

**PER- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY**

**2021 WORK PLAN ADDENDUM  
LOWER ISSAQUAH VALLEY  
175 NEWPORT WAY NORTHWEST  
ISSAQUAH, WASHINGTON**

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**For:  
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## 1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this addendum (Addendum) to the *Per- And Poly-Fluoroalkyl Substances Characterization Study Work Plan, Lower Issaquah Valley, Issaquah, Washington* dated August 6, 2018, prepared by Farallon (2018) for Eastside Fire & Rescue (EFR) (Work Plan), to present the proposed work elements and rationale to design and perform a pilot test of activated carbon injection to treat per- and poly-fluoroalkyl substances (PFAS) in soil and groundwater at the 175 Newport Way Northwest aqueous film-forming foam training area (NWN AFFF training area) in Issaquah, Washington (Figure 1). This Addendum was prepared in accordance with Task 1 of the Interagency Agreement C2100056 dated March 29, 2021 between the Washington State Department of Ecology (Ecology) and EFR (IAA). The work described in this Addendum is being performed as a joint effort by EFR, Ecology, and the City of Issaquah (collectively Parties) to evaluate and reduce potential future impacts to human health and the environment associated with historical releases of PFAS.

Although PFAS are not currently regulated as hazardous substances under federal or Washington State law, the remedy evaluation work will be performed consistent with the requirements of the Washington State Model Toxics Control Act Cleanup Regulation (MTCA), as established in Chapter 173-340 of the Washington Administrative Code (WAC 173-340). Data collected as part of the work described in this Addendum may be used to support future cleanup actions.

### 1.1 PROJECT PROBLEM STATEMENT

The additional work proposed under this Addendum will collect additional characterization data at the NWN AFFF training area and plan and perform a pilot-scale injection at the NWN AFFF training area. Specific objectives for the work described under this Addendum are:

- Collect additional characterization data at the NWN AFFF training area to supplement pilot test design and to establish pre-pilot test baseline conditions;
- Identify the most cost-effective treatment product and dosage that effectively binds subsurface PFAS in place under the conditions reported at NWN AFFF Training Area;
- Design the proposed pilot test for the NWN AFFF training area; and
- Evaluate the pilot test performance at reducing concentrations of PFAS in shallow and intermediate groundwater at the NWN AFFF training area and at down-gradient locations.

Data and observations generated under this Addendum will be documented in accordance with the requirements of the IAA and will include preparation of a final Summary Report documenting the additional characterization data, pilot test design, and pilot test performance results.



## 1.2 ADDENDUM PURPOSE

The specific purposes of this Addendum are to:

- Describe proposed additional characterization rationale and work elements for the NWN AFFF training area;
- Describe the proposed pilot test work elements and their rationale;
- Identify characterization and performance monitoring sample analytical methods and documentation protocols;
- Describe standard operating procedures (SOPs) for field sampling;
- Ensure collection of representative and defensible data through application of the procedures and processes identified in the updated Quality Assurance Project Plan (QAPP) (Appendix A); and
- Describe field work, analytical and other results documentation, and other relevant information that will be incorporated into the final Summary Report (Task 4 in the IAA).

## 1.3 ORGANIZATION

The Addendum and QAPP have been developed in accordance with the *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* revised December 2016, prepared by Ecology (2004). The Addendum is organized in the following sections:

- **Section 1, Introduction**, defines the purposes and organization of the Addendum;
- **Section 2, Background**, provides the project background, a description of the study area, a summary of previous studies, parameters of interest, and regulatory criteria;
- **Section 3, Project Description**, provides a description of the project goals and objectives, required tasks, organization, and schedule;
- **Section 4, Field Procedures**, provides a detailed description of the sampling equipment and protocols that will be used for collection of characterization samples;
- **Section 5, Sample Handling**, provides details on sample documentation, soil and groundwater sampling containers, sample preservation and holding times, collection of quality assurance/quality control (QA/QC) samples, and sample packaging and shipment;
- **Section 6, Field Documentation**, summarizes the procedures and forms that will be used to document the field activities conducted for the pilot study evaluation work;
- **Section 7, Management of Investigation-Derived Waste**, provides details on waste sampling, profiling, handling, and disposal;
- **Section 8, Laboratory Analysis**, identifies the selected analytical laboratory's preparation methods, method requirements, and accreditations;



- **Section 9, Reporting**, describes project reporting, including the frequency and distribution of reports, responsible personnel for preparation of reports, and data reduction and analysis to be included in summary reports; and
- **Section 10, References**, provides citations for documents referenced in this Addendum.



## 2.0 BACKGROUND

This section provides selected background on the NWN AFFF training area, parameters of interest, and regulatory criteria. Background on PFAS chemistry, recent changes in regulatory status, the larger environmental setting for 175 Newport Way Northwest, and PFAS previous characterization work in the Lower Issaquah Valley are provided in the Work Plan, Addendum 1 to the Work Plan (Farallon 2020), and the *Per- and Poly-Fluoroalkyl Substances Additional Characterization Study Summary Report, Lower Issaquah Valley, Issaquah, Washington* dated April 14, 2021, prepared by Farallon (2021b) for EFR (2021 Summary Report).

### 2.1 LOWER ISSAQUAH VALLEY SETTING AND GEOLOGY

175 Newport Way Northwest is in the Lower Issaquah Valley, east of Seattle and south of Lake Sammamish (Figure 1). Valley floor elevations range from approximately 40 to 160 feet North American Vertical Datum of 1988. The Lower Issaquah Valley is roughly bisected by Issaquah Creek, which runs longitudinally along the valley floor and flows to the north into Lake Sammamish.

According to the Western Regional Climate Center (2016), the climate of the greater Seattle area, including Puget Sound and the Lower Issaquah Valley, is maritime and characterized by cool summers and mild winters influenced by ocean air. Based on data published for the Snoqualmie Falls, Washington meteorological station (Identification No. 457773), the average annual minimum temperature for the Lower Issaquah Valley is 32 degrees Fahrenheit, and the average annual maximum temperature is 76 degrees Fahrenheit. The average annual precipitation ranges from 33 to 81 inches, with an average of 5 to 8 inches per month from October through March (U.S. Climate Data 2016).

The geology of the Lower Issaquah Valley comprises a series of interbedded sand-gravel and silt-clay layers overlying the bedrock units that form the adjacent foothills to the east and west of the Lower Issaquah Valley. As described in the 2021 Summary Report, three groundwater-bearing zones pertinent to the investigation of PFAS nature and extent have been identified in the Lower Issaquah Valley:

- Shallow groundwater, encountered at depths up to 60 feet below ground surface (bgs);
- Intermediate groundwater, encountered between depths of 60 and 120 feet bgs, which includes a poorly graded brown sand unit<sup>1</sup>; and
- Deep groundwater, encountered at depths greater than 120 feet bgs.

175 Newport Way Northwest is one of five areas of interest where previous characterization work has been performed. Detailed discussion of the areas of interest is provided in the Work Plan, Addendum 1 to the Work Plan (Farallon 2020), and the 2021 Summary Report.

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<sup>1</sup> City of Issaquah production well COI-PW04 is screened in the poorly graded brown sand unit.





## **2.2 175 NEWPORT WAY NORTHWEST**

175 Newport Way Northwest is on King County Parcel No. 2824069165 at 175 Newport Way Northwest in Issaquah, Washington. This area of interest serves as the location of the current headquarters facility for EFR. A brief review of historical AFFF training and subsurface conditions at the 175 Newport Way Northwest area of interest is provided below. Select analytical results from previous characterization of soil and groundwater at the 175 Newport Way Northwest area of interest are provided on Figures 2 and 3, respectively. A graphical cross section of the 175 Newport Way Northwest area of interest subsurface is provided on Figure 4.

### **2.2.1 Historical AFFF Training**

Historical AFFF training, including producing an effective AFFF mixture at the hose nozzle, and equipment cleaning and servicing were performed primarily at the NWN AFFF training area (Figure 2) during the period from approximately the early 1980s through the late 1990s at a frequency of up to 12 times per year. Active fire station operations and AFFF training at the facility were reduced beginning in 1999, when the facility transitioned fully into serving as EFR's administrative office and maintenance facility. Typically, one to three 5-gallon buckets of AFFF concentrate were expended during each training event. AFFF was applied on the grass median near the fire hydrant on the north-central portion of the NWN AFFF training area, and was likely sprayed at the base of the hillside west of the western property boundary.

### **2.2.2 Geology and Hydrogeology**

A graphical cross-section at 175 Newport Way is provided on Figure 4. Previous boring and existing monitoring well locations are presented on Figure 3. Based on field observations by Farallon, 175 Newport Way is underlain by well- to poorly graded sands and gravels with variable silt content to the maximum depth explored of 40 feet bgs. Discontinuous silt beds ranging from approximately 5 to 10 feet thick were observed in borings and monitoring wells on the western and northern portions of the property. A continuous hard gray silt was observed under the NWN AFFF training area on the western portion of 175 Newport Way Northwest that dips to the east. The silt is encountered at a depth of approximately 15 feet bgs on the western portion of the NWN AFFF training area and at approximately 30 feet bgs on the eastern portion of the NWN AFFF training area. The hard gray silt was interpreted as weathered bedrock based on its location, appearance, and massive bedding. Monitoring well NWN-MW09 was advanced more than 40 feet into the hard gray silt in March 2020; the unit was observed to be primarily dry below a depth of 65 feet bgs and only a single silty sand stringer was observed within the unit from 78 to 80 feet bgs. Field tests of the continuous hard gray silt reported medium plasticity (hand samples could be rolled out).

Shallow groundwater was observed under the NWN AFFF training area at a depth of approximately 10 to 18 feet bgs, near the contact between the surficial silty sand/sand unit and sand and gravel units. In addition to the observation of little to no groundwater in the hard gray silt, the field plasticity test results indicate the hard gray silt unit is likely acting as an aquitard below 175 Newport Way Northwest. Shallow groundwater flows to the east across the NWN AFFF training area and transitions to flowing north in the central and eastern portions of the 175 Newport



Way Northwest area of interest. A downward vertical gradient was observed in shallow groundwater using well pairs NWN-MW03/NWN-MW09 (both screened in shallow groundwater) and NWN-MW02/NWN-MW08 (shallow/intermediate well pair).

## 2.3 SUMMARY OF PREVIOUS STUDIES AND EXISTING DATA

Detailed discussion of PFAS characterization work in Lower Issaquah Valley soil and groundwater is addressed in the Work Plan and previous summary reports (Farallon 2019 and 2021b). Analytical results for soil and groundwater obtained through previous characterization work at 175 Newport Way Northwest indicate that some of the highest reported concentrations of PFAS in soil and shallow groundwater are at the NWN AFFF training area. Preliminary findings under previous scopes of work include:

- Observed concentrations of PFAS in soil, reconnaissance groundwater, and groundwater are highest within the footprint of the NWN AFFF training area (Figure 2).
- While variable, concentrations of PFAS in soil, including perfluorooctane sulfonic acid (PFOS)<sup>2</sup> and perfluorooctanoic acid (PFOA), generally attenuate with depth below the NWN AFFF training area. Reported concentrations of PFAS in soil at a depth of 15 feet bgs in the vadose zone are typically an order of magnitude or more less than those observed in the interval from ground surface to a depth of 5 feet bgs of the vadose zone (Figure 2).
- The hard gray silt basement unit has the characteristics to act as a low-permeability aquiclude. No lower groundwater-bearing unit has been identified below the hard gray silt.
- The hard gray silt unit may also support injected treatments by limiting the vertical spread of treatment solution.
- Observed concentrations of PFOS and PFOA in shallow groundwater suggest additional PFAS-contaminated soil and groundwater are present west of the 175 Newport Way Northwest area of interest. Reported concentrations of PFOS and PFOA in shallow groundwater are the same order of magnitude in monitoring wells NWN-MW04, NWN-MW07, and NWN-MW03 (west to east, respectively) before beginning to decline on the eastern portion of the area of interest (Figure 3).

## 2.4 FEASIBLE REMEDIATION TECHNOLOGIES

As part of the scope of work performed under Interagency Agreement C2000071, Farallon performed a preliminary screening of remediation technologies for PFAS in soil and groundwater. Although the remedial technology screening (and associated cleanup actions) was not subject to a formal Feasibility Study, the technology screening was performed based on preliminary evaluation of the criteria identified in MTCA Section 173-340-360(3) to identify permanent solutions to the maximum extent practicable, including protectiveness, permanence, cost, long-term effectiveness,

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<sup>2</sup> Conventional product chemical names are provided here consistent with the acronyms and terminology used in the Ecology Draft Chemical Action Plan (2020). Ionic forms of the chemicals are most commonly encountered in the environment.



management of short-term risks, technical and administrative implementability, and consideration of public concerns.

Retained technologies for soil were:

- Direct excavation and off-site disposal of higher concentration shallow PFAS-impacted soil;
- Installation of engineering controls, such as physical barriers at the surface to reduce or eliminate infiltration of precipitation through unsaturated soil;
- Solidification of contaminated soil to reduce infiltration of precipitation and PFAS mobility;
- In-situ treatment or amendment with activated carbon additives for unsaturated and saturated soil to reduce or eliminate PFAS mobility in the subsurface; and
- Subsurface barriers or structures to enhance treatment or isolate higher concentration media such as cutoff walls and/or vaults.

Retained technologies for groundwater were:

- Activated carbon treatment using either direct injection technology or direct installation for shallow groundwater to create permeable reaction barriers or retain PFAS in situ at the point of direct-treatment;
- Subsurface barriers or structures to enhance treatment or isolate higher concentration media such as cutoff walls, flume-and-gate structures, and similar treatment systems; and
- Localized low-volume hydraulic control using pump-and-treat systems for high-concentration groundwater to prevent migration, dispersion, and dilution that will contaminate larger down-gradient volumes of water.

Direct excavation and installation of physical barriers are mature remedial technologies and are anticipated ultimately to apply to unsaturated soil at the NWN AFFF training area. However, due to the anticipated hydraulic conductivity of the sands and gravels observed in the saturated portion of the subsurface at the NWN AFFF training area, direct excavation or physical barriers are anticipated to be much less practicable once shallow groundwater is encountered. Additionally, down-gradient impacts to intermediate groundwater are more than 60 feet bgs and are present in low concentrations over a large area that make direct excavation, solidification, and/or physical barriers not practicable. In-situ injected treatment of saturated soil and groundwater is likely the most practicable approach for future PFAS remediation. Therefore, pilot testing of an injected carbon-based treatment solution at the NWN AFFF training area, where concentrations of PFAS are elevated and confirmed in shallow groundwater, was selected to evaluate the technology's cost, effectiveness, and implementability and to further refine future design requirements necessary for future full-scale treatment.



## 2.5 PARAMETERS OF INTEREST

For the work described in the Addendum, parameters of interest for soil and groundwater include the following PFAS:

- Perfluorobutanesulfonic sulfonate (PFBS);
- Perfluorohexanoic acid;
- Perfluorohexane sulfonic acid (PFHxS);
- Perfluoroheptanoic acid;
- Perfluorooctanoic acid (PFOA);
- Perfluorooctane sulfonic acid (PFOS);
- Perfluorononanoic acid (PFNA);
- Perfluorodecanoic acid;
- Perfluoroundecanoic acid;
- Perfluorododecanoic acid;
- Perfluorotridecanoic acid; and
- Perfluorotetradecanoic acid.

## 2.6 REGULATORY CRITERIA

PFAS are not currently regulated as hazardous substances under MTCA. Ecology (2018) previously developed Investigatory Levels that include numerical criteria based on exposure scenarios for groundwater (drinking water scenario), residential and industrial soil contact, and protection of groundwater. The results of the sampling conducted per this Addendum will be compared with the Investigatory Levels for soil and groundwater presented in Tables 1 and 2. Since publication of the 2019 Summary Report (Farallon 2019), the Washington State Department of Health (2019) has released proposed State Action Levels (SALs) for drinking water that are lower than the original Investigatory Levels for groundwater (Table 2). Although SALs are not cleanup criteria, groundwater results will be compared to SALs and Investigatory Levels to evaluate groundwater quality and pilot test performance at reducing concentrations of PFAS in groundwater.



### 3.0 PROJECT DESCRIPTION

This section identifies work elements to be performed in accordance with this Addendum, project goals and objectives, tasks required, and Farallon's project organization and schedule. Data quality objectives for this project are identified in the QAPP provided in Appendix A.

#### 3.1 PROJECT GOALS

The overall project goal for the current phase of work is to identify an activated carbon product that effectively immobilizes PFAS in the NWN AFFF training area subsurface; identify the required dosage rate for the subsurface conditions that are present; and evaluate the effectiveness of a full-scale pilot test using the selected product to reduce PFAS mobility and concentrations in shallow and intermediate groundwater at the injection or direct installation site and down-gradient.

Complete project goals are summarized as follows:

- Perform limited additional characterization of the NWN AFFF training area subsurface through additional soil and groundwater sampling;
- Install additional monitoring wells to evaluate the efficacy of the proposed pilot test injection program and establish baseline groundwater quality conditions;
- Perform a full-scale pilot test in the NWN AFFF training area to treat PFAS-impacted soil and groundwater;
- Evaluate the effectiveness of the selected treatment and pilot test by performing groundwater monitoring following treatment and comparing changes in groundwater quality to baseline conditions, Investigatory Levels, and SALs; and
- Based on the pilot test performance, make appropriate recommendations for additional full-scale remediation of the NWN AFFF training area and other areas of interest as appropriate.

Previous evaluation performed as part of the Source Remediation Plan (Farallon 2021a) identified the following potential remedial technologies for soil at the NWN AFFF training area:

- Direct excavation of soil with high concentrations of PFAS to a depth of approximately 10 feet bgs;
- Capping, solidification, or amendment with activated carbon of unsaturated (vadose zone) soil with elevated concentrations of PFAS; and
- Injection treatment of the saturated sand and gravel interval overlying the hard gray silt.

