response staff (e.g., fire, ambulance) are necessary. If so, dial 911 on a cell phone or the closest available telephone. Describe the location of the injured person and provide other details as requested. If an individual requires non-emergency medical care at a hospital, follow the directions to the nearest hospital, which are provided in Attachment 2. IF EMERGENCY MEDICAL CARE IS NEEDED, CALL 911.
- Administer first aid to the individual immediately, using the first aid kit provided in the Site vehicle. Use the bloodborne pathogens kit and personal eyewash, as needed.
- Notify the SHSO immediately. The SHSO is responsible for preparing and submitting an Incident Report form to Farallon's Health and Safety Coordinator (HSC) within 24 hours of the incident, and for notifying the employee's supervisor and the Principal-in-Charge. The Incident Report form is provided in Attachment 5.

- ***All incidents must be reported to the HSC* (Joe Rounds) *within 24 hours; however, the actual investigation need not be completed within 24 hours*. A telephone message that includes the date, time, and general incident circumstances should be left at one of the following numbers if the HSC cannot be reached directly**:
  - HSC work phone: (425) 295-0800
  - HSC cell phone: (206) 484-2748
  - If the HSC cannot be located, contact the Principal-in-Charge
- The SHSO will assume responsibility during a medical emergency until emergency response personnel arrive at the Site.

4.3 REPORTING PROCEDURES FOR MINOR CUTS, SCRATCHES, BRUISES, ETC.

Every occupational illness or injury is to be reported immediately by the employee to the SHSO. The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC.

4.4 NEAR MISSES

A near miss is defined as an incident in which no personal injury is sustained and no property damage is incurred, but in which injury and/or property damage could have occurred under slightly different timing or location.

In the event of a near miss, the following actions are to be taken:

- Stop work if there is immediate danger of injury or property damage;
- Report the near miss to the SHSO as soon as practicable;
- Resume work upon satisfactory resolution of the near-miss condition, if work was stopped, and document the corrective action(s) taken by the SHSO; and
- Complete and submit the Near Miss Report form in Attachment 6 to the HSC within 2 business days.

4.5 MEDICAL INCIDENTS NOT REQUIRING AMBULANCE SERVICE

Medical incidents not requiring ambulance services include injuries and conditions such as minor lacerations and sprains. In the event of an injury, an illness, or a condition that does not require ambulance service, the following actions are to be taken:

- Stop work.
- Administer first aid as necessary to stabilize the individual for transport to the hospital.

- The SHSO is to facilitate prompt transportation of the individual to the hospital. Directions to the nearest hospital are provided in Attachment 2.
- A representative of Farallon or the subcontractor is to drive the individual to the medical facility and remain at the facility until the individual is able to return to the work site, or arrangements for further care have been established.
- If the driver is not familiar with the route to the hospital, a second person who is familiar with the route is to accompany the driver and the injured employee to the hospital.
- If it is necessary for the SHSO to accompany the injured employee to a medical facility, provisions must be made for another employee who is trained and certified in first aid to act as the temporary SHSO before work at the work site can resume.
- If the injured employee is able to return to the work site the same day, he/she is to bring a statement from the doctor that provides the following information:
  - Date of incident
  - Employee's name
  - Diagnosis
  - Date he/she is able to return to work, and whether regular or light duty
  - Date he/she is to return to the doctor for a follow-up appointment, if necessary
  - Signature and address of doctor
- The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC.
- If the injured employee is unable to return to the work site the same day, the employee who transported him/her should bring the statement from the doctor back to the work site. The information on this statement should be reported to the HSC immediately.

4.6 EMERGENCY CASES REQUIRING AMBULANCE SERVICE

In the event of an injury or illness that requires emergency response and transport to a hospital by ambulance the following actions should be taken:

- **Dial 911** to request ambulance service;
- Notify the SHSO;
- Administer first aid until the ambulance service arrives;
- One designated company representative should accompany the injured employee to the medical facility and remain there until final diagnosis, treatment plan, and other relevant information has been obtained; and

- The SHSO is to complete the Incident Report form provided in Attachment 5, and report the incident to the HSC immediately.

4.7 EMPLOYEE DEATH, OR HOSPITALIZATION OF THREE OR MORE EMPLOYEES

The procedures outlined in Section 6.2 should be followed in the event of an employee injury or illness. If an employee fatality occurs, the HSC, local emergency personnel, and the coroner must be notified **immediately**. **The HSC will initiate the required State of Washington Department of Labor and Industries and Occupational Safety and Health Administration (OSHA) notifications within 8 hours of a fatality or the hospitalization of three or more employees.**

4.8 RESPONSE TO SPILLS OR UTILITY BREACHES

The location of underground utilities (e.g., product, sewer, telephone, fiber optic) and facilities (e.g., underground storage tanks, septic tanks, utility vaults) is to be noted prior to commencement of intrusive subsurface work activities. Use the public and private locate services as required and complete the Utility Clearance Log (Attachment 7). If a utility line or tank is breached or a spill or release occurs, the event is to be documented on the Incident Report form provided in Attachment 5 as soon as possible. The date, time, name of the person(s) involved, actions taken, and discussions with other affected parties are to be included. The SHSO, Project Manager (PM), and client are to be notified immediately. The PM is to notify the regulatory authority and/or utility company, as necessary.

In the event of a spill or release, the following actions should be taken:

- Stay upwind of the spill or release.
- Don appropriate personal protective equipment (PPE).
- Turn off equipment and other sources of ignition.
- Turn off pumps and shut valves to stop the flow or leak.
- Plug the leak or collect drippings, if possible.
- Use sorbent pads to collect the product and impede its flow, if possible.
- Dial 911 or telephone the local fire department immediately if a fire or another emergency situation develops.
- Inform the Farallon PM of the situation.
- Determine whether the client would like Farallon to repair the damage or would rather use an emergency repair contractor.

- Advise the client of spill discharge notification requirements, and establish who will complete and submit the required forms. ***Do not report or submit information to an agency without the client's consent.*** Document each interaction with the client and regulators, and note in writing names, titles, authorizations, refusals, decisions, and commitments to any action.
- Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soil and/or product may meet criteria for hazardous waste.
- Do not sign manifests as a generator of wastes. Contact the PM to discuss waste transportation.

4.9 NOTIFICATIONS

A spill or release requires completion of an Incident Report form (provided in Attachment 5) per Farallon's Health and Safety program. **The PM must involve the client and/or generator in the incident reporting process. The client and/or generator is under obligation to report the incident to the appropriate government agency(ies). If the spill extends into waterways, the Coast Guard and the National Response Center must be notified immediately by the client or with client permission (1-800-424-8802).**

4.10 SHUTOFF VALVES AND/OR SWITCHES FOR UTILITIES AND PRODUCTS

Before starting work, locate and list below the location of utility and product line shutoff valves and switches on the work site. Review the location of shutoff valves and switches with field personnel before beginning work.

The shutoff valves and/or switches for electrical, natural gas, gasoline, water lines, etc.:

Will be located in the field before work commences, as applicable.