The Source Remediation Plan (Farallon 2021a) identified the following technologies for shallow groundwater at the NWN AFFF training area:

- Direct injection treatment of shallow groundwater below the NWN AFFF training area;



- Construction of a subsurface vault keyed into the hard gray silt to isolate soil and shallow groundwater with the highest reported concentrations of PFAS; and
- Construction of a passive treatment system with activated carbon such as a funnel-and-gate system keyed into the hard gray silt to enhance treatment of shallow groundwater prior to migration and dispersion out of the NWN AFFF training area and ultimately into intermediate groundwater.

## **3.2 PROJECT SCOPE OF WORK**

The scope of work for the proposed pilot test includes sampling additional PFAS-impacted shallow soil; installation of permanent monitoring wells for groundwater monitoring prior to and following pilot testing; the pilot test design; performing the pilot test; and performance groundwater monitoring.

Field sampling procedures, including soil sampling, monitoring well construction, and groundwater sampling, are addressed under Section 4, Field Procedures. Soil and groundwater samples will be analyzed by Modified U.S. Environmental Protection Agency (EPA) Method 537<sup>3</sup>. Additional sample preparation steps to eliminate matrix interference for soil and groundwater performed as part of the method modification will be consistent with U.S. Department of Defense May 2019 Quality Systems Manual for Environmental Laboratories Version 5.3 requirements (see Section 8, Laboratory Analysis).

### **3.2.1 Additional Characterization of NWN AFFF Training Area**

Additional characterization of the NWN AFFF training area will refine the extent of impacts to soil and confirm that observed impacts to shallow groundwater correspond to known areas with elevated PFAS concentrations in soil at the NWN AFFF training area (i.e., reducing the potential that a previously unidentified source in soil is causing impacts to shallow groundwater).

Additional characterization includes:

- Advancing 10 direct-push borings into the shallow zone (up to 20 feet bgs) or, at select locations, to the hard gray silt (20 to 30 feet bgs) at the NWN AFFF training area and central portion of the 175 Newport Way Northwest area of interest (Figures 2 and 3);
- Completion of six of the borings as new shallow monitoring wells;
- Collection of soil samples during drilling activities at depths of 3, 5, 10, and/or 15 feet bgs or at intervals selected by the field personnel based on field observations during drilling and for analysis by Modified EPA Method 537;

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<sup>3</sup> EPA Method 537.1 is the EPA-approved method for determination of PFAS in drinking water. As of this Addendum's publication, EPA has not issued approved analytical methods for non-drinking water matrixes. The Modified EPA Method 537 developed by this project's selected analytical laboratory for analysis of soil and groundwater will meet project data quality objectives as described in the QAPP and will generate results with practical quantitation limits as low as currently attainable.



- Installing passive flux meters in the groundwater monitoring wells for approximately 1 week; and
- Performing one baseline groundwater monitoring event with the new and existing groundwater monitoring wells.

The characterization sampling summary is included in Table 3.

### **3.2.2 Pilot Test Design**

Farallon will design a pilot test to evaluate the effectiveness of subsurface injection of the selected activated carbon product as a potential remedial approach for PFAS in soil and groundwater at the NWN AFFF training area. Pilot test design will include the following elements that will be documented:

- Identification of the preliminary treatment area based on available soil and groundwater analytical data and groundwater flow direction;
- The number and spacing of injection locations;
- Treatment area geometry;
- The target treatment interval(s) below the ground surface for injection across the NWN AFFF training area;
- Estimated injection volumes, solution strength, and/or total mass to be applied for subsurface treatment; and
- Groundwater performance monitoring locations and schedule.

Post-injection groundwater monitoring is anticipated to include 1-week, 1-month, and 3-month events. A 6-month groundwater sampling event may be performed, budget and schedule permitting (see Section 3.2.5, Performance Monitoring).

### **3.2.3 Pilot Test**

The pilot testing will be performed in accordance with the final pilot test design prepared under this Addendum. If direct injection is selected as the preferred treatment approach, the pilot test may include both a primary and potentially a polishing event. Farallon will observe the pilot test and will document:

- Groundwater conditions immediately prior to beginning pilot test;
- Final pilot test design installation;
- Flow rates, treatment solution concentration, and total volume for injected treatment;
- Any field observations, including surface returns, elevated injection pressure, or other relevant information; and
- Contractor performance, work hours, and equipment use and configuration.



### 3.2.4 Performance Monitoring

Pilot test performance monitoring comprises gauging groundwater elevations and collection of groundwater samples prior to pilot test injections and at planned intervals after completion of injection events. At a minimum performance groundwater monitoring will be performed:

- Immediately prior to the primary pilot test;
- 1 week after the primary pilot test;
- 1 month after the primary pilot test; and
- 3 months after the primary pilot test.

Preliminary proposed performance monitoring locations are identified on Figure 3 and in Table 3; final locations may be adjusted in consultation with the Parties. A 6-month performance monitoring event may be performed schedule and budget permitting. Each performance groundwater sampling event will include gauging all monitoring wells at the 175 Newport Way Northwest area of interest to support groundwater contouring and groundwater sampling at the selected subset of wells to evaluate changes in shallow and intermediate groundwater quality within and down-gradient of the NWN AFFF training area. Groundwater samples will be analyzed for PFAS by Modified EPA Method 537 (Section 8.0, Laboratory Analysis).

### 3.3 TASKS REQUIRED

The scope of work described in this Addendum will be performed under the following tasks in accordance with the IAA.

- **Task 1:** Pilot Test Work Plan;
- **Task 2:** NWN AFFF Training Area Data Collection and Monitoring;
- **Task 3:** Pilot Testing; and
- **Task 4:** Summary Reporting.

### 3.4 ORGANIZATION AND SCHEDULE

Farallon's Project Manager will be Vincent Tilotta, a licensed Engineer in Washington State. Farallon's Principal Reviewer will be Eric Buer, a licensed Geologist and Hydrogeologist in Washington State. Farallon's Project QA/QC Officer will be Jeanette Mullin, a licensed Geologist in Washington State. Additional Farallon staff will perform work on the project under the direction and supervision of the Farallon Project Manager and Principal Reviewer.





### 3.5 PROJECT SCHEDULE

Key project dates and milestones are identified below.

<b><u>Project Schedule Item</u></b>	<b><u>Estimated Start</u></b>	<b><u>Estimated Finish</u></b>
Preparation of Addendum	5/1/2021	5/21/2021
Review of draft Addendum by Parties	5/24/2021	5/28/2021
NWN AFFF training area additional characterization	6/14/2021	6/18/2021
Pilot test injection design	6/21/2021	8/20/2021
Installation of passive flux meters	8/2/2021	8/16/2021
Passive flux meter retrieval and analysis	8/17/2021	8/31/2021
Pilot test injection design review by Parties	9/13/2021	9/27/2021
Baseline groundwater monitoring event	10/11/2021	10/13/2021
Pilot test injection	10/18/2021	10/22/2021
1-week groundwater monitoring event	10/25/2021	10/29/2021
1-month groundwater monitoring event	11/17/2021	11/19/2021
3-month groundwater monitoring event	1/25/2022	1/26/2022
6-month groundwater monitoring event (optional)	4/4/2022	4/5/2022
Preparation of draft Summary Report	2/1/2022	4/29/2022
Draft Summary Report review by Parties	5/2/2022	5/13/2022
Delivery of Final Summary Report	6/24/2022	
IDW management and disposal		As needed
Closure of IAA	6/30/2022	–



## 4.0 FIELD PROCEDURES

This section summarizes the protocols and procedures that will be followed for field data collection performed under this Addendum. Farallon SOPs for fieldwork, including detailed step-by-step protocols, are provided in Appendix C.

Every effort will be made to use sampling equipment free of PFAS. The following materials will not be intentionally allowed to come in contact with sample media:

- Teflon (polytetrafluoroethylene);
- Gore-tex and other waterproof coatings, unless shown to be free of PFAS;
- Waterproof paper, unless shown to be free of PFAS (“Rite in the Rain” paper is acceptable);
- Coated Tyvek (plain Tyvek is acceptable);
- Fluorinated ethylene propylene;
- Ethylene tetrafluoroethylene;
- Polyvinylidene fluoride; and
- Any other fluorinated materials.

Equipment blanks will be periodically collected from low-density polyethylene sampling equipment such as drop tubing to confirm they are PFAS-free (Section 5.4 and Appendix A). Sample containers will be certified by the laboratory as PFAS-free.

### 4.1 INADVERTENT DISCOVERY PLAN

An Inadvertent Discovery Plan (IDP) was previously prepared in accordance with Ecology requirements for all work that disturbs soil (Appendix C). The proposed additional characterization and injection work is within the same footprint of the previous IDP and constitutes a similar level of ground disturbance. In the event cultural resources are discovered, work will stop while the IDP procedures are followed and the IDP-listed contacts are notified.

### 4.2 SOIL SAMPLING

The field sampling procedures, drilling methods, and sample handling protocols for soil samples are discussed below. Field sampling data will be documented on Field Report forms, as described in Section 6, Field Documentation.

Borings at 175 Newport Way Northwest will be installed using a direct-push drill rig. Soil samples will be collected continuously from the vadose zone soil using a 4- or 5-foot-long sampling tool lined with single use disposable high-density polyethylene sleeves. Soil samples will be logged for lithologic description and select intervals will be collected for potential laboratory analysis. Soil samples will be collected at depths of 3, 5, 10, and/or 15 feet bgs or at intervals with fine-grained



lithology as observed in the field. Final selection of the soil samples for laboratory analysis will be made by the Project Manager with input from field personnel and the Principal Reviewer. Boring locations will be marked and measured in the field prior to drilling.

Prior to conducting subsurface investigation activities, Farallon will prepare a site-specific Health and Safety Plan as required by Part 1910 of Title 29 of the Code of Federal Regulations. Public and private utility-locating services will be retained to clear the proposed boring locations and provide additional information pertaining to the locations of subsurface utilities at the area of interest. Locations may be adjusted as necessary based on access and utilities.

Borings will either be completed as monitoring wells or be abandoned in accordance with the requirements of WAC 173-160-460, chip sealed with bentonite to within 2 feet of the ground surface, and completed to grade with in-kind material (i.e., soil, cold patch asphalt, or concrete as appropriate).

### **4.3 GROUNDWATER SAMPLING**

The field sampling procedures and sample handling protocols for groundwater samples are discussed below. Field sampling data will be documented on Field Report forms, as described in Section 6, Field Documentation.

Groundwater samples will be collected from permanent monitoring wells constructed in accordance with WAC 173-160, Minimum Standards for Construction and Maintenance of Wells, and Farallon SOP GW-01. Procedures for monitoring well development, gauging, and low-flow sampling are provided in Farallon SOPs GW-02, GW-03, and GW-04 in Appendix B. Farallon will record observations and field data on Field Report forms as described in Section 6, Field Documentation.

### **4.4 DECONTAMINATION PROCEDURES**

Reusable equipment will be decontaminated in accordance with Farallon SOP EQ-01 (Appendix B). Final equipment rinses will use laboratory-supplied certified PFAS-free water. Powdered Alconox detergent, which does not include PFAS constituents or PFAS in its manufacturing process, will be used for the primary wash in equipment decontamination. Rinsate blanks will be collected from decontaminated equipment as appropriate to verify the efficacy of decontamination procedures.



## **5.0 SAMPLE HANDLING**

This section discusses the sample designation and labeling and sample-handling methods to be used during the PFAS characterization work. The protocols discussed include sample containers, preservation and holding times, sample documentation, collection of QA/QC samples, and sample packaging and shipment.

### **5.1 SAMPLE DOCUMENTATION**

Sample documentation includes sample labels, Field Report forms, and Chain of Custody forms. Sample documentation to be maintained by field personnel are provided in Appendix D.

Each sample container will be marked with a durable adhesive label and labeled with a unique identifier. The sample identifier for each sample will be constructed according to Section 5.2, Sample Designation, and recorded in the Field Report forms and on the sample Chain of Custody form (Attachment D). Sample labels will include the client name, project name and number, date and time sampled, sample identifier, sampler's initials, requested sample analysis, and analyte preservative(s), if any. The Chain of Custody form will include the sample identifier, date and time of sample collection, sampler's initials, number of containers, and requested sample analysis. Entries for all samples will be made on the Chain of Custody form prior to the transfer of the samples off the area of interest.

### **5.2 SAMPLE DESIGNATION**

Sample identification systems for soil and groundwater samples are presented below.

#### **5.2.1 Soil Sample Identifiers**

Soil samples will be assigned a unique sample identifier that will include the sample location (e.g., boring identifier) and the depth of collection in feet bgs. All numerical values less than 10 in the identifier will include a leading "0" (e.g., FB-01, FMW-08). Sample collection dates will be recorded on sample summary forms and the analytical laboratory Chain of Custody form.

For example, a soil sample collected from boring FB-01 at a depth of 8 feet bgs would be assigned the identifier FB-01-08. The sample identifier will be recorded on the sample label, Field Report form, Soil Sample Data Log, and Chain of Custody form.

#### **5.2.2 Groundwater Sample Identifiers**

Groundwater samples will be assigned a unique sample identifier that will include the sample location identifier (e.g., well identifier), the depth interval of the sample pump inlet in feet bgs, and the sample date in a "YYMMDD" format with a "W" flag for clarity. All numerical values less than 10 in the identifier will include a leading "0" (e.g., FB-01, FMW-08). Sample collection dates will be recorded on sample summary forms and the analytical laboratory Chain of Custody form.



For example, the groundwater sample collected from monitoring well FMW-04 at a depth of 25 feet bgs on May 5, 2021 would be labeled FMW-04-210505-W. The sample identifier will be recorded on the sample label, Field Report form, and Chain of Custody form.

### 5.3 SAMPLE CONTAINERS, PRESERVATION PROCEDURES, AND HOLDING TIMES

Sample containers, preservation, and holding times for each medium are described below:

- **Discrete-Interval Soil Samples:** Soil samples will be collected in accordance with the requirements for Modified EPA Method 537. Soil will be placed into a laboratory-supplied, 8-ounce, PFAS-free high-density polyethylene container with a screw-cap lid. Once sealed, the container will be stored in a cooler at approximately 4 degrees Celsius (°C). The samples will be submitted to the laboratory for analysis for PFAS by Modified EPA Method 537 within 48 hours of collection. The typical hold time for this type of preserved sample chilled to 4°C is 14 days.
- **Water Samples:** Water samples, including groundwater samples collected from monitoring wells, will be collected directly into laboratory-supplied, standard 500-milliliter, PFAS-free high-density polyethylene threaded containers with screw-cap lids. Once sealed, the containers will be stored in a cooler at approximately 4°C. The samples will be submitted to the laboratory for analysis for PFAS by Modified EPA Method 537 within 48 hours of collection. The typical hold time for this type of preserved sample chilled to 4°C is 14 days.

### 5.4 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

QA/QC samples will be analyzed to review and validate analytical data as detailed in the QAPP (Appendix A). QA/QC samples will include field duplicate samples, equipment rinsate blanks, and trip blanks. Field duplicate samples will be used to evaluate the accuracy and precision of the field sampling techniques as described in the QAPP (Appendix A).

Field duplicate samples will be collected in the same manner and at the same location as the original sample. Equipment rinsate blanks will be collected by rinsing non-dedicated sampling equipment with laboratory-supplied certified PFAS-free water following decontamination and collecting the rinsate for analysis to evaluate the efficacy of the decontamination procedures.

Laboratory-prepared trip blanks will be included in each sample cooler. Analysis of the trip blanks may be performed to evaluate potential contamination or exposure of samples to PFAS during transit if the reported concentrations of PFAS or field observations suggest this analysis is warranted. Field duplicate samples will be collected at a rate of 1 field duplicate per 10 samples collected. Equipment rinsate samples will be collected as needed to ensure sampling equipment is PFAS-free.



## 5.5 SAMPLE PACKAGING AND SHIPMENT

The 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:

- A sample label will be affixed to the corresponding sample container at the time of sample collection.
- Bubble-wrap bags or an equivalent will be used to protect sample containers.
- Sample containers will be placed 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 personnel.
- 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 a chemical equivalent and included in the cooler. Ice will be double-bagged in heavy-duty bags.
- The cooler will be sealed with a chain-of-custody seal and taped shut using strapping tape.
- The laboratory address will be affixed to the cooler.
- Extraneous stickers will be removed from the cooler.
- The cooler will be examined to ensure that Farallon's return address is affixed.

Upon transfer of the samples to laboratory personnel or arrival of the samples at the laboratory facility, the laboratory will assume responsibility for custody of the samples. Laboratory personnel will document the status of shipping and handling containers and will adhere to standard chain-of-custody procedures to track each sample through all of the stages of laboratory processing.



## **6.0 FIELD DOCUMENTATION**

Documentation of field activities will be provided on Field Report forms, boring logs, Low-Flow Well Purging and Sampling Data forms, Soil Sample Data Logs, sample and waste material labels, Waste Inventory Tracking Sheets, and Chain of Custody forms. Documentation generated during the field program will be retained in the project files and included in the reports generated, as appropriate. Filled forms and records will be maintained in the Farallon project files. Example forms and labels are provided in Appendix D.

### **6.1 FIELD REPORT FORM**

Field personnel will be required to keep a daily field log on a Field Report form. Field notes will be as descriptive and inclusive as possible, enabling independent parties to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate or ambiguous terms and/or opinions.

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 this Addendum. 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.

### **6.2 BORING LOGS**

Boring logs will be prepared by a Farallon Scientist for each boring and/or monitoring well drilled during the PFAS characterization work. The log includes hydrologic conditions, lithologic descriptions using the Unified Soil Classification System, information on the potential presence of contamination, and well construction details as applicable.

### **6.3 LOW-FLOW WELL PURGING AND SAMPLING DATA FORM**

A Low-Flow Well Purging and Sampling Data form will be used to record the depth to groundwater, well purging information, and other pertinent hydrologic measurements and supplementary information collected during reconnaissance groundwater sampling at each boring and groundwater sampling at each monitoring well. The form will be completed by the Farallon field personnel at the time of sample collection.

### **6.4 SOIL SAMPLE DATA LOG**

A Soil Sample Data Log will be used to record information pertaining to soil samples collected. This log includes entries for the sample location, identification, and depth; the time sampled; field-screening results; the types and number of containers collected; and a brief lithologic description.



## **6.5 SAMPLE LABEL**

Sample labels will be filled out and affixed to appropriate sample containers immediately prior to sample collection. The label will be filled out with indelible ink and include the medium, date, time sampled, sample identifier (see Section 5.2, Sample Designation), project name, project number, sampler's initials, and analyte preservative(s) if any.

## **6.6 WASTE MATERIAL LABEL**

A waste material label is filled out and affixed to the appropriate waste container immediately upon filling. The label will be filled out in indelible ink and include the job number and name, address where the waste was generated, container contents, date, consultant's name and phone number, and sampler's initials.

## **6.7 WASTE INVENTORY TRACKING SHEET**

The Waste Inventory Tracking Sheet will be used to document and track the wastes generated during the characterization field work. The form will include information on the waste container, origin of the waste, type of waste, date generated, date removed from the temporary storage location at the 175 Newport Way Northwest property, transporter, and disposal location.

## **6.8 CHAIN OF CUSTODY FORM**

The Chain of Custody form provides 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. The Chain of Custody form should be updated whenever samples are collected, transferred, stored, analyzed, or destroyed. The Chain of Custody form includes the client name, project name and number, date and time sampled, sample identifier, sampler's initials, and requested sample analysis.





## **7.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE**

Soil cuttings, wastewater, and other products generated during characterization work may be impacted with PFAS and will be containerized and stored at 175 Newport Way Northwest pending receipt of analytical results for selection of a disposal method. The specific criteria for tracking the sampling and analysis of the wastes to identify appropriate disposal options for each of the expected waste streams are discussed below. Waste-related documentation will be maintained in Farallon's project files.

### **7.1 SOIL CUTTINGS**

Waste soil will be generated by the following activity:

- Advancing borings.

Soil cuttings will be temporarily stored in 55-gallon drums or similar U.S. Department of Transportation–approved containers pending analytical results and profiling. Drums will be temporarily stored at 175 Newport Way Northwest. The waste soil will be segregated based on the location(s) where the soil was generated. The soil cuttings container used for waste storage will be labeled according to content, date, and origin. Soil cuttings containers and locations will be tracked using a Waste Inventory Tracking Sheet (Appendix D). Soil analytical results will be used to generate waste disposal profiles. Once the profiles are approved for an appropriately licensed permanent disposal facility, the drums will be removed by a qualified contractor.

### **7.2 WASTEWATER**

Wastewater will be generated during monitoring well purging and equipment decontamination. Wastewater will be segregated into 55-gallon drums or similar U.S. Department of Transportation–approved containers for temporary storage at the same location as the waste soil drums. Wastewater containers will be labeled according to the content, date, and origin and/or generating activity. Wastewater containers will be tracked using a Waste Inventory Tracking Sheet (Appendix D). Analytical results will be used to generate a profile for disposal. Once the profiles are approved for an appropriately licensed permanent disposal facility, the drums will be removed by a qualified contractor.

### **7.3 DISPOSABLE EQUIPMENT**

Disposable personal protective clothing (e.g., coveralls, nitrile gloves, boot covers) and sampling devices (e.g., plastic scoops, bailers) will be cleaned, placed into plastic garbage bags, and disposed of as nonhazardous waste.



## **8.0 LABORATORY ANALYSIS**

This section discusses sample preparation and laboratory analysis for the work described in the Addendum. Farallon has selected ALS Environmental-Kelso of Kelso, Washington (ALS) to complete the required laboratory analyses during PFAS characterization work. ALS has the capability to provide laboratory services that will meet Ecology Investigatory Levels and SALs for PFAS using Modified EPA Method 537.

### **8.1 SAMPLE PREPARATION METHODS**

PFAS samples will be prepared in accordance with the analytical laboratory modifications to EPA Method 537, including isotope dilution to improve quantitation of PFAS as specified by ALS's internal procedures.

### **8.2 SPECIAL METHOD REQUIREMENTS**

Special method requirements will be addressed by the analytical laboratory. Farallon's Project Manager will work closely with the analytical laboratory to ensure that the methods used meet project needs and reporting limits.

### **8.3 LABORATORY ACCREDITATION FOR METHODS**

ALS laboratory accreditation for PFAS analysis includes U.S. Department of Defense May 2019 Quality Systems Manual for Environmental Laboratories Version 5.3 requirements and accreditation by Ecology under the requirements described in WAC 173-50, Accreditation of Environmental Laboratories (Appendix E). A copy of the ALS Quality Assurance Manual that will be followed throughout PFAS characterization work will be kept on file at the Farallon office for review and reference (Appendix A).



## **9.0 REPORTING**

Farallon will prepare the following reporting documents as required under the IAA:

- This Addendum (Task 1);
- Boring logs, survey data, and summary data tables for additional characterization (Task 2);
- Preliminary design drawings, monitoring schedule, and field observations (e.g., total mass injected or installed) and performance monitoring data (Task 3); and
- A Summary Report including all additional data, summary tables and figures for the NWN AFFF training area characterization, pilot test, and pilot test performance monitoring, discussion of pilot test performance, and pilot test design documents (Task 4).

### **9.1 FREQUENCY AND DISTRIBUTION OF REPORTS**

The schedule of delivery for analytical summaries and summary reports is addressed in Section 3.5, Project Schedule. Boring logs and updated summary analytical results will be provided to the Parties 30 days after completion of drilling or receipt of laboratory analytical results.

### **9.2 RESPONSIBILITY FOR REPORTS**

Reports will be prepared by Farallon project personnel, overseen by the Project Manager, and reviewed by the Principal Reviewer. QA/QC review and reporting will be performed by the Project QA/QC Officer.

### **9.3 DATA ANALYSIS AND PRESENTATION**

Reporting will include analysis of laboratory analytical data, including data reduction, and production of summary tables and figures. Preparation of summary tables and figures is discussed below.

#### **9.3.1 Summary Tables**

Laboratory analytical data will be stored in a relational database and tabulated into summary data tables. To ensure that data are accurately tabulated, all summary tables will be checked by a second party against original laboratory analytical reports, which will initial and date the reviewed data. Any incorrect transfer of data will be highlighted and corrected.

Analytical laboratory reports will be categorized according to various parameters to summarize the information for easier assimilation and presentation. Soil sampling and analysis data will be categorized several ways, including by sample point number, constituent, and date of sample collection. The parameters chosen for categorizing soil and groundwater data will be determined based on the most-appropriate format and the utility of the format in demonstrating the physical and chemical characteristics of interest.



### **9.3.2 Figures**

Figures will be prepared to illustrate the results of the work described in this Addendum. Figures may include but are not limited to plan maps of the 175 Newport Way Northwest area of interest and detail views of the NWN AFFF training area depicting sampling locations and chemical concentrations for individual and groups of chemicals.

### **9.3.3 Documentation of Assessment**

Reports will include a QA/QC section that summarizes data quality information. The summary will include:

- An assessment of precision, accuracy, representativeness, comparability, completeness, and sensitivity parameters;
- The results of performance and/or system audits; and
- Significant QA problems, if any, and their impact on the data quality objectives.



## 10.0 REFERENCES

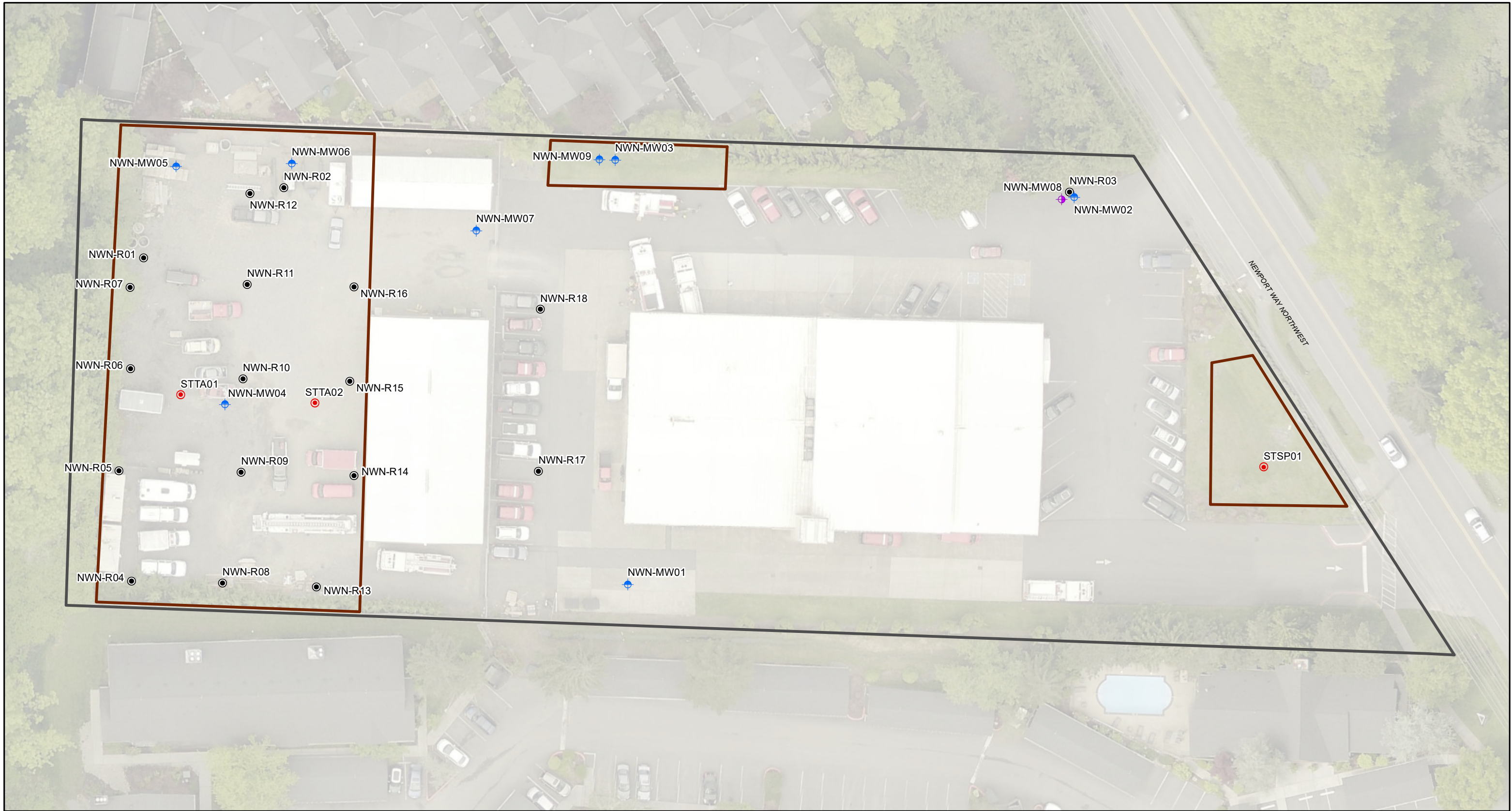
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## **FIGURES**

### **PRE- AND POLY-FLUOROALKYL SUBSTANCES CHARACTERIZATION STUDY WORK PLAN ADDENDUM**

**Lower Issaquah Valley  
Issaquah, Washington**

**Farallon PN: 1754-005**



**LEGEND**

- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- ▭ KING COUNTY PARCEL
- ▭ MULTI-INCREMENTAL SAMPLING DECISION UNIT



NOTES:  
 1. ALL LOCATIONS ARE APPROXIMATE.  
 2. FIGURES WERE PRODUCED IN COLOR.  
 GRAYSACLE COPIES MAY NOT REPRODUCE  
 ALL ORIGINAL INFORMATION.



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

Drawn By: jjones

Checked By: VT

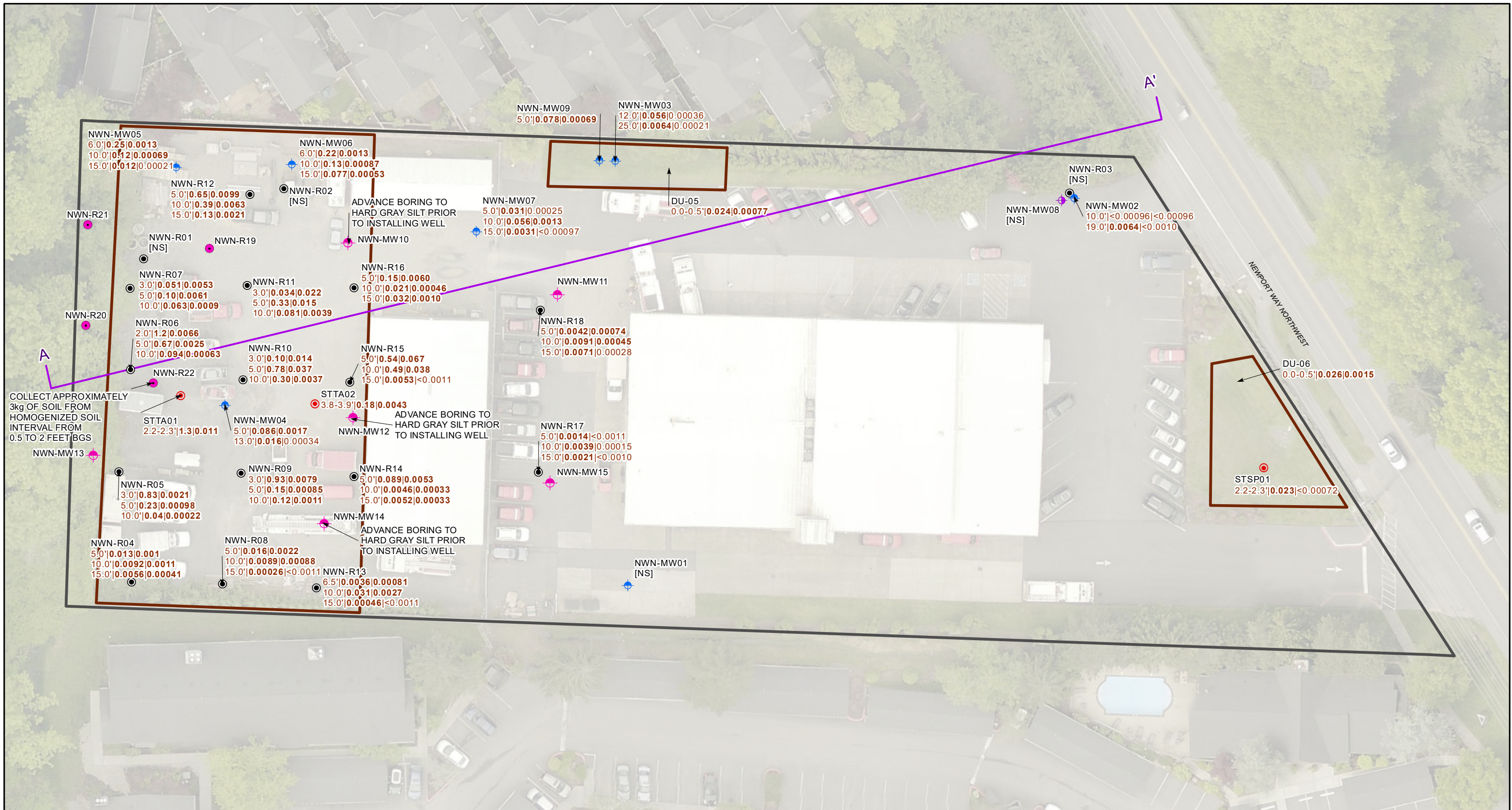
Date: 5/25/2021

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**FIGURE 1**

175 NEWPORT WAY NORTHWEST PLAN  
 PER- AND POLY-FLUOROALKYL SUBSTANCES  
 CHARACTERIZATION STUDY  
 2021 WORK PLAN ADDENDUM  
 LOWER ISSAQUAH VALLEY  
 ISSAQUAH, WASHINGTON  
 FARALLON PN: 1754-005



**LEGEND**

- PROPOSED BORING
- ⊕ PROPOSED SHALLOW MONITORING WELL
- BORING
- GEOSYNTec SAMPLE
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- KING COUNTY PARCEL
- MULTI-INCREMENTAL SAMPLING DECISION UNIT
- A A' LINE OF CROSS-SECTION

**NOTES:**

DEPTH AND CONCENTRATIONS REPORTED AS:  
 SOIL SAMPLE DEPTH IN FEET BGS | PFOS | PFOA  
 ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)  
 DU = DECISION UNIT  
 PFOA = PERFLUOROOCTANOIC ACID  
 PFOS = PERFLUOROOCTANE SULFONIC ACID  
**BOLD** = DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS.  
 < = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED  
 BGS = BELOW GROUND SURFACE  
 NS = NOT SAMPLED



NOTES:  
 1. ALL LOCATIONS ARE APPROXIMATE.  
 2. FIGURES WERE PRODUCED IN COLOR.  
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Washington  
 Issaquah | Bellingham | Seattle  
 Oregon  
 Portland | Baker City  
 California  
 Oakland | Irvine