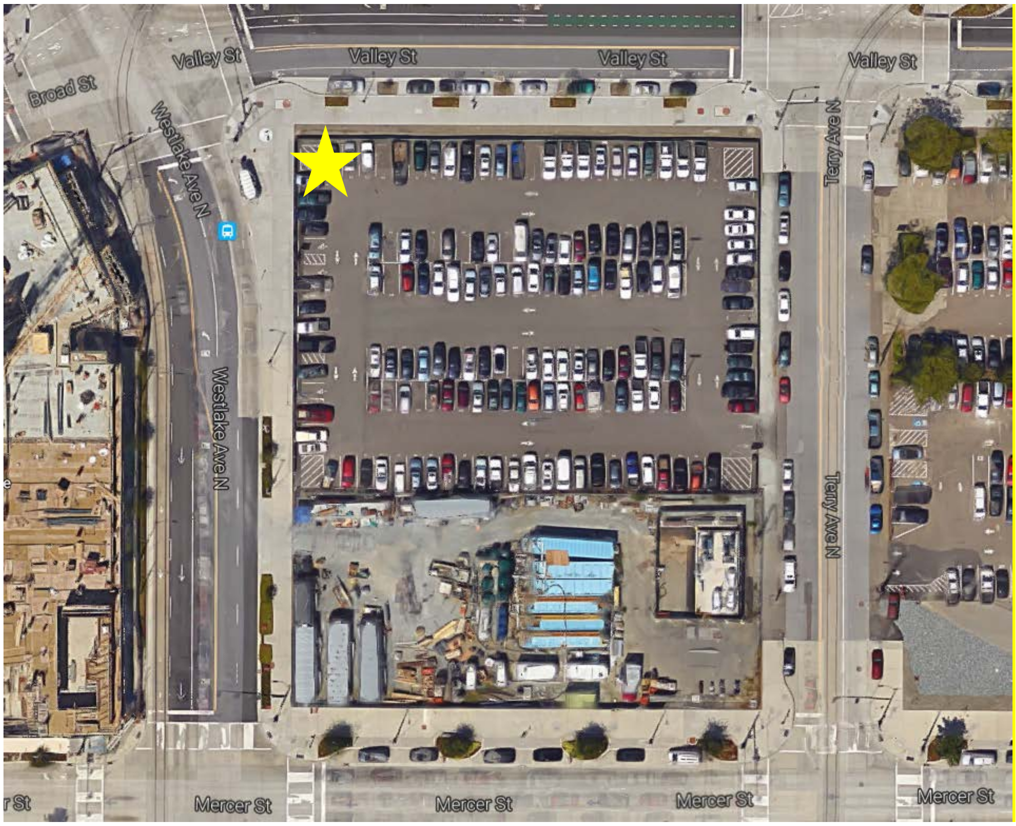
5.0 EMERGENCY RESPONSE AND EVACUATION PLAN

Farallon personnel and subcontractors working on the Site are to be aware of Site-specific emergency and evacuation procedures, including alarm systems and evacuation plans and routes. If an incident occurs that requires emergency response, such as a fire or spill, **CALL 911 and request assistance**. Farallon staff, subcontractors, and/or others working in an area where an emergency occurs are to evacuate to a safe location away from the incident area, preferably upwind, and take attendance.

For this project, the emergency evacuation gathering location is the northwestern corner of the Block 37 Property at Valley Street and Westlake Avenue North.

If the emergency causes the route to be obstructed, Farallon personnel and subcontractors are to move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (e.g., police, fire, ambulance personnel, paramedics) to do otherwise.

Subcontractors have the responsibility to account for their own employees and provide requested information to emergency response personnel immediately upon request. Farallon staff, subcontractors, and/or contractors may not reenter the scene of the emergency without specific approval from emergency response personnel.



6.0 LOCAL EMERGENCY CONTACT NAMES AND TELEPHONE NUMBERS

Local emergency response personnel can be contacted at the following numbers. Directions and a map to the hospital are included in Attachment 2.

Emergency Contact	Name and Location	Telephone No.
Hospital	Virginia Mason Emergency Department 1010 Spring Street Seattle, Washington 98104	(206) 583-6433
Police	Seattle Police Department – West Precinct 810 Virginia Street Seattle, Washington 98101	**911** or (206) 625-5011
Fire	Seattle Fire Department – Station 2 2320 4th Avenue Seattle, Washington 98121	**911** or (206) 386-1400
National Response Center		**1-800-424-8802**
Washington State Department of Ecology		**(360) 407-6300**
Poison Control		**1-800-424-5555**

7.0 PROJECT PERSONNEL AND RELEVANT INFORMATION

The following section provides contact information for the project and the HSC and client-specific health and safety requirements. Farallon field personnel training and medical surveillance dates are included in Attachment 8.

7.1 PROJECT PERSONNEL CONTACT INFORMATION

Questions about this project that are posed by neighbors, the press, or other interested parties should be directed to the Principal-in-Charge at Farallon: (425) 295-0800.

Personnel Title **Personnel Name** **Personnel Contact Information**	**General Project Responsibilities**
Health and Safety Coordinator Joe Rounds Office: (425) 295-0800 Cell: (206) 484-2748	Provide support in implementing HASP. Provide immediate support upon notice of any incident.
Principal-in-Charge Clifford T. Schmitt Office: (425) 295-0800 Cell: (425) 765-3365	Provide immediate support upon notice of any incident.
Project Manager Thaddeus Cline Office: (425) 295-0800 Cell: (206) 271-4122	Provide immediate support upon notice of any incident.
Client Contact Raymond Burdick Office: (206) 342-2451 Cell: (206) 255-9897	Provide known analytical data from work performed by others. Provide notice of Site hazards. Provide access to Site. Provide information regarding available emergency supplies at the Site.

8.0 POTENTIAL AIRBORNE CONTAMINANTS

The potential airborne contaminants of concern in the immediate vicinity at the Site are listed in the table on the following page. The table should be reviewed, and questions directed to the SHSO. The air monitoring table and forms are included in Attachment 9.

POTENTIAL AIRBORNE CHEMICALS ON SITE FOR THIS PROJECT REVIEW THIS TABLE AND CONTACT THE SHSO WITH ANY QUESTION						
Chemical (or Class)	**OSHA PEL ACGIH TLV**	**Other Pertinent Limits**	**Properties**	**Routes of Exposure or Irritation**	**Acute Health Effects**	**Chronic Health Effects/ Target Organs**
Benzene	PEL - 1 ppm TLV 0.5 ppm (skin)	PEL STEL - 5 ppm IDLH=500 ppm	Characteristic benzene odor.	Inhalation; dermal; ingestion; eye contact.	Skin (dermatitis); eye, respiratory tract irritant; headache; dizziness; nausea.	Carcinogen; CNS; eye damage; bone marrow; blood; skin; leukemia.
1,1-Dichloroethene (vinylidene chloride)	No PEL TLV – 5 ppm	NIOSH considers this compound to be a carcinogen.	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin, throat; dizziness; headache; nausea; dyspnea (breathing difficulty).	Liver, kidney dysfunction; pneumonitis; potential occupational liver and kidney carcinogen. **Target Organs:** Eyes, skin, respiratory system, CNS, liver, kidneys.
1,2-Dichloroethene (dichloroethylene)	PEL - TWA 200 ppm TLV - TWA 200 ppm	IDLH - 1000 ppm	Solvent odor.	Inhalation; skin absorption; ingestion; eye contact.	Typical solvent symptoms.	Liver, kidney, CNS symptoms.
Ethylbenzene	PEL - 100 ppm TLV - 100 ppm	PEL STEL - 125 ppm TLV STEL - 125 ppm NIOSH REL - 100 ppm REL STEL - 125 ppm IDLH - 800 ppm	Pungent, aromatic odor.	Inhalation; dermal; ingestion; eye contact.	Skin, eye, mucous membrane irritant; headache; dizziness; drowsiness.	Eyes; respiratory tract; skin; CNS; blood; kidneys; liver.