Drawn By: jjones

Checked By: VT

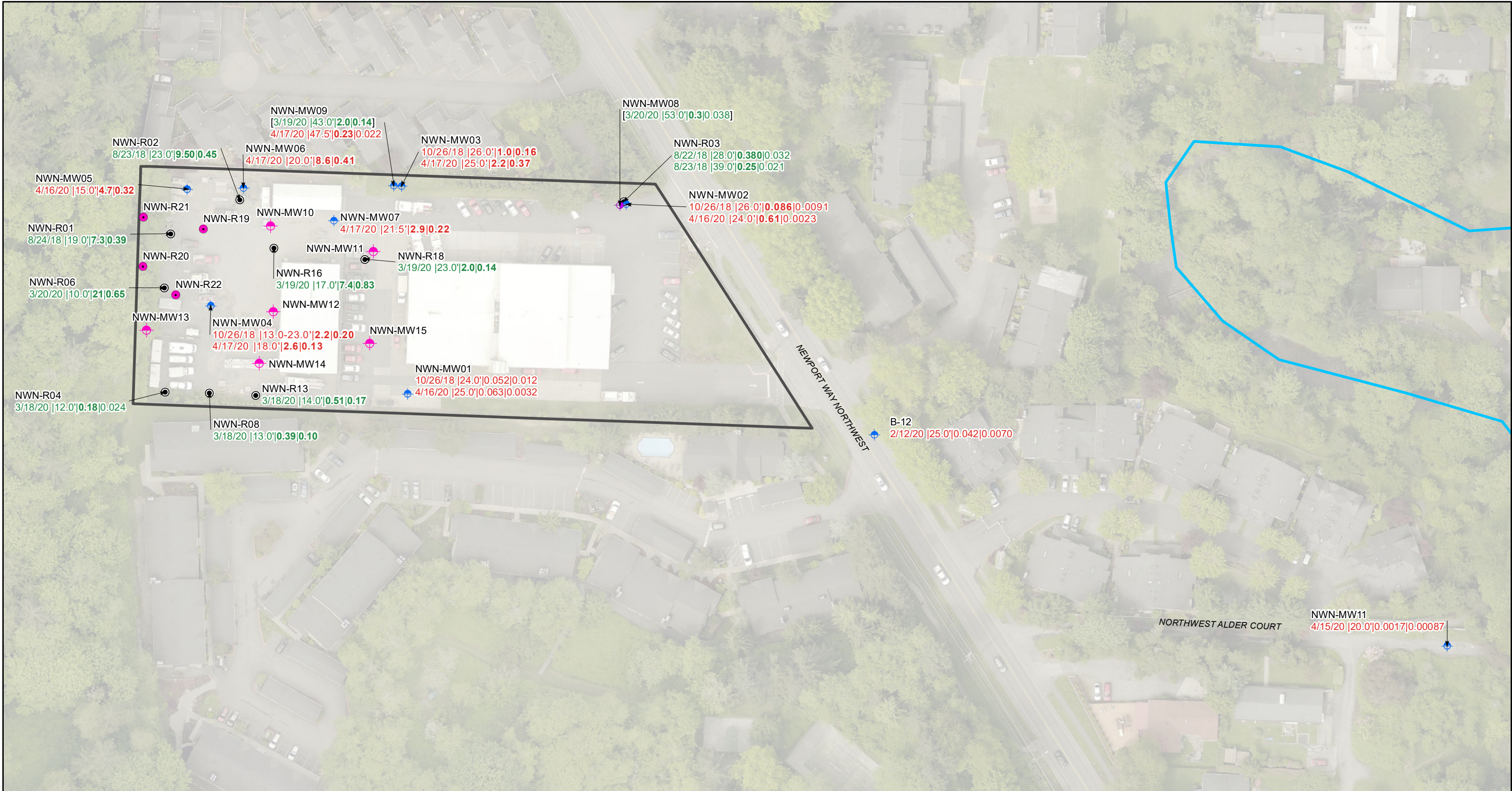
Date: 6/10/2021

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**FIGURE 2**  
 SOIL ANALYTICAL RESULTS AND  
 PROPOSED SAMPLING LOCATIONS  
 PER- AND POLY-FLUOROALKYL SUBSTANCES  
 CHARACTERIZATION STUDY  
 2021 WORK PLAN ADDENDUM  
 LOWER ISSAQUAH VALLEY  
 ISSAQUAH, WASHINGTON  
 FARALLON PN: 1754-005

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- LEGEND**
- PROPOSED BORING
  - ⊕ PROPOSED SHALLOW MONITORING WELL
  - BORING
  - ⊕ SHALLOW MONITORING WELL
  - ⊕ INTERMEDIATE MONITORING WELL
  - ▭ KING COUNTY PARCEL

**NOTES:**  
 SAMPLE RESULTS HIGHLIGHTED IN GREEN REPRESENT RECONNAISSANCE BORING TEMPORARY WELL GROUNDWATER RESULTS  
 SAMPLE RESULTS HIGHLIGHTED IN RED REPRESENT MONITORING WELL GROUNDWATER RESULTS  
 DEPTH AND CONCENTRATIONS REPORTED AS: SAMPLE DATE | GROUNDWATER SAMPLE DEPTH IN FEET BGS | PFOS | PFOA ANALYTICAL RESULTS IN MICROGRAMS PER LITER  
 [ ] = INTERMEDIATE RECONNAISSANCE GROUNDWATER SAMPLE

PFOA = PERFLUOROOCCTANOIC ACID  
 PFOS = PERFLUOROOCCTANE SULFONIC ACID  
**BOLD** = DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS.  
 < = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED  
 BGS = BELOW GROUND SURFACE



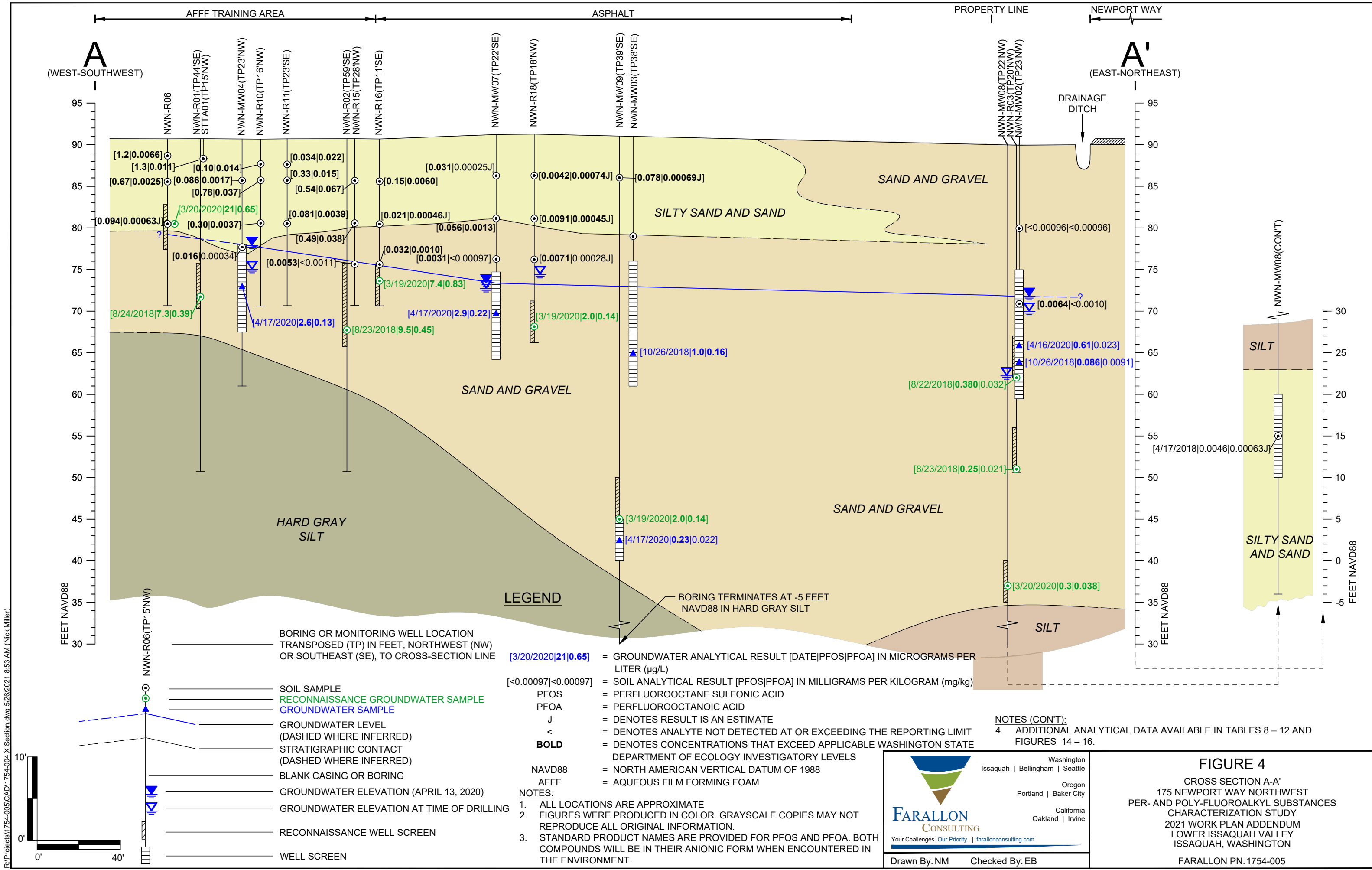
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Washington  
 Issaquah | Bellingham | Seattle

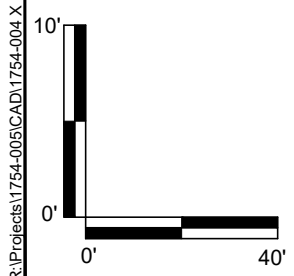
Oregon  
 Portland | Baker City

California  
 Oakland | Irvine

**FIGURE 3**  
 GROUNDWATER ANALYTICAL RESULTS AND PROPOSED SAMPLING LOCATIONS PER- AND POLY-FLUOROALKYL SUBSTANCES CHARACTERIZATION STUDY 2021 WORK PLAN ADDENDUM LOWER ISSAQUAH VALLEY ISSAQUAH, WASHINGTON  
 FARALLON PN: 1754-005



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- LEGEND**
- BORING OR MONITORING WELL LOCATION  
TRANSPosed (TP) IN FEET, NORTHWEST (NW)  
OR SOUTHEAST (SE), TO CROSS-SECTION LINE
  - SOIL SAMPLE
  - RECONNAISSANCE GROUNDWATER SAMPLE
  - GROUNDWATER SAMPLE
  - GROUNDWATER LEVEL  
(DASHED WHERE INFERRED)
  - STRATIGRAPHIC CONTACT  
(DASHED WHERE INFERRED)
  - BLANK CASING OR BORING
  - GROUNDWATER ELEVATION (APRIL 13, 2020)
  - GROUNDWATER ELEVATION AT TIME OF DRILLING
  - RECONNAISSANCE WELL SCREEN
  - WELL SCREEN

- LEGEND**
- [3/20/2020|21|0.65] = GROUNDWATER ANALYTICAL RESULT [DATE|PFOS|PFOA] IN MICROGRAMS PER LITER (µg/L)
  - <0.00097|<0.00097 = SOIL ANALYTICAL RESULT [PFOS|PFOA] IN MILLIGRAMS PER KILOGRAM (mg/kg)
  - PFOS = PERFLUOROOCANE SULFONIC ACID
  - PFOA = PERFLUOROOCANOIC ACID
  - J = DENOTES RESULT IS AN ESTIMATE
  - < = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT
  - BOLD** = DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS
  - NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988
  - AFFF = AQUEOUS FILM FORMING FOAM
- NOTES:**
1. ALL LOCATIONS ARE APPROXIMATE
  2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.
  3. STANDARD PRODUCT NAMES ARE PROVIDED FOR PFOS AND PFOA. BOTH COMPOUNDS WILL BE IN THEIR ANIONIC FORM WHEN ENCOUNTERED IN THE ENVIRONMENT.

- NOTES (CON'T):**
4. ADDITIONAL ANALYTICAL DATA AVAILABLE IN TABLES 8 – 12 AND FIGURES 14 – 16.

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Washington  
Issaquah | Bellingham | Seattle

Oregon  
Portland | Baker City

California  
Oakland | Irvine

Drawn By: NM    Checked By: EB

**FIGURE 4**  
CROSS SECTION A-A'  
175 NEWPORT WAY NORTHWEST  
PER- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY  
2021 WORK PLAN ADDENDUM  
LOWER ISSAQUAH VALLEY  
ISSAQUAH, WASHINGTON  
FARALLON PN: 1754-005

## **TABLES**

### **PRE- AND POLY-FLUOROALKYL SUBSTANCES CHARACTERIZATION STUDY WORK PLAN ADDENDUM**

**Lower Issaquah Valley  
Issaquah, Washington**

**Farallon PN: 1754-005**

**Table 1**  
**Soil Reporting Limits and Investigatory Levels**  
**PFAS Characterization Study Work Plan Addendum**  
**Issaquah, Washington**  
**Farallon PN: 1754-005**

Analyte	Typical Reporting Limit (mg/kg) <sup>1</sup>	Ecology Investigatory Levels for Soil (mg/kg) <sup>2</sup>			
		Human Contact – Unrestricted	Human Contact – Industrial	Leaching From Unsaturated Zone	Leaching From Saturated Zone
PFBS	0.00073 - 0.001	--	--	--	--
PFHxS	0.00026 - 0.001	--	--	--	--
PFOS	0.00096 - 0.001	1.6	70	0.0008	0.000046
PFOA	0.00036 - 0.001	--	--	0.00044	0.000028
PFNA	0.00054 - 0.0010	--	--	--	--

**NOTES:**

-- denotes no value currently available.

<sup>1</sup>Representative range of reporting limits from Lower Issaquah Valley PFAS Characterization Study investigation results (2018).

<sup>2</sup>Developed in 2018 by Ecology using standard Model Toxics Control Act exposure scenario values and toxicity data published by the U.S. Environmental Protection Agency.

Ecology = Washington State Department of Ecology

mg/kg = milligrams per kilogram

PFBS = perfluorobutanesulfonic acid

PFHxS = perfluorohexane sulfonic acid

PFNA = perfluorononanoic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonic acid

**Table 2**  
**Groundwater Reporting Limits and Standards**  
**PFAS Characterization Study Work Plan Addendum**  
**Issaquah, Washington**  
**Farallon PN: 1754-005**

Analyte	Typical Reporting Limit <sup>1</sup> (µg/l)	Ecology Drinking Water Investigatory Level (2018) <sup>2</sup> (µg/l)	ATSDR Minimum Risk Level (2018) <sup>3</sup> (µg/l)	Proposed State Action Level (2020) <sup>4</sup> (µg/l)
PFBS	0.0041 - 0.0083	--	--	1.3
PFHxS	0.0041 - 0.0083	--	0.517	0.070
PFOA <sup>5</sup>	0.0016 - 0.0033	0.070	0.078	0.010
PFOS <sup>5</sup>	0.0041 - 0.0083		0.052	0.015
PFNA	0.0041 - 0.0083	--	0.078	0.014

**NOTES:**

Applicable standard for groundwater.

-- denotes no value currently available.

<sup>1</sup>Representative range of reporting limits from Lower Issaquah Valley PFAS Characterization Study investigation results (2018).

<sup>2</sup>Developed in 2018 by Ecology using standard Model Toxics Control Act exposure scenario values and toxicity data published by the U.S. Environmental Protection Agency.

<sup>3</sup>Agency for Toxic Substances and Disease Registry calculated value for an 80 kilogram adult consuming approximately 3 liters of water per day that is likely to cause a health effect.

<sup>4</sup>Proposed values recommended by the Washington State Department of Health and Board of Health for public water supplies under Chapter 246-290 of the Washington Administrative Code. State Action Levels, if enacted, would trigger required notification to users and monitoring for water supplies with exceedances.

<sup>5</sup>Drinking water investigatory levels apply both to PFOS and PFOA individually, and the sum of both chemicals.

ATSDR = Agency for Toxic Substances and Disease Registry

DOH = Washington State Department of Health

Ecology = Washington State Department of Ecology

µg/l = micrograms per liter

PFBS = perfluorobutanesulfonic acid

PFHxS = perfluorohexane sulfonic acid

PFNA = perfluorononanoic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonic acid

**Table 3  
Characterization and Performance Monitoring Sample Summary  
PFAS Characterization Study Work Plan Addendum  
Issaquah, Washington  
Farallon PN: 1754-004**

Associated Area of Interest	Sampling Location	Location Type	Sample Count and Type		
			Subsurface Vadose Zone Soil	Performance Groundwater Sample <sup>1</sup>	Quality Control Sample Location <sup>2</sup>
175 Newport Way Northwest	NWN-MW01	Shallow Well	--	2	--
	NWN-MW02	Shallow Well	--	2	--
	NWN-MW03	Shallow Well	--	2	--
	NWN-MW04	Shallow Well	--	2	2
	NWN-MW05	Shallow Well	--	2	--
	NWN-MW06	Shallow Well	--	2	--
	NWN-MW07	Shallow Well	--	2	--
	NWN-MW08	Intermediate Well	--	2	--
	NWN-MW09	Intermediate Well	--	2	--
	NWN-MW10	Shallow Well	3	4	2
	NWN-MW11	Shallow Well	3	4	--
	NWN-MW12	Shallow Well	3	4	--
	NWN-MW13	Shallow Well	3	4	--
	NWN-MW14	Shallow Well	3	4	--
	NWN-MW15	Shallow Well	3	4	--
	NWN-R19	Shallow Boring	3	--	1
	NWN-R20	Shallow Boring	3	--	--
	NWN-R21	Shallow Boring	3	--	--
NWN-R22	Shallow Boring	3	--	--	
<b>Total Samples Collected</b>			<b>30</b>	<b>42</b>	<b>5</b>

NOTES:

Cells shaded in green indicate locations proposed as part of 2021 characterization work.

\* Location to be confirmed based on review of draft boring log results from prior locations.

-- denotes no samples of this type are proposed for the identified location.

<sup>1</sup>Draft counts only, final locations to be confirmed as part of planned Executive Committee meetings.

<sup>2</sup>Quality control locations will be assigned a unique station identifier to submit samples blind to the laboratory.

**APPENDIX A**  
**QUALITY ASSURANCE PROJECT PLAN**

**PRE- AND POLY-FLUOROALKYL SUBSTANCES**  
**CHARACTERIZATION STUDY WORK PLAN ADDENDUM**

Lower Issaquah Valley  
Issaquah, Washington

Farallon PN: 1754-004

## **QUALITY ASSURANCE PROJECT PLAN**

### **APPENDIX A OF PER- AND POLY-FLUOROALKYL SUBSTANCES CHARACTERIZATION STUDY WORK PLAN 2021ADDENDUM LOWER ISSAQUAH VALLEY ISSAQUAH, WASHINGTON**

**Submitted by:  
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975 5<sup>th</sup> Avenue Northwest  
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**Farallon PN: 1754-005**

**For:  
Eastside Fire & Rescue  
175 Newport Way Northwest  
Issaquah, Washington 98027**

June 23, 2021

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## 1.0 INTRODUCTION

### 1.1 PROBLEM STATEMENT

This Quality Assurance Project Plan (QAPP) has been prepared by Farallon Consulting, L.L.C. (Farallon) on behalf of Eastside Fire & Rescue to present the quality assurance (QA) and quality control (QC) criteria and procedures that will be applied to work described in the *Per- and Poly-Fluoroalkyl Substances Characterization Study Work Plan Addendum, Lower Issaquah Valley, Issaquah, Washington* dated April 2, 2020, prepared by Farallon (2020) (Work Plan). This QAPP was prepared in accordance with *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* revised December 2016, prepared by the Washington Department of Ecology (Ecology) (2004) (Ecology Guidance).

QA/QC criteria and procedures described in this QAPP will ensure that data collected under the Work Plan are of sufficient quality to be scientifically defensible based on the current state of knowledge regarding per- and poly-fluoroalkyl substances (PFAS) and, to the extent possible, are appropriate for potential future use performing a cleanup action under the supervision of Ecology. Extensive research is underway on technical issues surrounding PFAS. It is possible that recommended sample collection protocols and analytical methods will change over time.

### 1.2 QAPP ORGANIZATION

The QAPP is organized into the following sections:

- **Section 1, Introduction**, defines the purpose of the QAPP, the problem statement, and organization of the QAPP;
- **Section 2, Data Quality Objectives**, provides data quality objectives (DQOs) for the project and measurement criteria for those objectives;
- **Section 3, Quality Control Procedures**, provides a description of field and laboratory QC procedures, data QC procedures, and corrective actions when QC criteria are not met;
- **Section 4, Management Procedures**, provides details regarding data recording and reporting procedures and practices, handling of laboratory data packages, transfer of files, and data management for upload to the Environmental Information Management System maintained by Ecology;
- **Section 5, Audits and Reports**, describes audit procedures and processes, responsible personnel, and the frequency and distribution of reports;
- **Section 6, Data Verification**, provides details regarding data verification, including field and laboratory verification;
- **Section 7, Data Quality Assessment**, summarizes data quality assessment procedures and reporting, including evaluating project objectives, treatment of non-detects, data reduction and presentation, and documentation of QA/QC assessment results; and
- **Section 8, References**, provides references cited in this QAPP.



## **2.0 DATA QUALITY OBJECTIVES**

The DQOs for PFAS characterization work will be used to develop and implement procedures to ensure that project data are of sufficient quality to be scientifically defensible based on the current state of knowledge regarding PFAS. Observations and measurements will be made and recorded in a manner that will yield results representative of the media of interest.

The quality of the field sampling methods and laboratory data will be assessed using the parameters of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). QC procedures for PARCCS are described in the following sections. Quantitative DQOs for applicable parameters (i.e., precision, accuracy, and completeness) are provided following their definition. Laboratory DQOs have been established by the analytical laboratories and are specified in the individual analytical laboratory Quality Assurance Manuals. The applicable analytical laboratory Quality Assurance Manual for the PFAS characterization work will be kept on file at the Farallon corporate office in Issaquah, Washington.

### **2.1 DATA QUALITY OBJECTIVES**

DQOs for this project include the following:

- Collect up to 30 subsurface vadose zone soil samples from 4 borings and 6 monitoring wells to further evaluate PFAS nature and extent proximate to the 175 Newport Way Northwest former aqueous film forming foam training area (NWN AFFF training area);
- Collect up to 42 groundwater samples from wells at the 175 Newport Way Northwest area of interest to evaluate groundwater flow direction and quality, facilitate pilot test design, and monitor pilot test performance;
- Achieve a practical quantitation limit (PQL) sufficient for direct comparison against investigatory levels (Ecology 2018) identified in the Work Plan (Investigatory Levels) for all sample analyses; and
- Implement QA/QC protocols described in this QAPP so that data collected are scientifically defensible and, to the extent possible, appropriate for future use performing a cleanup action under the supervision of Ecology.

### **2.2 MEASUREMENT OF QUALITY OBJECTIVES**

Measurement quality objectives are described below using standard PARCCS criteria as specified in Ecology Guidance.

#### **2.2.1 Precision**

Precision measures the variability between results of replicate measurements under a given set of conditions due to random error. Precision is calculated from the results of duplicate sample



analysis and matrix spike/matrix spike duplicate (MS/MSD) sample analyses, and is quantitatively expressed as the relative percent difference (RPD). Precision is calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Where:

RPD = relative percent difference

C<sub>1</sub> = the larger of the two duplicate results (i.e., the higher detected concentration)

C<sub>2</sub> = the smaller of the two duplicate results (i.e., the lower detected concentration)

Quantitative RPD criteria for laboratory duplicate results were developed by Ecology for the *Quality Assurance Project Plan: Statewide Survey of Per- and Poly-Fluoroalkyl Substances in Washington State Rivers and Lakes* dated April 2016 (Ecology 2016) (Ecology PFAS Survey). RPD values for laboratory duplicate samples and field replicate samples should be less than 40 percent for results detected at 5 times the laboratory PQL.

### 2.2.2 Accuracy

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of analytical results is assessed by “spiking” samples in the laboratory with known standards (i.e., surrogates or MSs of known concentration) and determining the percent recovery (%R). Accuracy is measured as the %R and is calculated as follows:

$$\%R = \frac{(M_{sa} - M_{ua})}{C_{sa}} \times 100$$

Where:

%R = percent recovery

M<sub>sa</sub> = measured concentration in spiked aliquot

M<sub>ua</sub> = measured concentration in unspiked aliquot

C<sub>sa</sub> = actual concentration of spike added

Target control limits for accuracy will be set by the selected analytical laboratory.

The accuracy of sample results can be affected by sample contamination (which can occur because of improperly cleaned sampling equipment), exposure of the samples to chemical concentrations in the field or during transport to the laboratory, or the presence of chemical concentrations in the laboratory. To confirm that the samples collected are not contaminated, blank samples will be collected and analyzed. The laboratory will run method blanks at a minimum frequency of one per sample digestion group to assess sample contamination in the laboratory.

Trip blanks will be used to check for procedural contamination, cross-contamination, and contamination during shipment and storage of solid and aqueous samples. One trip blank will be



submitted to the laboratory for each cooler containing soil samples for analysis for PFAS. A trip blank filled with analyte-free deionized water will be included when a cooler contains reconnaissance groundwater, groundwater, or soil samples collected for analysis. After their preparation, the sample containers are not to be opened until they have been returned to the laboratory.

One field equipment rinsate blank will be used to evaluate whether the decontamination procedures were adequate to prevent cross-contamination between samples or introduction of PFAS into samples from the materials in the sampling equipment. One rinsate blank will be collected for each type of sampling equipment that comes in contact with sample material (e.g., hand-coring device, drill bit, hollow-stem-auger flight, peristaltic pump tubing, protective gloves).

### **2.2.3 Representativeness**

Representativeness is a qualitative measure of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the medium sampled. Sampling plan design, collection techniques, sample handling protocols, analytical methods, and data review procedures have been developed in the Work Plan and this QAPP to ensure that the results obtained are representative of conditions in the Lower Issaquah Valley study area.

Representative data will be obtained through adherence to the Work Plan. Goals for representativeness will be met by ensuring that sampling locations and procedures are properly selected and performed and that a sufficient number of samples are collected at the areas of interest to confirm whether there has been a release of PFAS to the environment at concentrations exceeding Investigatory Levels.

### **2.2.4 Comparability**

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard U.S. Environmental Protection Agency (EPA) and Ecology methods and procedures for both sample collection and laboratory analysis will ensure the data collected are comparable against other data collected using the same methods and procedures. EPA Method 537 is approved for drinking water. No EPA-approved method is available for soil or groundwater; the most appropriate method available at this time is EPA Method 537, modified by qualified analytical laboratories to extract and analyze soil and groundwater matrices. Additional sample preparation steps to eliminate matrix interference for soil and groundwater performed as part of the method modification will be consistent with U.S. Department of Defense (DOD) (2017) guidance.

### **2.2.5 Completeness**

Completeness is defined as the percentage of measurements judged to be valid. Results are considered valid if they are not rejected during data validation (see Section 3.3, Data Quality Control). Completeness is calculated as presented below.



The site-specific target completeness goal for the PFAS characterization work will be 95 percent for a given analysis.

$$\text{Completeness} = \frac{(\text{Number of Valid Measurements})}{(\text{Total Number of Measurements})} \times 100$$

### **2.2.6 Sensitivity**

Sensitivity has been defined as the PQL for Modified EPA Method 537 for soil and groundwater analyses. Analytical reporting limits are lower than Ecology Investigatory Levels for groundwater and for soil in the vadose zone, but not for soil in the saturated zone (Work Plan Table 1). Thus, the analytical method is sufficiently sensitive for groundwater and vadose soil.



## 3.0 QUALITY CONTROL PROCEDURES

QC refers to the system of maintaining standards through testing against established standards or specifications. This section addresses QC procedures that will be applied to the PFAS characterization project sample collection and analysis work, including procedures for field and laboratory QC and analytical data QC.

### 3.1 FIELD QUALITY CONTROL

Field QC samples (e.g., duplicate samples, equipment rinsate blanks) to be collected during this project are described in Section 5.4, Field Quality Assurance/Quality Control Samples, of the Work Plan. The purpose of the field QC samples is discussed in Section 2, Data Quality Objectives, of this QAPP.

### 3.2 LABORATORY QUALITY CONTROL

Analytical laboratory QA/QC procedures are described in the laboratory Quality Assurance Manual, which will be kept on file at the Farallon corporate office in Issaquah, Washington.

Each lot of laboratory supplies will be verified as PFAS-free prior to use. Samples will not be filtered prior to analysis because PFAS can adsorb to the filters. When analyzing groundwater samples, the entire sample will be prepared and the sample container will be rinsed with the rinse water included in the analysis. The laboratory will use sample extraction and preparation methods consistent with DOD (2017) guidance to alleviate matrix interferences.

### 3.3 DATA QUALITY CONTROL

Data will undergo two levels of QA/QC evaluation: one by the laboratory and one by Farallon. Initial data reduction, evaluation, and reporting will be performed by the laboratory, as specified in the laboratory Quality Assurance Manual. The analytical data will then be validated by Farallon under the supervision of the Project QA/QC Officer. The following types of QC information will be reviewed, as appropriate:

- Method deviations;
- Sample extraction and hold times;
- Method reporting limits;
- Blank samples (e.g., equipment rinsate, trip, and laboratory method);
- Field duplicate samples;
- RPD (for precision);
- MS/MSD samples (for accuracy);
- Surrogate recoveries; and
- Percent completeness.





Farallon will review field records and the results of field observations and measurements to ensure that procedures were properly performed and documented. Field procedures will be reviewed for the following elements:

- Completeness and legibility of field logs;
- Preparation and frequency of field QC samples;
- Field equipment calibration and maintenance; and
- Chain of Custody forms.

### **3.4 CORRECTIVE ACTION**

Corrective action will be the joint responsibility of the Project Manager and the Project QA/QC Officer. Corrective procedures may include:

- Identifying the source of deviation from the quality standards set forth in the Work Plan and its supporting documents;
- Re-analyzing soil and/or groundwater samples if hold-time criteria permit;
- Re-sampling and analyzing soil and/or groundwater if necessary to meet the quality standards set forth in this QAPP;
- Evaluating and amending sampling, analytical, and/or data transfer procedures; and/or
- Qualifying data to indicate the level of uncertainty.

During field operations and sampling procedures, field team members will be responsible for identifying and correcting equipment malfunctions and documenting sampling procedures in a manner that will enable the Project Manager or the Project QA/QC Officer to evaluate whether corrective action is warranted.

Equipment malfunctions, variances in sampling protocols, and corrective actions taken by field team members will be documented in the field notes. The Project Manager or the Project QA/QC Officer will evaluate the field notes upon submittal to determine whether the corrective action taken was adequate to meet project quality standards or whether additional corrective action is required.



## **4.0 MANAGEMENT PROCEDURES**

Procedures for filing, storing, and retrieving project files are described below.

### **4.1 DATA RECORDING AND REPORTING REQUIREMENTS**

The following sections address the receipt and recording of incoming data and reports, and records for transmittal of outgoing data and reports.

#### **4.1.1 Document Filing and Storage**

Project files and raw data files will be maintained at the Farallon corporate office in Issaquah, Washington. Files will be organized by project number and document type, and maintained by the Document Control Clerk and the Project Manager. Electronic copies of final documents, emails, boring logs, laboratory data, drafted project content, correspondence, and other project documentation will be maintained in Farallon's project files. Draft documents and data will be removed from Farallon project files once final versions have been completed and distributed.

#### **4.1.2 Meeting, Telephone, and Field Notes**

Notes from project meetings and telephone conversations will be maintained in the project files by the Project Manager. Field notes will be scanned on a daily basis, retained in PDF file format, and maintained in Farallon project files.

#### **4.1.3 Receipt of Data and Reports**

Incoming documents will be date-stamped and filed in accordance with established procedures. Correspondence and transmittal letters for reports, maps, and data will be filed chronologically. Data packages such as those from field personnel, laboratories, and surveyors (e.g., soil analytical data, survey data, geologic observations) will be filed by project task, subject heading, and date. If distribution of a document is required, the required number of copies will be made and distributed to the appropriate persons or agencies. The original document will not be distributed to project personnel and will be retained in the Farallon project files.

#### **4.1.4 Outgoing Data and Reports**

A transmittal sheet will be attached to outgoing project data and reports. A copy of each transmittal sheet will be kept in the Farallon project files. Outgoing reports and maps will be reviewed by the Project Manager and the Project QA/QC Officer prior to being sent. Reports, data, and other documentation sent via email also will be tracked. Copies of emails will be maintained in the Farallon project files.

#### **4.1.5 Access to Project Files**

Access to Farallon project files will be controlled by and limited to authorized agents of Eastside Fire & Rescue, the City of Issaquah, Ecology, and Farallon. Authorized agents may direct Farallon to provide project-related information to others as appropriate and agreed to by other authorized



agents. Access to Farallon project files is restricted to Farallon personnel. Documents in Farallon project files cannot be altered or deleted by anyone but the Document Control Clerk.

## **4.2 LABORATORY DATA PACKAGE REQUIREMENTS**

Laboratory data packages will consist of a laboratory report and electronic data deliverable. Laboratory reports will include the following elements:

- Case narrative;
- Analytical notes;
- QC narrative;
- Sample inventory report;
- Analytical results; and
- Data qualifiers and abbreviations.

The electronic data deliverable will include at a minimum:

- Sample identification information;
- Sample media;
- Sampling, laboratory receiving, extraction, and analysis dates;
- Analyte and Chemical Abstracts Service Reference No.;
- Reported concentrations and reporting units;
- Analytical method detection limits;
- Machine reporting limits and reporting units; and
- QA/QC results, including identification of MS/MSD and surrogate samples.

## **4.3 ELECTRONIC TRANSFER REQUIREMENTS**

The final repository for sample analytical information will be an EQUIS environmental data management system database (EQUIS database). The electronic data deliverables received from the laboratories will be directly transferred into the EQUIS database, reducing the likelihood of data entry errors. The Project QA/QC Officer will manage and maintain the EQUIS database.

Emails associated with the project will be placed in Farallon project files. These mailings typically include routine correspondence, laboratory data, and transmissions of reports or other project documentation. Emails that include draft versions of any project document will be deleted once the document has been issued in final format. Electronic communications and documents provided to public entities will be retained in accordance with each entity's document retention policy.



#### **4.4 ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM DATA UPLOAD PROCEDURES**

Farallon will maintain laboratory and field data in a format appropriate for future transfer into the Ecology Environmental Information Management System. At the request of Ecology, Farallon will directly transfer the analytical data provided by the laboratory into the Environmental Information Management System, thus eliminating the likelihood of data entry errors inherent with manual data entry.

Field measurements and other data requiring manual entry will be reviewed by Farallon personnel other than the data entry staff prior to submission to the Environmental Information Management System. Ecology's confirmation of receipt of the data will be maintained in Farallon project files.



## **5.0 AUDITS AND REPORTS**

### **5.1 FIELD, LABORATORY, AND OTHER AUDITS**

Performance audits will be conducted for both sampling and analysis work. Field performance will be monitored through regular review of field notebooks, field measurements, and Chain of Custody forms. Periodic on-site review of work in progress will be performed by the Farallon Project Manager and/or the Project QA/QC Officer. Project staff and organization are provided in Section 3.3, Project Organization and Schedule, of the Work Plan.