POTENTIAL AIRBORNE CHEMICALS ON SITE FOR THIS PROJECT REVIEW THIS TABLE AND CONTACT THE SHSO WITH ANY QUESTION						
Chemical (or Class)	**OSHA PEL ACGIH TLV**	**Other Pertinent Limits**	**Properties**	**Routes of Exposure or Irritation**	**Acute Health Effects**	**Chronic Health Effects/ Target Organs**
Lead	PEL - 0.05 mg/m^3 TLV - 0.05 mg/m^3	IDLH - 100 mg/m^3	A heavy, flexible, soft, gray solid.	Inhalation; dermal; ingestion; eye contact.	Lassitude (weakness, exhaustion); abdominal pain; gingival lead line; tremor; irritation to eyes; hypotension.	Insomnia; facial pallor; anorexia; weight loss; malnutrition; constipation; colic; anemia; paralysis: wrist, ankles; encephalopathy; kidney disease; potential for damage to eyes, gastrointestinal tract, CNS, kidneys, blood, gingival tissue.
Naphthalene	PEL - 10 ppm TLV - 10 ppm	TLV-STEL=15 ppm NIOSH REL=10 ppm REL-STEL=15 ppm IDLH - 250 ppm	Mothball-like odor.	Inhalation; dermal; ingestion; eye contact.	Skin, eye, mucous membrane irritant; nausea.	Eyes; blood; skin; liver; kidneys; RBC; CNS.
Tetrachloroethene (perchloroethylene)	PEL - 100 ppm TLV - 25 ppm	PEL Ceiling - 200 ppm TLV STEL - 100 ppm IDLH - 150 ppm NIOSH considers this compound to be a carcinogen.	Colorless liquid with a mild, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin, nose, throat, respiratory system; nausea; flushed face, neck; vertigo (an illusion of movement); dizziness; lack of coordination; headache; skin erythema (redness).	Somnolence (sleepiness, unnatural drowsiness); liver damage; potential occupational liver carcinogen. **Target Organs:** Eyes, skin, respiratory system, liver, kidneys, CNS.
1,1,1-Trichloroethane (methyl chloroform)	PEL - TWA 350 ppm TLV - 350 ppm STEL - 450 ppm	NIOSH Ceiling - 350 ppm	Colorless liquid with a mild, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin; headache; lassitude (weakness, exhaustion); central nervous system depressant; depression; poor equilibrium; dermatitis.	Cardiac arrhythmias; liver damage. **Target Organs:** Eyes, skin, CNS, cardiovascular system, liver.

POTENTIAL AIRBORNE CHEMICALS ON SITE FOR THIS PROJECT REVIEW THIS TABLE AND CONTACT THE SHSO WITH ANY QUESTION						
Chemical (or Class)	**OSHA PEL ACGIH TLV**	**Other Pertinent Limits**	**Properties**	**Routes of Exposure or Irritation**	**Acute Health Effects**	**Chronic Health Effects/ Target Organs**
1,1,2-Trichloroethane	PEL TWA - 10 ppm (45 mg/m^3) (skin) TLV - 10 ppm	NIOSH considers this compound to be a carcinogen. REL TWA - 10 ppm (45 mg/m^3) (skin)	Colorless liquid with a sweet, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, nose; central nervous system depressant; depression; dermatitis.	Liver, kidney damage; potential occupational liver carcinogen. **Target Organs:** Eyes, respiratory system, central nervous system, liver, kidneys.
Trichloroethene (trichloroethylene)	PEL - 100 ppm TLV - 50 ppm	PEL Ceiling - 200 ppm NIOSH considers trichloroethylene to be a carcinogen.	Colorless liquid (unless dyed blue) with a chloroform-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, skin; headache; vertigo (an illusion of movement); visual disturbance; fatigue; giddiness; tremor; somnolence (sleepiness, unnatural drowsiness); nausea; vomiting; dermatitis.	Cardiac arrhythmias; paresthesia; liver injury; potential occupational carcinogen of liver, kidney.
Toluene	PEL - 200 ppm TLV - 50 ppm	NIOSH REL = 100 ppm TWA; 150 ppm STEL ILDH = 500 ppm	Sweet, pungent, benzene-like odor.	Eye contact.	Skin (dermatitis); eye, respiratory tract irritant; headache; dizziness; weakness; fatigue.	CNS; liver; kidneys; skin.
Vinyl chloride	PEL - 1 ppm TLV - 1 ppm	NIOSH considers this material to be a carcinogen.	Liquid with a pleasant odor at high concentrations.	Inhalation; dermal; eye contact.	Weakness; abdominal pain; pallor or cyanosis of extremities; liquid frostbite.	Gastrointestinal bleeding; enlarged liver; potential occupational liver carcinogen; damage to CNS, blood, respiratory system, lymphatic system.

POTENTIAL AIRBORNE CHEMICALS ON SITE FOR THIS PROJECT REVIEW THIS TABLE AND CONTACT THE SHSO WITH ANY QUESTION						
Chemical (or Class)	**OSHA PEL ACGIH TLV**	**Other Pertinent Limits**	**Properties**	**Routes of Exposure or Irritation**	**Acute Health Effects**	**Chronic Health Effects/ Target Organs**
Xylenes	PEL - 100 ppm TLV - 100 ppm	TLV STEL - 500 ppm NIOSH REL - 100 ppm NIOSH REL STEL - 100 ppm IDLH - 900 ppm	Aromatic odor.	Inhalation; dermal; ingestion; eye contact.	Throat and skin irritant (dermatitis); headache; nausea; drowsiness; fatigue.	CNS; liver; kidneys; skin; gastrointestinal damage; eye damage.

NOTES:
ACGIH = American Conference of Governmental Industrial Hygienists
AIHA = American Industrial Hygiene Association
AIHA WEEL = AIHA-set workplace environmental exposure limits
C = ceiling limit
CNS = central nervous system
CVS = cardiovascular system
IDLH = immediately dangerous to life or health
mg/m^3 = milligrams per cubic meter
NIOSH = National Institute for Occupation Safety and Health
OSHA = Occupation Safety and Health Administration
PEL = permissible exposure limit
ppm = parts per million
RBC = red blood cells
REL = recommended exposure limit set by NIOSH
Skin = skin absorption
STEL = short-term exposure limit
TLV = threshold limit value set by ACGIH
TWA = time-weighted average

9.0 POTENTIAL SITE HAZARDS AND APPROPRIATE PRECAUTIONS

Activities listed may be associated with work performed by others. The information contained in this section is for the use of Farallon personnel and not intended for use by others. The following tables list potential hazards and appropriate precautions associated with planned field work.

9.1 MONITORING WELL SAMPLING/GAUGING AND SAMPLING INFLUENT

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with equipment/supplies suitable for sampling.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Vehicle accident. Lifting hazards. Delay or unsafe performance of work due to lack of necessary equipment on Site. Cross-contamination of wells.	• Follow safe driving procedures. • Use proper lifting techniques. • Review work plan to determine equipment/supply needs. • Verify that all sampling/gauging equipment has been decontaminated. • Bring ice for sample storage. • Review the HASP. • Gather the necessary PPE.
Set up necessary traffic control.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic-control equipment placement.	• Use buddy system for placing traffic control. Refer to the traffic control plan section of the HASP (which may include specific requirements based on encroachment permit).
Set up exclusion zone(s).	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Struck by vehicle. Slip or fall hazards to workers.	• Face incoming traffic. • Implement exclusion zone setup instructions of the HASP (e.g., barricades, caution tape, cones). • Set up work area free of trip hazards.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Gauge water levels and product thickness (where applicable) in wells.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Inhalation of, or dermal exposure to, chemical hazards. Repetitive motion.	• Wear required PPE. • Initiate air quality monitoring in accordance with the HASP. • Maintain a safe distance from wellhead. • Bend at knees rather than at waist.
Purge well(s) and collect purge water.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Cross-contamination. Back strain. Inhalation of, or dermal exposure to, chemical hazards. Slip or fall. Contaminated water spill.	• Decontaminate purging equipment between each sampling location. • Use proper lifting techniques. • Use PPE and conduct monitoring in accordance with the HASP. • Keep work area clear of tripping or slipping hazards. • Store purge water in appropriate containers.
Collect samples in accordance with sampling plan.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Cross-contamination. Back strain. Inhalation of, or dermal exposure to, chemical hazards. Slip or fall. Improper labeling or storage. Injury from broken sample bottle (e.g., cut or acid burn).	• Decontaminate sampling equipment between each well (unless disposable equipment). • Use proper lifting techniques. • Use PPE in accordance with the HASP. • Label samples in accordance with sampling plan. • Keep samples stored in suitable containers, at correct temperature, and away from work area. • Handle bottles carefully.