DOD accreditation for each of the analyses conducted by a laboratory demonstrates the laboratory's ability to properly perform requested methods. Therefore, a system audit of the analytical laboratory will not be conducted during the course of this project.

The Project Manager and/or the Project QA/QC Officer will oversee communication with the analytical laboratory on an ongoing basis during sample processing and analysis. This oversight will allow Farallon to assess progress toward achieving the DQOs and take corrective measures if problems are encountered. Corrective measures will be the joint responsibility of the Project Manager and the Project QA/QC Officer.

The analytical laboratory will be responsible for identifying any deviation from the performance standards described in the laboratory Quality Assurance Plan, and for taking appropriate corrective action. The laboratory will communicate to the Project Manager or the Project QA/QC Officer any deviation from the performance standards during sample analysis, and the corrective action taken. Corrective actions are discussed in Section 3.4, Corrective Action.

### **5.2 RESPONSIBLE PERSONNEL**

Farallon staff responsible for field and reporting audits include the Project Manager, Principal Reviewer, and Project QA/QC Officer. Audits and reporting for analytical laboratories will be addressed by each laboratory's Project Manager or Project QA/QC Officer.

### **5.3 REPORTS**

Farallon will prepare final written deliverables as specified in the Interagency Agreement dated March 29, executed between Ecology (2021) and Eastside Fire & Rescue (IAA), including the Work Plan (Task 1), boring logs and summary analytical data (Task 2), pilot test design documents (Task 3), and a summary report (Task 4). The summary report will include appropriate background, a description and the rationale of the work performed, evaluation of pilot test performance, a summary of data QA/QC, summary figures and tables, and attachments, including analytical laboratory reports, boring logs, and other records as appropriate.

Monthly status memoranda, the summary reports, and the Interim Remedial Action Plan will be prepared by qualified personnel, overseen by the Project Manager, reviewed by the Principal



Reviewer, and provided to the Parties as specified under the IAA. QA/QC review and reporting will be performed by the Project QA/QC Officer. The QA/QC summary will include:

- A description of any changes or deviations from the sampling plan or QAPP;
- An assessment of PARCCS parameters;
- The results of performance and/or system audits; and
- Significant QA problems, if any, and their impact on the DQOs.



## **6.0 DATA VERIFICATION**

### **6.1 FIELD DATA VERIFICATION, REQUIREMENTS AND RESPONSIBILITIES**

Field data verification will be conducted by the Project Manager. Field data verification will consist of the tasks identified in Section 3.3, Data Quality Control, and Section 3.4, Corrective Action.

Field measurements and data requiring manual tabulation from field records will be reviewed by Farallon personnel other than the data entry staff and approved by the Project Manager. Any discrepancies will be corrected prior to use.

### **6.2 LABORATORY DATA VERIFICATION**

Data verification involves examining the data for errors, omissions, and compliance with QC acceptance criteria. Each analytical laboratory will follow its on-file procedures for data reduction, review, and reporting, which meet the needs of the project.

Laboratory staff will provide as part of the laboratory data package a narrative that will include a discussion of whether PARCCS criteria were met and proper analytical methods and protocols were followed. The narrative will include a discussion of QA/QC, including whether control limits were met and data were consistent, correct, and complete, without errors or omissions. The Principal Reviewer is responsible for the final acceptance of the project data.

Electronic data deliverables will be provided by the laboratories and directly transferred into Farallon's EQuIS database, reducing the likelihood of data entry errors. Reportable data entered into the EQuIS database will be quality checked against the laboratory reports as the official laboratory record. Any discrepancies identified in the data during the QA/QC check against the laboratory reports will be corrected in the EQuIS database prior to reporting and use. The Principal Reviewer is responsible for the final acceptance of the project data.

### **6.3 DATA VALIDATION**

Independent data validation will not be required for this project. The data are being used for general characterization of the PFAS source(s) and distribution, and not to assess cleanup performance or confirmation.



## **7.0 DATA QUALITY ASSESSMENT**

This section outlines data types that will be generated by implementation of the Work Plan and the procedures to be followed for the inventory, control, storage, and retrieval of data collected during performance of the PFAS characterization work. The procedures described in the Work Plan are designed to ensure that the integrity of the collected data is maintained for subsequent use. In addition, project-tracking data (e.g., schedules, progress reports) will be maintained to monitor, manage, and document the progress of PFAS characterization work.

Farallon will maintain project files in accordance with Washington State Model Toxics Control Act Cleanup Regulation requirements and the procedures outlined in this QAPP. Data generated during field activities and laboratory analyses will be submitted directly to Farallon. Laboratory documentation from the analytical laboratories will be maintained in Farallon project files to validate analytical data collected during the cleanup action.

### **7.1 PROJECT OBJECTIVES EVALUATION**

The Project Manager will assess the quality of data and verify that the DQOs presented in Section 2.1 were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will be evaluated in terms of major impacts observed from data validation, data quality indicators (including an evaluation with respect to the PARCCS parameters specified in this QAPP), and performance criteria. Based on the results of these assessments, the usability of the data will be determined. Any limitations on the usability of the data will be described (e.g., whether data need to be qualified, whether data can be used in the technical analysis). The Principal Reviewer will determine whether the combined analyses for an objective are sufficient to meet project goals and whether any data gaps were identified.

### **7.2 SAMPLE DESIGN EVALUATION**

The sampling program described in the Work Plan has been developed to address project goals, including:

- Further characterize the NWN AFFF training area to support pilot test design and to establish pre-pilot test baseline conditions;
- Identify an appropriate treatment product and dosage for pilot testing;
- Design and perform a treatment pilot test; and
- Evaluate pilot test performance for reducing concentrations of PFAS in shallow and intermediate groundwater at the NWN AFFF training area and down-gradient locations.

The following types of data are to be collected as described in Section 2.1, Data Quality Objectives:

- Analytical results for PFAS in up to 55 subsurface vadose zone soil samples;
- Analytical results for PFAS in up to 26 reconnaissance groundwater samples;
- Analytical results for PFAS in 18 monitoring well installation groundwater samples;





- Analytical results for PFAS in 104 groundwater samples collected from monitoring wells;
- Groundwater geochemical parameters (e.g., pH, specific conductivity) measured during monitoring well purging and sampling;
- Lithology information collected during advancement of borings;
- Synoptic measurements of groundwater levels in monitoring wells in the monitoring well network; and
- Synoptic measurement of surface water elevations at gauging stations along Issaquah Creek in the Lower Issaquah Valley.

Evaluation of the analytical results will include data trending, comparison of data with historical and previously collected data, and comparison against Ecology Investigatory Levels. Data results will also be evaluated spatially and vertically to determine whether project goals were achieved. The data will be used to enhance the conceptual site model for the Lower Issaquah Valley.

Successful completion of the tasks and work elements outlined in the Work Plan will meet project goals.

### **7.3 TREATMENT OF NON-DETECTS**

Non-detects will be reported at the PQL for a given analyte when reported in tables and as data on figures. Non-detects will be treated as zero values when used in preparing graphs (such as trend plots) and potentially for preparing isoconcentration contour maps. Analytical method detection limits will be included in laboratory electronic data deliverables and transferred into Farallon's EQUIS database for future upload to the Ecology Environmental Information Management System.



## 8.0 REFERENCES

- Farallon Consulting, L.L.C. (Farallon). 2020. Draft *Per- and Poly-Fluoroalkyl Substances Characterization Study Work Plan Addendum, Lower Issaquah Valley, Issaquah, Washington*. Prepared for Eastside Fire & Rescue. March 6.
- U.S. Department of Defense (DOD). 2017. *Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories*. Version 5.1. Environmental Data Quality Workgroup.
- Washington State Department of Ecology (Ecology). 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030. Revised December 2016. July.
- . 2016. *Quality Assurance Project Plan: Statewide Survey of Per- and Poly-Fluoroalkyl Substances in Washington State Rivers and Lakes*. Publication No. 16-03-110. April.
- . 2018. Investigatory Levels for Perfluoroalkyl Substances. February 9.
- . 2019. *IAA No. C2000071, Interagency Agreement (IAA) Between the State of Washington, Department of Ecology and Eastside Fire and Rescue*. December 3.

**APPENDIX B**  
**FARALLON FIELD WORK STANDARD OPERATING PROCEDURES**

PRE- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY WORK PLAN ADDENDUM  
Lower Issaquah Valley  
Issaquah, Washington

Farallon PN: 1754-004

## **STANDARD OPERATING PROCEDURE EQ-01**

### **EQUIPMENT DECONTAMINATION PROCEDURES**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for decontaminating sampling equipment during various field activities. The step-by-step guidelines provided in this SOP are to be followed by the field crew during all site visits, as applicable.

#### **EQUIPMENT AND SUPPLIES/REAGENTS**

The following equipment is necessary to properly decontaminate field equipment during various field tasks:

- Rinse water or distilled water.
- Deionized water.
- Liquinox or other phosphate-free detergent.
- Paper towels.
- Labeled squirt bottles.
- Long-handled hard-bristle brushes (for sediment and soil).
- Cotton swabs.
- Plastic sheeting, garbage bags, and aluminum foil (for sediment and soil).
- Core liner caps or plastic wrap and rubber bands (for sediment and soil).
- Extension arm for cleaning core liners (for sediment and soil).
- Plastic 5-gallon bucket.
- U.S. Department of Transportation-approved drum(s) for decontamination water unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (see Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

Dilute Liquinox with distilled water in a squirt bottle in accordance with the instructions on the Liquinox package, and label the bottle. Fill another squirt bottle with distilled water, and label the bottle.



## **FIELD EQUIPMENT TO BE DECONTAMINATED AFTER USE**

Decontaminate the following field equipment at the conclusion of field work each day, in accordance with the procedures outlined in this SOP:

- Water-level meter.
- Horiba/YSI multiparameter probe.
- Bladder pump.
- Submersible pump.
- Sediment and soil collection and processing equipment.

## **WATER-LEVEL METER DECONTAMINATION**

Decontaminate the water-level meter after measuring the water level at a monitoring well before moving to a new monitoring well, using the following procedures:

- Spray the bottom half of a paper towel with the diluted Liquinox solution, and the upper half with deionized water.
- Grip the measuring tape of the water-level meter with the paper towel in one hand with the Liquinox side down toward the monitoring well casing.
- Begin slowly reeling up the water-level meter while maintaining firm contact between the measuring tape and the paper towel.
- Ensure that no debris or contamination remains on the measuring tape of the water-level meter once it has been reeled up.
- Use a clean new paper towel for each successive decontamination of the measuring tape of the water-level meter.

## **HORIBA/YSI MULTIPARAMETER PROBE DECONTAMINATION**

Decontaminate the Horiba/YSI multiparameter probe at the end of each workday or after sampling a monitoring well with high concentrations of contamination, using the following procedures:

- Remove the multiparameter probe from the flow-through cell, and thoroughly spray each component with deionized water.
- Use a cotton swab to gently clean around each sensor probe, ensuring that all contaminated water and material has been washed away.
- Refill the protective dissolved oxygen and pH probe caps with deionized water, and replace prior to storage.
- Once the multiparameter probe has been adequately cleaned, replace the protective shield, and return the probe to the case. If the device appears to be overly wet, allow it to air-dry with the case open.



- Do not use Liquinox to clean any probes on the Horiba multiparameter probe, as it may damage the device.

### **BLADDER PUMP DECONTAMINATION**

Decontaminate the bladder pump after sampling a well and at the end of each workday, using the following procedures:

- After extracting the bladder pump from the well, break down the pump, remove and dispose of the used bladder, and spray each component with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.
- Ensure that all contamination and Liquinox solution is washed off all components before reassembling the device, installing a new bladder, and moving to sample a new well.

### **SUBMERSIBLE PUMP DECONTAMINATION**

Decontaminate the submersible pump after purging water from any well, using the following procedures:

- After extracting the submersible pump from the well, thoroughly spray down the pump with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Purge clean water through the pump and tubing to ensure that contaminated water has been cleared from all lines.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

### **SEDIMENT AND SOIL SAMPLING AND PROCESSING EQUIPMENT DECONTAMINATION**

Decontaminate sampling equipment used to collect and process sediment and soil samples, using the following procedures:

- Place contaminated equipment and decontamination tools on plastic sheeting.
- Thoroughly rinse all used equipment with distilled water in a 5-gallon bucket to remove excess sediment or soil.
- Pour one capful of Liquinox solution into a 5-gallon bucket filled with tap water or distilled water.
- Using a long-handled hard-bristle brush, thoroughly scrub the equipment with the Liquinox solution until no sediment or soil particles remain.



- Holding the equipment over a 5-gallon bucket, double-rinse the equipment with distilled water until no Liquinox solution remains. Do not allow clean equipment to come into contact with a contaminated surface.
- Drain the equipment and place it in a clean, dry place to prevent recontamination.
- If decontaminated equipment will not be re-used immediately, wrap stainless steel equipment (e.g., bowls, spoons) in aluminum foil with the dull side facing the equipment. Seal polycarbonate core liners with core caps or cellophane plastic. Rubber-band ends to ensure a proper seal.
- After decontamination has been completed, place disposable items into a garbage bag, and store decontamination water in a drum in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

## **STANDARD OPERATING PROCEDURE GN-01**

### **FIELD NOTE PROCEDURES**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the information needed to document site and sampling activities during field work. The step-by-step guidelines provided in this SOP are to be followed by the field personnel during field work.

#### **GENERAL FIELD NOTE INSTRUCTIONS**

- Use a blue or black pen.
- Always document time in military time.
- Record your full name and the names of other Farallon employees present. Initials of personnel can be used after the full names have been provided in the field notes.
- Don't leave line spaces between field note entries.
- Keep handwriting neat.
- Be concise.

#### **ITEMS TO INCLUDE IN FIELD NOTES**

##### **At Start of Workday:**

- Document when and where you started the field day and when you arrived at the site.
- Note any stops along the way to the site.

##### **Upon Arrival at Site:**

- Note the reason for the site visit/site work.
- Document the weather on page 1, and throughout the day if the weather changes.
- Document the time personnel arrive at the site and the name of the company/agency they are affiliated with.
- Document the time subcontractors arrive, the tasks they are conducting, and the time they leave the Site.
- Conduct the Health and Safety (H&S) meeting, ensure all participants sign the H&S form, and include the signed H&S form in the field notes.
- Calibrate equipment: document equipment model number/serial number, calibration method, and results. Be specific (e.g., "Calibrated Horiba for pH using 4.0 standard." "Calibrated PID using 100 ppm isobutylene span gas and ambient air as zero gas."). Note whether the instrument is Farallon's or a rental. If using a rental, include in the field notes the calibration sheet that should have come with the equipment. If using two sets of





equipment, note on the field forms which equipment was used for each location. For example, label “Horiba 1” and “Horiba 2” on the groundwater sampling sheets, and document the serial numbers of the instruments in the field notes. Make sure to document the calibration results for Farallon equipment in the Rite-in-the-Rain notebook kept in each field equipment case.

- Document when work starts at a specific task location (e.g., well or boring), and document what equipment Farallon or the subcontractors are using at that location.
- Measure out and record the sample locations (using a rolling wheel, or GPS if available), and mark utilities on a field map if applicable.
- If media samples will be collected, complete the appropriate documentation form, or record the information in the field notes. For example, record field sampling methods (e.g., grab, composite), the type of media (e.g., soil, groundwater, stormwater), the time the sample was collected, sample location and ID, analytical method(s), the laboratory conducting the analysis, the size of the sample container, the number of containers used, and the preservative included in the sample container. If a composite sample is collected, record how many composite points make up the sample, and document where the composite samples were collected.
- If multiple samples are collected using the same methods and the same type of sample containers, simply document that a sample was collected the same as previous samples.
- Document when work is complete at each location.
- If conducting groundwater monitoring, note the condition of monitoring well monuments (e.g., bolts missing, gasket needed).
- Throughout the workday, note any relevant information (e.g., QC-sampling discrepancies, unexpected conditions, abnormal sampling events).

#### **At End of Workday:**

- Decontaminate equipment and note the decontamination method (e.g., Alconox and towels).
- Review the field notes, and complete sketches of any relevant features and sample locations if necessary.
- Record whether wastes were generated. If so, record how much was generated, whether the waste was sampled, and where the waste is stored.
- Place an “Analysis Pending” label on drums of waste, and fill out the label completely.
- Complete a drum inventory sheet and note the drum/container sizes and how much waste was accumulated.
- Document when you left the site;



- Document when you returned to the office or when the field day ended.
- Note any additional work performed after returning to the office (e.g., finished field notes, downloaded field photos).

**Make sure to include any of the following forms relevant for the type of field work conducted:**

- Daily Field Notes
- Health and Safety Meeting form
- Water Level Summary form
- Low Flow Well Purging and Sampling Data form
- Boring and/or test pit logs
- Monitoring Well Construction Data form
- Soil Sample Data form
- SVE Monitoring form
- Any site-specific operation and maintenance or pilot test forms
- Elevation Survey Data form
- Utility Clearance Log
- Waste Inventory Tracking Sheet
- Copy of the laboratory Chain of Custody form for any samples collected
- Copies of subcontractor daily log sheets (e.g., utility locate, drilling)
- Copies of rental equipment calibration sheets
- Near Miss form (if applicable)
- Incident Report form (if applicable)

**Assemble all field forms used each day, scan, save to the electronic project Field Notes folder, and give the hard copy of the forms to the Project Manager.**

Refer to the [Farallon Field Documentation Checklist](#) and the [Doc Reqs by Field Task list](#).

## **STANDARD OPERATING PROCEDURE GN-02**

### **UTILITY LOCATE**

#### **PURPOSE**

The purpose of this standard operating procedure (SOP) is to provide Farallon Consulting, L.L.C. (Farallon) personnel with the specific information needed to identify and locate utilities on sites where drilling or excavation activities will occur. Excavation is defined by Section 20 of Chapter 19.122 of the Revised Code of Washington (RCW 19.122.020) as “any operation, including the installation of signs, in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means.” For the purposes of this SOP, the excavation area refers to the area of an excavation or a perimeter around all proposed borings, test pits, soil gas sampling locations, and subslab soil gas sampling locations. Identifying utilities within the boundaries of a proposed excavation area prior to any digging is required by law and is necessary for the safety of Farallon personnel and contractors.

The guidelines provided in this SOP are to be followed by Farallon personnel who coordinate utility locating, mark locate boundaries, and/or observe field work that involves any type of excavation.

#### **EQUIPMENT AND SUPPLIES**

The following equipment and supplies are necessary to arrange and conduct utility locating:

- A map of the site with the proposed excavation area(s);
- Readable side sewer card figures, if applicable;
- Geographic information system (GIS) utility figures, if applicable;
- Readable American Land Title Association (ALTA) survey figures, if applicable;
- Any previous utility figures associated with the site;
- White marking products (e.g., paint, flags, stakes, grease marking pen, tape, chalk);
- Materials necessary to provide required documentation (e.g., Field Report form, camera, measuring wheel, global positioning system); and
- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan, or Level D PPE at a minimum.



## PROCEDURES

The following utility locating procedures have been developed for use before excavation occurs on a site. The procedures are divided into the following five parts:

- Call Before You Dig System;
- Private Utility Locating Services;
- Hand-Clearing Proposed Excavation Areas;
- Maintaining Public Utility Locate Marks; and
- Utility Line Damage.

The Project Manager should discuss the scope of work, details of the project location, and any essential information with the project field team before any of the procedures described below commence. When practicable, an on-site kickoff meeting involving a member of the field team and the Project Manager should be conducted to discuss the work to be performed, mark the boundaries of the excavation area, and mark potential boring locations, if applicable.

### Call Before You Dig System

According to RCW 19.122.030, excavators are required to mark the boundary of a proposed excavation area using white marking products. Marking products include paint, flags, and stakes. Boundary marks should conform to the following guidelines:

- A continuous line, hashed line, dots, or corner marks with arrows are acceptable ways to mark the boundary; and
- Flags and stakes can be used if paint is not adequate.

The location(s) of the proposed excavation area(s) must be reviewed to verify that no visible utilities that would interfere with the proposed excavation area(s) are present. If utilities are present, the Project Manager and field personnel should communicate the changes to the excavation that are area necessary before the boundaries are marked with white paint.

After marking the boundaries of the proposed excavation area, Farallon personnel must provide notice of the scheduled excavation to the owner/operators of buried utilities at least 2 but no more than 10 business days in advance by calling 811 or 1-800-424-5555, or using the online tool at [www.callbeforeyoudig.org](http://www.callbeforeyoudig.org). Use of the online tool is preferred.

A map with the excavation area boundaries depicted and/or photos of the white paint marks is helpful in conveying the scope of work to the Call Before You Dig service.

The following information should be available to provide the Call Before You Dig service at the time of initial contact:

- Scope of work, including the start date and time;



- Contact information for the Project Manager and a field person able to answer questions from public utility locators regarding project details; and
- Site address, township/range/section quarter, and name of property owner.

Once the Call Before You Dig system has been notified of the upcoming work, the system provides a ticket number, which

- Should be referenced whenever the Call Before You Dig service is contacted about the job.
- Provides proof that the Call Before You Dig system was notified prior to excavation. Public utility locators, inspectors, and law enforcement personnel may ask for the ticket number.
- Should be supplied to any subcontractors doing work on the site for reference when contacting the system for their own ticket number.

Call Before You Dig personnel will provide a list of public utilities present on the site, and will notify public utility operators of the planned work.

Public utility operators have 2 full business days after the day notification was received to locate and mark their lines, or to provide reasonable information on lines that they are not able to locate. The day notice is given is not included as 1 of these 2 days. Therefore, if excavation work is planned to start on a Monday, for example, the Call Before You Dig system must be notified by Wednesday the week before.

Two full business days must elapse between Call Before You Dig notification and the start of excavation. No excavation is to take place until all known utilities are marked or otherwise accounted for with information provided by the facility operator.

Locators mark their lines with colored hash marks. The American Public Works Association determines the colors to be used to denote different kinds of lines:

Red: Power Lines and Cable	Yellow: Gas, Oil, Petroleum
Orange: Telephone and Cable	Blue: Drinking Water
Green: Sewer (Storm and Sanitary)	Purple: Non-Potable Water
Pink: Survey Marks	White: Excavator Marks

Public utility operators are required to mark their lines only to the meter. Utility lines located beyond the meter are the responsibility of the property owner. Public utility operators should indicate by marking if no public utilities are present.



Public utility locators are required to mark their lines with reasonable accuracy. According to RCW 19.122.020, “reasonable accuracy means location within twenty-four inches of the outside dimensions of both sides of an underground facility.”

At this time, public utility companies are not required to mark abandoned or deactivated lines in Washington.

An individual not following the protocols established by the Call Before You Dig system can be held liable for up to three times the cost to repair a utility line damaged during excavation.

Records of ticket numbers and communications with the Call Before You Dig service should be stored in the project folder and supplied to on-site project personnel.

Before any excavation work is started, Farallon personnel should verify that all public utility marks are present on the site. The public utility company/ies listed on the Call Before You Dig system ticket should be contacted if marks for that utility/ies are not present.

### **Private Utility Locating Services**

After the public utility companies have marked their lines and before excavation begins, it is standard practice to have a private utility locating service clear areas that will be excavated.

Private locates generally are scheduled for the day before or the morning of the start of excavation.

Areas where excavation will occur must be cleared for conductible utilities by a private locator. Depending on the nature of the site and the proximity of utility lines, the private locator may also mark non-conductible utilities.

If possible, the excavation contractor should be on the site during the private utility locating to verify with the private locator that all proposed excavation areas are accessible.

When working with private utility locators, Farallon personnel should:

- Study existing figures of the site, noting the locations of known utilities.
- Use available side sewer cards or geographic information system utility figures to verify utility locations at the site.
- Verify that all public utilities have been marked by physically verifying that colored paint marks are present for all of the public utility companies listed on the One Call Before You Dig ticket. If any public utilities have not been marked, the utility company must be contacted and requested to mark the area, or to provide confirmation that the area is clear of their utility.
- Discuss the scope of work/excavation areas with the private locator.
- Document the name of the locating company and the name of the locator.



- Observe the locator clear the excavation area(s).
- Document the locate marks with photos, and note any uncertainties in the Field Report form.
- Identify the locations of shut-off valves for utilities such as water and natural gas.
- Contact the Project Manager or Principal to discuss relocating the excavation area if a proposed excavation area is in conflict with a utility identified by the private locator.
- Sign the locator's paperwork, if necessary, and depart the site if no additional field work is to be performed that day.

Private location of conductible utilities should sweep the excavation area in two perpendicular directions.

Private location of non-conductible utilities (typically storm and sanitary sewer) can use either a probe or a camera for accessible lines. Appropriately colored paint marks are applied by the private locator based on a signal sent from the probe or camera. For inaccessible lines, a ground-penetrating radar or magnetometer can be used to approximate the line locations. Marks based on this method should be considered approximate.

### **Hand-Clearing Excavation Areas**

Prior to conducting certain excavation activities, excavators will clear the proposed excavation area to verify that no utilities are present. This can be accomplished through use of an air knife/vacuum truck, post-hole digging, hand-augering, or use of other hand tools that allow the excavation location be explored sufficiently to verify that no utilities are present. Farallon Project Managers will confirm the method of clearing and depths with the field team before the excavation work is performed. Farallon Project Managers also need to discuss shallow soil sampling needs with the field team if clearing activities are being performed. Clearing activities should be conducted according to the following guidelines:

- **Hollow-Stem Auger Drilling:** Hand-clear to a minimum depth of 5 feet below ground surface (bgs) using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- **Sonic Drilling:** Hand-clear to a minimum depth of 5 feet bgs using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- **Geoprobe Drilling:** Clearing activity requirements are dependent on known utilities and results of the public and private utility location procedures completed above. Hand-clear using a post-hole digger or hand-auger to a maximum depth of 5 feet bgs is necessary. An air knife/vacuum truck may be used to hand clear each boring location to a maximum depth of 5 feet bgs, if available.



- **Test Pit Excavation:** No hand-clearing is necessary. Excavation contractors should be directed to dig cautiously in the upper 5 feet bgs in the event an unknown utility is present. A test pit excavation or regular excavation using machinery (e.g., track hoe, backhoe) should include using a spotter to watch for unidentified utility lines. Ideally, the spotter should be provided by the excavation contractor.
- **Rotary Hammer for Soil Gas Sampling:** No hand-clearing is necessary.
- **Rotary Hammer for Subslab Soil Gas Sampling:** No-hand clearing is necessary.

Some drilling contractors require that a utility line be exposed prior to drilling if the proposed drilling location is within a certain distance of the utility line. Farallon personnel should confirm drilling contractor requirements prior to conducting drilling activities.

If a utility line is encountered during clearing, excavators should verify that the utility has not been damaged, and Farallon personnel should document the encounter on the Field Report form with photos and details. RCW 19.122.020 states that “damage” includes the substantial weakening of structural or lateral support of an underground facility, penetration, impairment, or destruction of any underground protective coating, housing, or other protective device, or the severance, partial or complete, of any underground facility to the extent that the project owner of the affected facility operator determines that repairs are required. The Project Manager or Principal should be notified immediately if a utility line is encountered during hand-clearing, and an alternate location will be proposed. A hand-cleared area having an exposed utility line should be backfilled with a bentonite seal and finished to match existing grade.

### **Maintaining Public Utility Locate Marks**

According to RCW 19.122.030, “public utility locate marks expire 45 days from the date the excavator provides notice,” and “it is the responsibility of the excavator to maintain the public utility marks for 45 days, or for the length of the project–whichever is shortest. In any case, the public utility locate marks expire after 45 days.”

Locate marks can be maintained digitally through both photos and figures drawn to scale.

Locate marks can be maintained in the field using white paint. White paint can be applied between original hash marks, on either side of the hash marks, or on both ends. Offset paint or staking can be used if placed a uniform distance from the original marks with a clear indication of the direction and distance from the original marks. The original marks should not be painted over, and white paint should never be applied over colored paint. White marks should include a letter identifying the type of buried line.

### **Utility Line Damage**

A utility line does not need to be ruptured or severed to be considered damaged. Scratching or denting a utility line or its protective tape also is considered damage, as the integrity of the line may have damaged even if the damage does not appear to be significant. Before excavation work





begins, shut-off valve locations for applicable utilities should be documented. If a utility is believed to be damaged, the utility should be shut down if practicable and safe to do so. According to RCW 19.122.053, “all facility operators and excavators who observe or cause damage to an underground facility must report the damage event to the Washington State Utilities and Transportation Commission.”

If a utility line is hit and public safety is a concern, 911 should be the first call made after the immediate area has been evacuated. If a utility line is hit and the public is not at risk, the field team should notify the Project Manager, who will notify the Principal and the corporate Health and Safety Coordinator immediately. The Project Manager should then contact the utility that owns the damaged line, and report to the field team any instructions issued by the utility owner, and an expected timeframe for arrival of a utility owner representative at the site. Repairs to a utility line will not be attempted by Farallon personnel or contractors.

Damage must be reported through the Common Ground Alliance Damage Information Reporting Tool website, hosted by the Washington State Utilities and Transportation Commission: <http://www.utc.wa.gov/publicSafety/pipelineSafety/Pages/Damagereportingrequirements.aspx>

Access to damaged utility lines should be maintained to allow inspection by the utility company. An exposed utility should not be backfilled or patched until instruction to do so has been provided by the Project Manager or Principal.

## **DOCUMENTATION**

Farallon personnel should document in the Field Report form the work performed and methods used by private utility locators, and photos from multiple angles with good reference points for each utility line in the excavation area(s).

## **REFERENCES**

Washington Utilities Coordinating Council. 2014. *Guide to Safe Digging, Washington State Law and Industry Best Practices.*

## **STANDARD OPERATING PROCEDURE GW-01**

### **MONITORING WELL CONSTRUCTION**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for monitoring well construction and installation. Monitoring well construction ultimately is at the discretion of the Project Manager, and is based on the geology at the site and the use of the monitoring well.

Groundwater monitoring wells in the Puget Sound region, for example, typically are constructed using 2-inch-diameter Schedule 40 polyvinyl chloride well casing with 0.010-inch slotted screens because of the finer-grained materials prevalent in the region. Slot and sand sizes may be increased at the discretion of the Project Manager, depending on local geology. Monitoring wells must be installed and decommissioned by a licensed well driller, and constructed in general accordance with Chapter 173-360, Minimum Standards for Construction and Maintenance of Wells, of the Washington Administrative Code in Washington; with Rule 0410 of Division 240 of Chapter 690, Well Construction Standards – General, of the Oregon Administrative Rules in Oregon; with Bulletins 74-81 and 74-90, California Well Standards, from the California Department of Water Resources in California; and with the federal and/or state standards established for well construction specified in the project-specific field sampling plan in other states.

#### **EQUIPMENT AND SUPPLIES/REAGENTS**

The following equipment is necessary for the construction and installation of monitoring wells:

- Monitoring well construction equipment (e.g., water-level meter, photoionization detector, tape measure, camera, plastic sheeting), as applicable.
- Monitoring well construction materials (e.g., well casing [screened and blank], filter pack sand, bentonite and/or Volclay Grout annular seal material, concrete, locking casing cap, well-head monument [flush-mounted or stove-pipe monument, as appropriate] complete with locking top, bollards for placement around well-head monument as applicable), provided by the driller.
- Materials necessary to provide required documentation, including Boring Log, Monitoring Well Construction Data form, and Field Report form.
- Personal protective equipment as described in the site-specific Health and Safety Plan.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater and excess soil cuttings. Separate drums are needed for liquid and solid wastes (refer to Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.



## **DECONTAMINATION**

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate equipment that will come into contact with potentially contaminated soil and groundwater, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

## **PROCEDURES**

Follow the instructions below for monitoring well construction and installation:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Before installing the casing, discuss the geology and groundwater conditions at the site with the Project Manager to confirm the depth the monitoring well screen should be placed at, and the length of screen to be used.
- Measure the depth to the bottom of the borehole to calculate the appropriate placement and length of the screened interval, filter pack, annular seal, and concrete surface seal. Calculate the approximate volumes of the filter pack and the seal material required for the specific monitoring well bore annulus and monitoring well casing diameter. Ensure that the filter pack extends from the bottom of the monitoring well intake to approximately 2 to 5 feet above the top of the monitoring well intake, and is approximately 2 to 4 inches thick. The monitoring well casing should be centered in the borehole. Ensure that the annular seal is a minimum of 2 feet thick above the top of the filter pack, and that the concrete seal is a minimum of 2 feet in depth from the surface.
- Prior to installation, measure and check the lengths of the monitoring well screen and the blank casing, and confirm the slot size and the sand filter pack size, the type of bentonite seal and/or Volclay Grout seal, and the monitoring well-head monument. For boreholes completed to depths deeper than the planned installation depth of the monitoring well casing, backfill the borehole with bentonite, sand, or pea gravel. Record the type and brand of the monitoring well construction materials used on a Monitoring Well Construction Data form.
- Record on a Field Report form the start and completion times for the various stages of monitoring well construction such as installation of the monitoring well casing into the borehole, filter pack and seal emplacement, and well-head monument placement.
- Record on a Monitoring Well Construction Data form the volumes of filter pack, the bentonite seal, and the concrete used to construct the monitoring well, and check against calculated volumes to confirm proper placement and amount. During the construction process, record any irregularities such as bridging of the filter pack or seal material that could indicate construction problems.



- Upon completion of monitoring well installation, measure the total monitoring well depth and the depth to groundwater, and record the measurements on the Monitoring Well Construction Data form.
- Place a mark or notch on the northern side of the top of the monitoring well casing to provide a monument for the measurement of water levels.

## **DOCUMENTATION**

Document monitoring well construction activities on the Monitoring Well Construction Data form and the Field Report form.

## **REFERENCES**

- U.S. Environmental Protection Agency. 1991. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*. EPA160014-891034. March.
- . 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA/540/S-95/504. April.

## **STANDARD OPERATING PROCEDURE GW-02**

### **MONITORING WELL DEVELOPMENT**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for monitoring well development. All monitoring wells should be developed to create an effective filter pack around the monitoring well screen, rectify damage to the formation caused by drilling, remove fine particulates from the formation near the borehole, and assist in restoring the natural water quality of the aquifer in the vicinity of the monitoring well. The step-by-step guidelines provided in this SOP are to be followed by the field crew performing or overseeing monitoring well development.

#### **EQUIPMENT AND SUPPLIES/REAGENTS**

The following equipment is necessary to properly develop a groundwater monitoring well:

- Monitoring well key, socket wrench or speed wrench, socket set, padlock key, or other monitoring well-access equipment.
- Electric water-level meter long enough to reach the bottom of the monitoring well, calibrated to 0.01 foot.
- Two-inch-diameter (or appropriately sized) surge block.
- Monitoring well-purging equipment (e.g., silicone line, polyvinyl chloride pipe, plug, submersible or non-submersible pump, tubing, power supply, extension cord), as applicable.
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (see Farallon SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.
- Materials necessary to provide required documentation (e.g., Field Report form, Monitoring Well Construction Data form, and Waste Inventory Tracking Sheet).
- Personal protective equipment as described in the site-specific Health and Safety Plan.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.