Job Steps	**Personal Protective Equipment**	**Potential Hazard**	**Critical Actions**
Dispose of or store purge water on the Site.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves. Respirator with organic vapor cartridges, chemical-resistant gloves, chemical-resistant apron as required.	Back strain. Exposure to contaminants. Damage or injury from improper use of on-Site treatment system equipment. Improper storage or disposal.	• Use suitable equipment to transport water (e.g., pumps, drum dollies). • Wear PPE in accordance with the HASP. • Review any necessary instructions for use of on-Site treatment systems. • Label storage containers properly and locate in an isolated area away from traffic and other Site functions. • Coordinate off-Site disposal, where applicable.
Clean the Site; demobilize.	Reflective vest, steel-toed and -shank shoes, hard hat, safety glasses with side shields, ear plugs or ear muffs, work gloves.	Traffic. Safety hazard left on Site. Lifting hazard.	• Use buddy system to remove traffic control, as necessary. • Leave the Site clear of refuse and debris. • Notify business personnel of departure, and of any purge water left on the Site. • Use proper lifting techniques.
Package and deliver samples to laboratory.		Bottle breakage. Back strain.	• Handle and pack bottles carefully (e.g., bubble wrap bags). • Use proper lifting techniques.

10.0 WASTE CHARACTERISTICS

Waste anticipated to be generated on the Site:

Type(s): ☒ Liquid ☐ Solid ☐ Sludge ☒ Other Consumable materials (e.g., used sampling tubing, paper towels, disposable coveralls, gloves).

The approximate volume for each anticipated waste stream per sampling event:

Waste: Liquid Approximate Volume: 12 gallons

Waste: Consumables Approximate Volume: 10 gallons

Characteristics**:**

☐ Corrosive ☐ Flammable/Ignitable ☐ Radioactive ☐ Toxic

☐ Reactive ☒ Unknown ☐ Other *(specify)*______________________

11.0 TRAFFIC CONTROL

Work on the Site will be conducted in areas of uncontrolled traffic access. Traffic control/warning devices will be placed around the work area to prevent undesirable interface between pedestrian and automotive traffic and project workers and equipment. These devices may include:

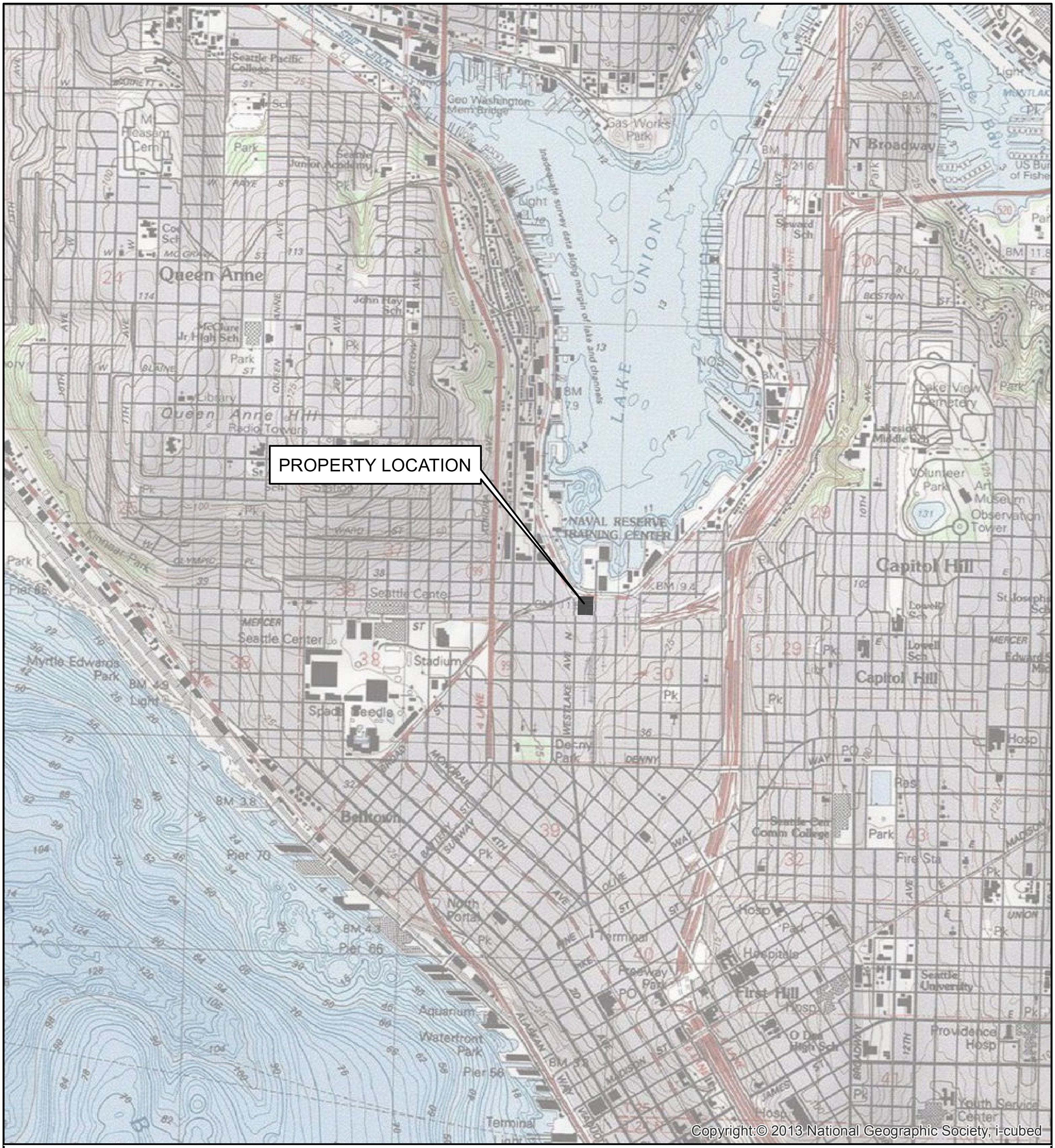
- Cones;
- Tubular markers;
- Traffic delineators;
- Barricades;
- Barricade tape; and
- Temporary fencing.

The traffic control/warning devices will be placed around the work in such a way that traffic access is inhibited (i.e., place cones less than 8 feet apart so cars cannot easily drive through work area without moving a cone). Barricade tape or temporary fencing will be used to inhibit access to the work area in locations where pedestrians will be encountered.

FIGURES

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044



REFERENCE: 7.5 MINUTE USGS QUADRANGLE SEATTLE NORTH, WASHINGTON, DATED 1983

0 1,000 2,000
SCALE IN FEET

N

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Issaquah | Bellingham | Seattle

Oregon
Portland | Bend | Baker City

California
Oakland | Sacramento | Irvine

FIGURE 1
VICINITY MAP
INTERIM ACTION 700 DEXTER HVOC PLUME
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: tperrin | Checked By: BJ | Date: 9/27/2016 | Disc Reference:
Document Path: G:\Projects\397 Vulcan\GIS\Block 37\Figure_1_Bl37_397-010.mxd

LEGEND

- MONITORING WELL
- SHALLOW WATER-BEARING ZONE WELL
- INTERMEDIATE WATER-BEARING ZONE WELL
- INTERMEDIATE B WATER-BEARING ZONE WELL
- INTERMEDIATE A WATER-BEARING ZONE WELL
- DEEP OUTWASH AQUIFER WELL
- DECOMMISSIONED SHALLOW WELL
- DECOMMISSIONED INTERMEDIATE WELL
- DECOMMISSIONED MONITORING WELL (UNKNOWN ZONE)
- PROPOSED DEWATERING WELL
- PROPOSED OBSERVATION WELL
- APPROXIMATE EASTERN EXTENT OF 700 DEXTER HVOC PLUME AT THE BLOCK 37 PROPERTY
- A — A' CROSS SECTION
- KING COUNTY PARCELS

0 80 160
SCALE IN FEET

N

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FIGURE 2

SOUTH LAKE UNION AREA
INTERIM ACTION 700 DEXTER HVOC PLUME
SOUTH LAKE UNION PROPERTIES
SEATTLE, WASHINGTON

FARALLON PN: 397-010

Drawn By: tperrin | Checked By: | Date: 10/5/2016 | Disc Reference:

Document Path: G:\Projects\397 Vulcan\GIS\Block 37\FIGURE2_Block37_DWSamples.mxd

ATTACHMENT 1
HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT AND AGREEMENT FORM

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All Farallon and subcontractor personnel must sign on a daily basis.)

This Health and Safety Plan (HASP) has been developed for the purpose of informing Farallon employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Subcontractors and other parties at the site must develop their own HASP to address the hazards faced by their own employees. Farallon will make a copy of this HASP available to subcontractors and other interested parties to fully disclose hazards we may be aware of, and to satisfy Farallon's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, subcontractors and others on site are required to inform Farallon of any hazards they are aware of or that their work on site might possibly pose to Farallon employees, including but not limited to Material Safety Data Sheets for chemicals brought on site. This plan should NOT be understood by contractors to provide information pertaining to all of the hazards that a contractor's employees may be exposed to as a result of their work.

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer (SHSO). Your signature below affirms that you have read and understand the hazards discussed in this HASP, and that you understand that subcontractors and other parties working on site must develop their own HASP for their employees. Your signature also affirms that you understand that you could be prohibited by the SHSO or other Farallon personnel from working on this project for not complying with any aspect of this HASP. The SHSO will be noted on the sheet below on a daily basis.

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

Check for SHSO	Name	Title	Signature	Company	Date

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM					
Check for SHSO	**Name**	**Title**	**Signature**	**Company**	**Date**

ATTACHMENT 2
DIRECTIONS TO HOSPITAL

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

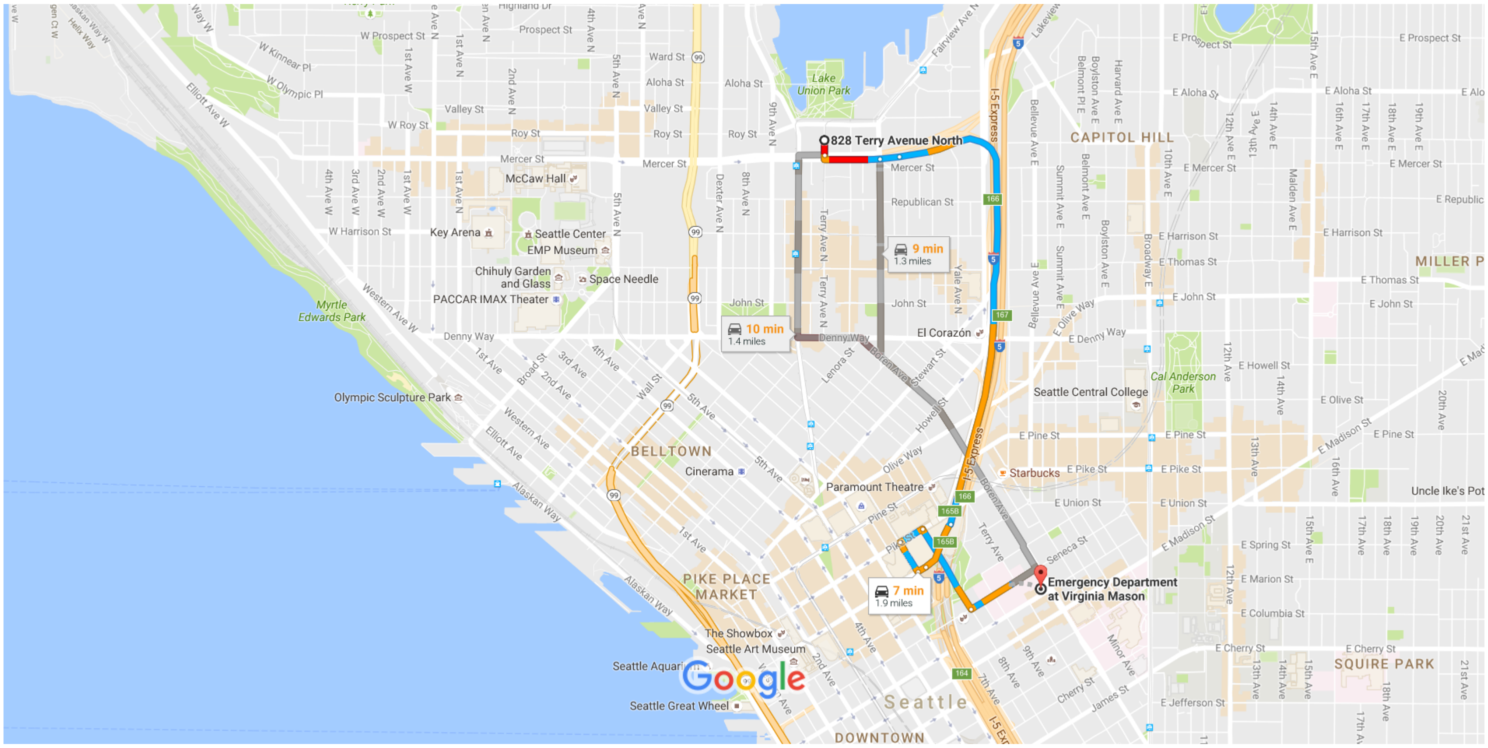
Farallon PN: 397-044

Google Maps

828 Terry Avenue North, Seattle, WA 98109 to Emergency Department at Virginia Mason

Drive 1.9 miles, 7 min

1010 Spring St, Seattle, WA 98104



Map data ©2016 Google   1000 ft

828 Terry Avenue North

Seattle, WA 98109

1. Head south on Terry Ave N toward Mercer St

20 s (187 ft)

Take I-5 S to 8th Ave

4 min (1.6 mi)

2. Turn left at the 1st cross street onto Mercer St

0.1 mi

3. Use the right 2 lanes to take the ramp to I-5 S

236 ft

4. Keep right at the fork, follow signs for I-5 S and merge onto I-5 S

1.1 mi

5. Take exit 165B for Union St

0.1 mi

6. Continue onto Union St

115 ft

7. Turn right onto 7th Ave

423 ft

8. Turn right onto Pike St

322 ft

Continue on 8th Ave. Drive to Seneca St

2 min (0.3 mi)

9. Turn right onto 8th Ave

0.2 mi

10. Turn left onto Seneca St

0.1 mi

Emergency Department at Virginia Mason

1010 Spring Street, Seattle, WA 98104

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

ATTACHMENT 3
POTENTIAL TOPICS FOR DAILY HEALTH AND SAFETY MEETING

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

POTENTIAL TOPICS FOR DAILY
HEALTH AND SAFETY MEETING

- ☐ Emergency response plan, emergency vehicle (full of fuel) and muster point
- ☐ Route to medical aid (hospital or other facility)
- ☐ Work hours. Is night work planned?
- ☐ Hand signals around heavy equipment
- ☐ Traffic control
- ☐ Pertinent legislation and regulations
- ☐ Above- and below-ground utilities (energized or de-energized)
- ☐ Material Safety Data Sheets
- ☐ Reporting an incident: to whom, what, why, and when to report
- ☐ Fire extinguisher and first aid kit locations
- ☐ Excavations, trenching, sloping, and shoring
- ☐ Personal protective equipment and training
- ☐ Safety equipment and training
- ☐ Emergency telephone location(s) and telephone numbers (in addition to 911)
- ☐ Eye wash stations and washroom locations
- ☐ Energy lock-out/tag-out procedures. Location of "kill switches," etc.
- ☐ Weather restrictions
- ☐ Site security. Site hazards. Is special waste present?
- ☐ Traffic and people movement
- ☐ Working around machinery (both static and mobile)
- ☐ Sources of ignition, static electricity, etc.
- ☐ Stings, bites, large animals, and other nature-related injuries and conditions
- ☐ Working above grade
- ☐ Working at isolated sites
- ☐ Decontamination procedures (for both personnel and equipment)
- ☐ How to prevent falls, trips, sprains, and lifting injuries
- ☐ Right to refuse unsafe work
- ☐ Adjacent property issues (e.g., residence, business, school, daycare center)

ATTACHMENT 4
DAILY HEALTH AND SAFETY BRIEFING LOG

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

DAILY HEALTH AND SAFETY BRIEFING LOG

PROJECT INFORMATION	
Farallon PN:	Project Name:
Site Address:	City/State:
MEETING INFORMATION	
Conducted By:	Weather:
Major Job Task:	Date:

DAILY EQUIPMENT CHECKLIST

☐ Site Check In	☐ First Aid Kit Location(s)	☐ Ear Plugs (if required)
☐ Proper ID/Safety Credentials	☐ Fire Extinguisher Location(s)	☐ Hand Protection (if required)
☐ Hard Hat	☐ Eye Wash Station	☐ Face Shield (if required)
☐ Safety Glasses	☐ Traffic Control (if needed)	☐ Respirator (if required)
☐ Orange Reflective Vest (H or X back BNSF)		☐ ___________________________
☐ Safety Toe Boots (lace up and leather BNSF)		☐ ___________________________

HEALTH AND SAFETY BRIEFING

☐ Head Count (No. of employees:)	☐ Excavation Safety (if applicable)
☐ Emergency Response	☐ Health Hazards
☐ Who will...? (provide names below)	☐ Environmental Hazards
Call 911:	☐ Physical Hazards
Alternate to call 911:	☐ Slips, Trips and Falls
Provide First Aid/CPR:	☐ Utility Locates
☐ Emergency Exits/ Rally Points/Hospital Route	☐ Near Miss Reporting (reminder to look)
☐ Site Security and Exclusion Zone	☐ Incident Reporting (procedures and forms)
☐ Vehicle/Equipment-Specific Safety Practices	☐ Traffic Control
☐ Stop Work Authority	☐ HASP Reviewed and Signed

SITE-SPECIFIC HEALTH AND SAFETY ISSUES DISCUSSED
1)
2)
3)
4)
5)

DAILY HEALTH AND SAFETY BRIEFING ATTENDEES

NAME	COMPANY	SIGNATURE

ATTACHMENT 5
INCIDENT REPORT FORM

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

FARALLON CONSULTING

Accidental Injury, Occupational Illness, or Workplace Incident
INCIDENT REPORT

INCIDENT TYPE	**INCIDENT DATE:**

☐ FATALITY	☐ INDUSTRIAL NON-RECORDABLE	☐ SPILL/LEAK	☐ GENERAL LIABILITY
☐ LOST WORKDAY	☐ NON-INDUSTRIAL	☐ PRODUCT INTEGRITY	☐ CRIMINAL ACTIVITY
☐ LW RESTRICTED DUTY	☐ OFF-THE-JOB INJURY	☐ EQUIPMENT	☐ NOTICE OF VIOLATION
☐ OSHA MEDICAL OR ILLNESS W/O LW	☐ MVA	☐ BUSINESS INTERRUPTION	☐ OTHER
☐ FIRST AID	☐ FIRE	**(TO BE COMPLETED BY HEALTH AND SAFETY COORDINATOR)**	

This report must be completed by the employee or Health and Safety Coordinator immediately upon learning of the incident. The completed report must be reviewed and signed by a Principal, within 24 hours of the incident, even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Gerald Portele within 24 hours of the initial exam and any subsequent exams. After hours or weekends, please call Joe Rounds, Mobile (206) 484-2748.

EMPLOYEE INFO

LAST NAME:	FIRST NAME AND MIDDLE INITIAL:	TITLE:	TIME OF EVENT OR EXPOSURE: ☐ AM ☐ PM

EMPLOYMENT STATUS: ☐ FULL-TIME ☐ PART-TIME ☐ HOURLY-AS-NEEDED	HOW LONG?
DATE OF INJURY OR ONSET OF ILLNESS (MM/DD/YYYY)	

INJURY OR ILLNESS INFO

EXACT LOCATION OF INCIDENT (ADDRESS, GEOGRAPHICAL LOCATION, FLOOR, BUILDING, ETC.):

COUNTY:	ON EMPLOYER'S PREMISES? ☐ YES ☐ NO

COMPLETE DESCRIPTION OF INCIDENT, INCLUDE SPECIFIC ACTIVITY DURING INCIDENT (LIFTING, PUSHING, WALKING, ETC.):

DESCRIBE THE EQUIPMENT, MATERIALS, OR CHEMICALS THAT DIRECTLY HARMED THE PARTY (E.G., THE MACHINE EMPLOYEE STRUCK AGAINST OR WHICH STRUCK EMPLOYEE; THE VAPOR INHALED OR MATERIAL SWALLOWED; WHAT THE EMPLOYEE WAS LIFTING, PULLING, ETC.):

DESCRIBE THE SPECIFIC INJURY OR ILLNESS (E.G., CUT, STRAIN, FRACTURE, SKIN RASH, ETC.):

BODY PART(S) AFFECTED (E.G., BACK, LEFT WRIST, RIGHT EYE, ETC.):

DATE EMPLOYER NOTIFIED:	TO WHOM REPORTED:

MEDICAL PROVIDER (HOSPITAL, DOCTOR, CLINIC, ETC.) INFO

NAME AND ADDRESS OF HEALTH CARE PROVIDER:	PHONE NO.:
TREATED IN EMERGENCY ROOM: ☐ YES ☐ NO	HOSPITALIZED OVERNIGHT AS INPATIENT: ☐ YES ☐ NO

INJURY/ILLNESS SEVERITY	TIME LOSS (Check all that apply)	WORKDAY PHASE
☐ NO TREATMENT REQUIRED ☐ FIRST AID ONLY ☐ MEDICAL TREATMENT ☐ FATALITY, ENTER DATE:	☐ RETURN TO WORK THE NEXT DAY ☐ NO TIME LOSS ☐ RESTRICTED ACTIVITY BEGIN DATE: RETURN DATE: ☐ LOST WORKDAY, NOT AT WORK BEGIN DATE: RETURN DATE:	☐ PERFORM NORMAL WORK DUTIES ☐ MEAL PERIOD ☐ REST PERIOD ☐ ENTERING/LEAVING ☐ CHRONIC EXPOSURE ☐ OTHER, SPECIFY:

MOTOR VEHICLE ACCIDENT (MVA)		PROFESSIONAL DRIVER?	☐ YES ☐ NO	
TOTAL YEARS DRIVING:	COMPANY VEHICLE? ☐ YES ☐ NO	VEHICLE TYPE:		
NO. OF VEHICLES TOWED	NO. OF INJURIES:	NO. OF FATALITIES:		

THIRD-PARTY INCIDENTS					
NAME OF OWNER		ADDRESS		PHONE NO.:	
DESCRIPTION OF DAMAGE:					
INSURANCE INFORMATION:					
WITNESS NAME		ADDRESS		PHONE NO.:	
WITNESS NAME		ADDRESS		PHONE NO.:	

REVIEWED BY			
NAME (PRINT)	SIGNATURE	TITLE	DATE

ADDITIONAL INFORMATION (USE SPACE BELOW FOR ADDITIONAL INFROMATION AS NECESSARY TO COMPLETE THIS FORM.)

ATTACHMENT 6
SAFETY OBSERVATION AND NEAR MISS REPORT

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

SAFETY OBSERVATION AND NEAR MISS REPORT

This report is to be filled out by any employee involved in or witnessing a near miss, or making a safety observation. A near miss is an incident that did not result in any personal injury, property damage, or production interruption, but could have under slightly different circumstances. A safety observation is witnessing any activity that places a person or property at risk of injury, accident, or damage. These are very important indicators of potentially harmful future accidents, and provide valuable insights to preventing personal injury and/or property damage.

PROJECT INFORMATION	
Farallon PN:	Project Name:
Site Address:	City/State:
INCIDENT INFORMATION	
Date:	Time: ☐ AM ☐ PM
Exact Location:	
Description of Incident or Potential Hazard:	
Corrective Action Taken:	
Lessons Learned:	

Employee Signature ______________________ Date: ______________

Printed Name ______________________

Supervisor Signature ______________________ Date: ______________

Printed Name ______________________

ATTACHMENT 7
UTILITY CLEARANCE LOGS

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

UTILITY CLEARANCE LOG

Project Name: ______________________________ **Project Number:** ____________________
Location: ______________________________ **Date of Work:** ____________________

Instructions. This log must be completed by a Farallon staff member **before** any Farallon-directed excavation (e.g., test pit excavation) or drilling operation.

DRILLING OR EXCAVATION WORK MAY NOT COMMENCE
UNTIL UTILITY LOCATES HAVE BEEN COMPLETED
(see the One-Call Utility Locate Request Procedure on the following page)

Farallon is responsible for having underground utilities and structures located and marked when drilling or directing test pit excavation operations. Any drilling or excavation within 2 feet of a marked utility must be done with hand tools.

Owners of underground utilities are required by law to mark underground facilities on public and private property. Owners of underground utilities are **not required** to mark existing service laterals or appurtenances. Utility owners in Washington are required to subscribe to the One-Call service.

Private utility locate services must be hired to locate service laterals and other buried utilities (e.g., on-Site electric distribution lines, irrigation pipes) on private property.

Re-mark after 10 days or maintain as appropriate.

Utility Locate Checklist

☐ Attach map showing drilling and/or excavation sites and known utilities
☐ Attach copy of One-Call Utility Notification Ticket (http://www.searchandstatus.com/)
One-Call Utility Notification Ticket Number: ______________________________
☐ Attach copy of Side Sewer Card (available for City of Seattle; check municipality for availability)
☐ Attach copy of Private Locate Receipt
☐ Photograph all excavation and/or drilling locations and download to project file
☐ Review utilities with Site Contact:
Name: ______________________________ Phone: ______________________________

Utilities and Structures

Utility Type	**Utility Name**	**Public Utilities Marked (Y/N)**	**Private Utilities/Laterals Marked (Y/N)**	**Marking Method** (flags, wooden stakes, paint on pavement, etc.)
Petroleum product li				
Natural gas line				
Water line				
Sewer line				
Storm drain				
Telephone cable				
Electric power line				
Product tank				
Septic tank/drain field				
Other				

Farallon Consulting, L.L.C.

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

Field Team Leader: ___________________________________ Date: _________________________

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

ONE-CALL UTILITY LOCATE REQUEST PROCEDURE

THE ONE-CALL UTILITY NOTIFICATION CENTER REQUIRES 48 HOURS NOTICE TO MARK UTILITIES BEFORE YOU CAN DIG OR DRILL

Washington: 1-800-424-5555
Oregon: 1-800-332-2344

Washington state law states that "before commencing **any** excavation," the excavator or driller must provide notice to all owners of underground utilities by use of the One-Call locator service, and that the excavator or driller shall not dig or drill until all known utilities are marked. To fully comply with the law, you **must** take the following steps:

1. **Call before you dig or drill:** Notify the One-Call Utility Notification Center (OCUNC) a minimum of 48 hours (2 full business days) before digging or drilling. Provide the following **required** information:
    a. Your name and phone number, company name and mailing address, and Farallon Account Number 25999.
    b. The type of work being done.
    c. Who the work is being done for.
    d. The county and city where the work is being done.
    e. The address or street where the work is being done.
    f. Marking Instructions: "Generally locate entire site including rights-of-way and easements."

    Provide the following information if applicable or requested:
    a. The name and phone number of an alternate contact person.
    b. If the work is being done within 10 feet of any overhead power lines.
    c. The nearest cross street.
    d. The distance and direction of the work site from the intersection.
    e. Township, range, section, and quarter section of the work site.
2. **Record the utilities that will be notified:** OCUNC will tell you the utilities that are on or adjacent to the work site, based on their database. Record the name(s) of the utility on the reverse side of this form.
3. **After the 48-hour waiting period, confirm that the utility locations have been marked:** Before digging or drilling, walk the work site and confirm that the utility companies have marked the utility locations in the field.
4. **If a locate appears to be missing:** If a utility locate appears to be missing and the utility company has not notified you that there are no utilities in the area, call OCUNC and:
    a. Provide the OCUNC locate number.
    b. Clearly state which utility has not been marked. The call is being recorded.
    c. Ask for a contact person at that utility.

Electric = **RED**	*Gas-Oil-Steam =* **YELLOW**	*Comm-CATV =* **ORANGE**	*Water =* **BLUE/PURPLE**	*Sewer =* **GREEN**	*Temp Survey =* **PINK**

d. **Call the contact person for the missing utility locate:** Determine why there is no utility locate in the field.

e. **Record the reason(s) for the missing locate(s):** There are valid reasons that locates do not appear in the field (e.g., there are no utilities located on the work site or the utility has been abandoned). However, IF THEY ARE LATE, **YOU MUST WAIT** TO DRILL OR DIG. If the utility fails to mark a locate within the required 48 hours (2 full business days), the utility is liable for delay costs.

5. **Hand dig within 2 feet of a marked utility:** When digging or drilling within 2 feet of any marked utility, the utility must be exposed <u>first</u> by using hand tools.

6. **Record reason(s) for missing locate(s)**: There may be reasons that locates do not appear in the field (e.g., no utilities are located on the site, utility has been abandoned). Record the reason given. IF THEY ARE LATE – YOU WAIT TO DRILL OR DIG. If the utility failed to mark within the required two days, they are liable for delay costs.

FARALLON CONSULTING, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington
98027

TELEPHONE CONVERSATION
Date: ____________________ **Time:** _________
Project Name: ______________________________
Job No.: ________________________________
Phone No.: 1-800-424-5555 WA, 1-800-332-2344
OR ____
Prepared By/Initials: ______________________
Call: ☐ **Placed** ☐ **Received**

Contact/Title: ____

Agency/Region: One-Call Utility Notification Center

PROJECT: ____

1. Your name and the Farallon Account No. #25999: ____________________________

2. What is the type of work being conducted (e.g., environmental drilling, test pit excavation) ?

____

3. Who is the property owner? ____

4. County and city were work is being done? ______________________________________

5. Address or street where work is taking place? ___________________________________

____

6. Nearest cross street? ____

7. Distance and direction of the work site from the intersection? ____________________________

8. Marking Instructions (generally locate on entire Site, including rights-of-way and easements): ____

____

____

9. What time and date will the locate be completed? _________________________________

10. Utility Locate Request Number? ____

11. Utilities that will be notified? ____

____

12. Any Overhead Concerns? ____

____

____

cc:____**Page**__________**of**_________

Note: Bold indicates required information.

ATTACHMENT 8
FARALLON FIELD PERSONNEL TRAINING DATES

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

Health and Safety
Certifications and Training

Name	Medical Monitoring		Annual/Biennial	Resp. Clearance	Respirator Fit Test	CPR	First Aid	Fire Extinguisher Training	Expiration Dates		GHS Training	8 Hour Supervisor	40 Hour Training Taken (Initial)	8 Hour Refresher
	Date of Last Exam	Next Exam Due							BNSF E-Railsafe (Bi-annual)	BNSF Contractor Orientation (Annual)				
Aguilar, Daniel	04/01/16	04/01/18	B	04/01/16	09/27/16			06/10/16	5/5/2018	4/15/17			04/08/16	
Bailey, Amber	12/21/15	12/20/17	B	12/21/15	07/13/16	10/21/16	10/21/16	06/16/16	12/15/17	11/16/17			11/22/13	01/18/16
Bowser, Matthew	06/11/15	06/10/17	B	06/11/15		10/07/16	10/07/16	05/16/16	06/22/17	06/10/17			06/11/15	01/18/16
Burns, Anastasia	05/16/16	05/16/18	B	05/16/16		10/21/16	10/21/16	05/16/16	04/22/18	04/13/17			09/15/14	08/31/15
Dlubac, Katherine	03/13/15	03/12/17	B	03/13/15		04/24/15	04/24/15	09/26/16					02/20/15	01/18/16
Emahiser, Parker								05/16/16					02/17/13	
Fisco, Gavin	08/11/16	08/11/18	B	08/11/16	08/11/16	09/26/16	09/26/16	05/18/16				12/12/14	05/04/07	01/18/16
Garvin, Paul	03/10/16	03/10/18	B	03/10/16		02/09/15	02/09/15	08/29/16	11/20/17	10/03/17			06/22/12	02/02/15
Hudspeth, Amber	04/08/16	04/08/18	B	04/08/16	04/08/16			06/19/16						01/18/16
Johnson, David	04/20/16	04/20/18	B	04/20/16	03/06/12	10/07/16	10/07/16	06/15/16	06/14/17	11/17/17		11/24/14	06/06/11	01/18/16
Kayhan, Dincer	04/20/16	04/20/18	B	04/20/16	2/14/12012	10/16/14	10/16/14		03/09/18	01/11/17			03/02/12	01/18/16
Kerr, Jared	06/11/16	06/11/18	B	06/11/16		10/21/16	10/21/16	05/16/16	03/05/17	03/03/17			06/27/14	01/18/16
Luiten, Russell	10/20/15	10/19/17	B	10/20/15		10/07/16	10/07/16	05/17/16	11/22/17	10/11/17			6/2012?	01/18/16
Oscilia, Margaret	06/01/16	06/01/18	B	06/01/16	06/01/16			06/13/16	11/09/17	11/08/17			09/17/07	01/18/16
Ostrom, Ryan	12/15/15	12/14/17	B	12/13/13	02/12/15	10/07/16	10/07/16	06/06/16	10/06/17	06/07/17			05/09/13	01/18/16
Raven, Dan								06/06/16					07/17/15	01/18/16
Scott, Ken	01/26/16	01/25/18	B	01/26/16	04/28/15	10/21/16	10/21/16	09/02/16	10/08/17	04/12/17		02/17/05	09/01/95	01/18/16
Taylor, Brenden	05/10/16	05/10/18	B			09/23/14	09/23/14	08/23/16		05/11/17		04/17/09	07/18/06	07/17/15
Vining, Andrew	03/10/16	03/10/18	B	03/10/16	02/12/15	10/07/16	10/07/16	05/16/16	03/09/18	05/11/17	11/18/13	11/24/14	02/07/12	01/18/16
Wishnoff, Benjamin						11/24/15	04/16/16	06/24/16				06/09/15	05/29/07	07/28/15

ATTACHMENT 9
AIR MONITORING TABLE AND FORMS

HEALTH AND SAFETY PLAN
Interim Action Well Monitoring
700 Dexter HVOC Plume
Portion of 700 Dexter Site
South Lake Union Properties
Seattle, Washington

Farallon PN: 397-044

ACTION LEVEL TABLE FOR AIR MONITORING

The Air Monitoring table (following page) presents protocol for monitoring ambient air for constituents of concern and other parameters that may affect worker safety. Please note the following with respect to use of this table:

- The Level for Respirator Use indicates the concentration at which a respirator must be donned. It does not require that the job stop. The respirator is a piece of equipment that is to be used while determining why a concentration has reached that level. Implement engineering controls such as water mist, spray foam, plastic cover, etc. to reduce the concentration.
- The Level for Work Stoppage indicates the concentration at which work on the job must stop. Determine why a concentration has reached that level, and how it can be decreased. Site evacuation is not necessary at this level. Stopping work does not imply that the concentration level will decrease. Implement engineering controls to reduce the concentration; resume work when it is safe to do so.
- These values can be modified under particular Site conditions and with specific knowledge of the contaminant(s). Should such conditions arise, contact Farallon's Health and Safety Officer at (425) 295-0800.

AIR MONITORING

Chemical (or Class)	Monitoring Equipment	Task	Monitoring Frequency and Location	Level for Respirator Use	Level for Work Stoppage
Volatile Organic Vapors	Flame ionization detector (FID)/photoionization detector (PID) as appropriate for chemicals of concern. Read manual to determine. Draeger Tube for vinyl chloride (Model 1/a; Part Number 67 28031). Draeger Tube for benzene (Model 0.5/a).	From start of mobilization to completion and demobilization.	Sampling should be continuous during the project while disturbing potentially contaminated soil, uncovering and/or removing tanks and piping, or drilling —at least every 15 minutes in the breathing zone. Sample at the exclusion zone boundaries every 30 minutes. Continuously sample during each soil and groundwater sampling interval. If 10 parts per million (ppm) in breathing zone, collect a Draeger Tube for benzene and/or vinyl chloride (depending upon contaminants of concern).	20 ppm above background sustained in breathing zone for 2 minutes, and no benzene and/or vinyl chloride tube discoloration. If a color change appears on the tube for benzene or vinyl chloride at 10 ppm on FID/PID, don respirator. If no Draeger Tube is available, the level for respirator use is to be 5 ppm.	50 ppm above background in breathing zone and no vinyl chloride or benzene tube discoloration. Stop work if tube indicates > 1 ppm for benzene or vinyl chloride. If no Draeger Tube is available, stop work at 25 ppm.

AIR MONITORING EQUIPMENT CALIBRATION/CHECK LOG

Date	Instrument/ Model No.	Serial No.	Battery Check OK?	Zero Adjust OK?	Calibration Gas (ppm)	Reading (ppm)	Leak Check	Performed By	Comments

AIR MONITORING LOG

Date	Time	Location	Source/Area/ Breathing Zone	Instrument	Concentration/Units	Sampled by