#### **DECONTAMINATION**

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate equipment that will come into contact with groundwater, in accordance with SOP EQ-01, Equipment Decontamination Procedures.



## PROCEDURES

Follow the instructions below for each monitoring well:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Brush away soil and vegetation, and pump standing water away from the monitoring well opening.
- Open the monitoring well cap.
- Measure the depth to water and the total depth of the monitoring well to the nearest 0.01 foot using a decontaminated water-level meter in accordance with Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells. Record the measurements on the Monitoring Well Construction Data form.
- Calculate the unit purge volume using the formula and the input values from the table below:

$$V = [X(\text{monitoring well depth} - \text{water level})] + [Y(\text{monitoring well depth} - \text{bottom of seal or water level, whichever is lowest in depth})]$$

Where:

V = monitoring well volume, including annular space

X = internal casing volume per unit length (gallons per linear foot)

Y = annular volume per unit length (gallons per linear foot)

Borehole Diameter (inches)	Casing Diameter (inches)	Volume <sub>casing</sub> (X) (gallons per linear foot)	Volume <sub>annulus</sub> (Y) (gallons per linear foot)
7	2	0.17	0.68
8	2	0.17	0.98
10	4	0.65	1.34
12	4	0.65	2.07
12	6	1.47	1.70
14	8	2.61	1.98

### Development Procedures – Existing and New Monitoring Wells

Existing wells in a monitoring well network may require redevelopment if an excessive amount of fines are present in the monitoring well casing that could interfere with stabilization of water-quality parameters or collection of representative water-quality samples.



The instructions below are to be followed for development of existing and new monitoring wells:

**For existing monitoring wells only:**

- Remove the pump and/or any dedicated tubing from the monitoring well.

**For existing and new monitoring wells:**

- Attach one length of twine to the decontaminated surge block (or use a drill rig or tripod) and lower the surge block to within 0.25 foot of the bottom of the monitoring well.
- Surge the monitoring well by vigorously moving the surge block up and down from 0.25 foot from the bottom of the monitoring well to 1 foot above the top of the screened interval for a minimum of 5 minutes to create a surging action across the screened interval, which will bring finer-grained material into suspension. Move the surge block up and down in 3-foot sections until the entire monitoring well screen length has been surged. Record on the Monitoring Well Construction Data form the number of times the surge block is raised and lowered, and total surge time.
- Remove the surge block.
- If a submersible pump is to be used for monitoring well development, gently lower the pump into the monitoring well to within 1 foot of the bottom of the screened interval. If a non-submersible pump is to be used, lower the tubing to within 1 foot of the bottom of the screened interval.
- Begin purging the monitoring well at a rate sufficient to remove fines without pumping the monitoring well dry. Record on the Monitoring Well Construction Data form the volume of water pumped from the monitoring well.
- Surge and pump the monitoring well, including saturated annular space, a minimum of three and a maximum of five monitoring well volumes. If the monitoring well runs dry, let the monitoring well recharge. Then commence purging until a minimum of three monitoring well volumes have been purged. If this event is the first time the monitoring well has been developed and water was added during the drilling process, remove the volume of water introduced during drilling and monitoring well construction. Purging has been completed when *one* of the following has occurred:
  - The minimum purge volume has been removed; OR
  - Five purge volumes and the drilling process water volume have been removed.
- Measure the total depth of the monitoring well after development, and record on the Monitoring Well Construction Data form the total volume of water pumped from the monitoring well.
- Record on the Monitoring Well Construction Data form a description of the suspended particle content, and additional information such as unique odor or water color.



- Containerize the purge water in a U.S. Department of Transportation-approved drum(s) unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (refer to Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.
- Upon completion of monitoring well development, properly seal, secure, and label the drums in accordance with Farallon SOP WM-01, , Field-Handling of Investigation-Derived Waste. Record the number and contents of the drums on a Waste Inventory Tracking Sheet. At a minimum, the drum label(s) should include:
  - Boring/monitoring well ID.
  - Facility name.
  - Drum contents.
  - Date.
  - Drum number.
- Close the monitoring well and record any monitoring well-integrity concerns on the Field Report form and the Monitoring Well Construction Data form.
- Decontaminate all equipment in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

## **DOCUMENTATION**

Document monitoring well development activities on the Monitoring Well Construction Data form. Record the number and contents of the drums on a Waste Inventory Tracking Sheet.

## **REFERENCE**

U.S. Environmental Protection Agency. 1991. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*. Document No. 160014-891034. March.



## **STANDARD OPERATING PROCEDURE GW-03**

### **GROUNDWATER LEVEL MEASUREMENT IN MONITORING WELLS**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for measuring and documenting the depth to groundwater in monitoring wells. The step-by-step guidelines provided in this SOP are to be followed by the field crew to ensure consistent and representative measurements of depth to groundwater in monitoring wells. When multiple wells are present at a site, all 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:

- Monitoring well key, hand drill, socket set, Allen wrench, speed handle, padlock key, or other monitoring well-access equipment specific to the monitoring well monument cover plate.
- Electronic water-level 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.
- Oil-water interface probe, if light nonaqueous-phase liquid (LNAPL) is known or suspected to be present.
- Disposable bailer if LNAPL is known or suspected to be present, and the Project Manager requests that LNAPL be bailed from the well.
- Tape measure.
- Materials necessary to provide required documentation, including Groundwater Level Measurement Summary Forms and Field Report forms.
- Personal protective equipment as described in the site-specific Health and Safety Plan.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.

#### **DECONTAMINATION**

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate equipment that will come into contact with groundwater, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.



## PROCEDURES

Follow the instructions below for measuring water levels at each monitoring well:

- Don appropriate personal protective equipment as described in the site-specific 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 use a bilge pump or cup to remove standing water inside the monitoring well monument before opening the monitoring well cap. Dispose of standing water 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.
- Repeat above procedure until all monitoring wells are open.
- 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 Farallon SOP EQ-01, Equipment Decontamination Procedures. 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 northern 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 consecutive stabilized readings have been measured. 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 notch or mark 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 on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.



- Measure the total monitoring well depth. **NOTE:** If groundwater samples are to be collected, measure the 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 on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.
- Decontaminate the water-level meter in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.
- If the presence of LNAPL is suspected or if site conditions are unknown, check for the presence of LNAPL by one of two methods:
  - Use of a bailer: Use 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 Farallon SOP WM-01, Field Handling of Investigation-Derived Waste.
  - Use of an oil-water interface probe: Decontaminate the oil-water interface probe in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures. With the oil-water interface probe meter turned on to a medium level of sensitivity, slowly lower the probe into the monitoring well casing until it reaches the top of the LNAPL. The probe will have a steady beep when it reaches the interface of the LNAPL (when the electronic circuit is first completed). Stop lowering the probe, hold the graduated oil-water interface cable to the notch or mark on the northern side of the top of the monitoring well casing, and note the length measurement. Repeat this process to collect a second LNAPL measurement. If the two readings differ by more than 0.01 foot, repeat the measurements until the readings stabilize. Repeat the process until three consecutive stabilized readings have been measured. Record the depth to LNAPL 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 oil-water interface probe beeps, grasp the tape with your thumb and index finger exactly at the measuring point corresponding with the notch or mark 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. Once the depth to LNAPL has been recorded, collect the water-level measurement as described above using the oil-water interface probe. Once the depth to LNAPL and the depth to the groundwater table have been determined, subtract the depth to LNAPL from the depth to the groundwater table to determine LNAPL thickness.

- Close the monitoring well as appropriate based on monitoring well-head construction. Record any concerns about monitoring well integrity on the Groundwater Level Measurement Summary Form and on the Field Report form.

### **DOCUMENTATION**

Document monitoring well water-level measurements on the Groundwater Level Measurement Summary Form. Document any additional information on the Field Report form.

### **REFERENCE**

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 field personnel with the methodology for collecting and documenting groundwater samples from monitoring wells using U.S. Environmental Protection Agency (EPA) low-flow groundwater sampling procedures (EPA 1996, 2017) 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 crew conducting groundwater sampling.

#### **EQUIPMENT AND SUPPLIES/REAGENTS**

The following equipment is necessary to properly purge and sample a monitoring well:

- Monitoring well key, hand drill, socket set, padlock key, or other monitoring well-access equipment.
- Electronic water-level meter long enough to reach the bottom of the monitoring well, calibrated to 0.01 foot. Alternatively, to measure for light nonaqueous-phase liquid thickness in addition to groundwater, use an oil-water interface probe.
- Monitoring well purging and sampling equipment:
  - Submersible pump (bladder or Grundfos): the pump, control box, and power source (typically a portable generator or a 12-volt battery); or
  - Peristaltic pump: the pump with pump head, silicone tubing, tubing connectors (as needed), and power source (typically a 12-volt battery).
- Sample tubing of project- and site-specific type and length.
- Bailer, if a pump is not used, or if light nonaqueous-phase liquid requires removal.
- Sufficient number of 55-gallon drums, including lids, gaskets, and fasteners, to contain all purge water, unless other water-handling arrangements have been made.
- Flow-through water-quality meter(s) to measure temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity.
- Air-space monitoring equipment if required (photoionization detector or multi-gas meter).
- 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 project-specific plans, or as required by the analytical laboratory at a minimum.
- Personal protective equipment as described in the site-specific Health and Safety Plan (HASP).
- 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).
- 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 (Refer to Farallon SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

## **DECONTAMINATION**

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate reusable equipment that will come into contact with the monitoring well(s) and/or be used to acquire samples, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

## **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). Setup, purging, sample collection, and post-sampling procedures for dedicated and non-dedicated monitoring wells are presented below.

### **Setup**

Setup procedures differ slightly for dedicated versus non-dedicated monitoring wells. Follow the instructions below for the monitoring wells as indicated:

- 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 on the Field Report form the equipment calibration and maintenance performed. Decontaminate the water-quality meter between monitoring wells by rinsing with distilled or deionized water. Manage the rinsate water used in collecting these measurements in the same manner as for purge water, as defined in project-specific plans, and in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste.
- Don appropriate personal protective equipment as described in the site-specific HASP, including nitrile gloves for activities that might involve contact with groundwater or equipment. Change gloves between each monitoring well at a minimum, or when



contaminants could be introduced into a monitoring well or onto 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 contacting 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 the 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 Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells.
- If light 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 Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells. 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 =  $(\pi * r^2) * h (7.48 \text{ gallons/cubic foot})$

Where:

$r$  = radius of the inside of the monitoring well casing in feet

$h$  = length of the water column in the monitoring well casing (i.e., the depth to the bottom of the monitoring well minus the depth to water, both measured from the mark at the top of the monitoring well casing), in feet

- **For monitoring wells with dedicated pumps and tubing:** 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 in purge water containing nonaqueous-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.



- **For monitoring wells with non-dedicated pumps:** 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 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. If the water level continues to drop by more than 0.33 foot during the low-flow purging at a rate less than 100 ml/min, notify and consult with the Project Manager on how to proceed.
- 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

Continue purging at a constant rate until the water-quality parameters have stabilized for three successive measurements according to the stability criteria provided in the table below. Before samples can be collected from each monitoring well, the groundwater must stabilize according to following criteria:

- Drawdown is no greater than 0.33 foot for low-flow sampling, and
- The water-quality parameters should stabilize according to the criteria specified below:





Water-Quality Parameter	Stability Criterion
Turbidity (if required)	10% for values greater than 5 NTU or three consecutive values < 5 NTU
Dissolved oxygen	10% for values greater than 0.5 mg/l, or three consecutive values <0.5 mg/l
Specific conductivity	3%
Oxidation-reduction potential	+/- 10 millivolts
pH	+/- 0.1 unit
Temperature	3%

**Notes:**

mg/l = milligrams per liter

NTU = nephelometric turbidity unit

Although under some circumstances, a monitoring well may not stabilize according to the above criteria, the monitoring well can still be sampled if the monitoring well does not meet stability criteria due to the instrument accuracy, or the water level drops below the minimum value using low-flow sampling procedures. For example, a fluctuation in ORP greater than 10 millivolts does not meet the stability criterion. However, because the accuracy range of the ORP instrument is  $\pm 20$  millivolt, the stability criterion would be considered satisfied and within the range of instrument accuracy. Consult the manual for the instrument to determine the accuracy range.

Also, if 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 and one monitoring well volume of groundwater has been removed from the monitoring well, or the monitoring well runs dry during the purging procedure, 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:

$$\text{Minimum purge volume} = 2 * [500 \text{ milliliters} + M * (\text{length of tubing in feet})]$$

Where: M = 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

Record on the Field Report form and the Low-Flow Well Purging and Sampling Data form if any monitoring well did not meet the drawdown and stability criteria and explain the rationale for sampling the monitoring well at the time it was sampled. If stability criteria have not been achieved following completion of all entries in the Low-Flow Well Purging and Sampling Data form, notify



and consult with the Project Manager whether to continue purging until stability criteria have been achieved or begin sample collection.

### **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 maintain 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 order listed below per the EPA (1992) groundwater sampling technical guidance:

- Volatile organic compounds (VOCs);
- Dissolved gases and total organic carbon;
- Semivolatile organic compounds;
- Metals and cyanide;
- Major water quality cations and anions;
- Radionuclides; and
- Dissolved (filtered) inorganics (if required).

When collecting samples for VOCs, adjust the flow rate as low 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 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 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 of well 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 label. Separate drums are 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 GROUNDWATER SAMPLING

Collect reconnaissance groundwater samples from borings using direct-push or hollow-stem auger drilling methods and 0.75- or 2-inch-inside-diameter temporary monitoring well casing and 0.010-inch slotted screen. In some cases, alternate well casing diameters or screen slot sizes may be appropriate based on the drilling equipment or project-specific requirements. Follow the instructions below for reconnaissance groundwater sample collection:

- Withdraw the drill casing when the desired sampling depth has been reached, so 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 the 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 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 above.
- If insufficient groundwater is available to collect a sample using a peristaltic or bladder pump (i.e., the boring pumps dry or cannot maintain a sufficient flow of 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 groundwater 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. Track samples on a Chain of Custody form. Track waste generated during groundwater sampling on a Waste Inventory Tracking Sheet.

## **REFERENCES**

- U.S. Environmental Protection Agency. 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance*. Office of Solid Waste. November.
- . 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA/540/S-95/504. April.
- . 2017. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells*. EQASOP-GW4. September.

## **STANDARD OPERATING PROCEDURE SL-01**

### **SOIL CORE SAMPLING**

#### **PURPOSE AND APPLICATION**

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for collecting and documenting soil core samples using a hollow-stem-auger drill rig, a direct-push drill rig, and a sonic drill rig. All drilling operations will be conducted by a licensed drilling subcontractor in accordance with subcontractor SOPs. This SOP presents the procedures that will be performed by Farallon field staff once the soil core has been collected by the drilling subcontractor. The step-by-step guidelines provided in this SOP are to be followed by the field crew conducting subsurface soil sampling.

#### **EQUIPMENT AND SUPPLIES/REAGENTS**

The following equipment is necessary to properly collect soil samples from borings:

- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan.
- Differential global positioning system, if required in project-specific plans. Discuss the methodology for recording the location of the sample point with the Project Manager before conducting the field work.
- Photoionization detector (PID) to monitor and record soil headspace readings.
- Applicable soil sampling equipment, including:
  - Stainless steel hand auger.
  - Wooden or steel stakes to stabilize cores on table while sampling.
  - Folding table.
  - Utility knife.
  - Stainless steel spoons or scoops.
  - Six-mil plastic sheeting.
  - Resealable plastic bags.
  - Duct tape.
  - Aluminum foil.
  - Tape measure.
  - Five-gallon buckets, and scrub brushes.
  - Alconox phosphate-free cleanser.
  - Laboratory-provided certified pre-cleaned sample containers.



- Soil sample plunger and syringes for sampling volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 5035A.
- Materials necessary to provide required documentation, including:
  - Camera.
  - White board and dry-erase markers, if specified in project-specific plan.
  - Sample labels.
  - Field Report forms.
  - Boring Log forms.
  - Chain of Custody forms.
  - Chain-of-custody seals for the sample cooler(s).
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater and excess soil cuttings. Separate drums are needed for liquid and solid wastes (refer to Farallon SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.
- Sampling support equipment (e.g., sample coolers, ice, bubble wrap, clear packing tape, heavy resealable plastic bags, razor knives, garbage bags, paper towels, distilled water, nitrile gloves).

## **DECONTAMINATION**

Reusable equipment that will come into contact with soil boring samples or will be used to acquire soil samples is to be decontaminated before arrival at the site, between soil samples collected, upon relocation at the site, and upon demobilization from the site, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

## **PROCEDURES**

*Prior to drilling, all underground utilities must be located, and cleared with an air-knife or other method approved by the Farallon Health and Safety Coordinator.*

Collect soil samples from areas known or suspected to have the lowest concentrations of constituents of concern first, with areas of higher concentrations of constituents of concern sampled last, unless the Project Manager indicates a different project-specific sampling protocol. The procedures listed below may be modified, with approval from the field team lead and the Project Manager. Any modifications must be identified in the project-specific sampling plans or, at a minimum, details must be noted on the Field Report form.



Soil core collection methods differ for hollow-stem-auger, direct-push, and sonic drilling techniques, each summarized below:

- **Hollow-stem-auger:** Collect soil core samples using a standard 18-inch-length (6-inch waste barrel) Dames & Moore split-spoon sampler with a 2.5-inch inner diameter that can be used with or without brass or stainless steel liners.
- **Direct-push:** Collect soil core samples using 5-foot macrocore samplers with acetate sample liners.
- **Sonic:** Collect soil core samples using a standard 6-inch-diameter stainless steel sampling rod. Use a 2.5-, 5.0-, or 10-foot polyethylene liner inside the sampling rod for soil sample collection.

Record the specific drilling and soil sampling equipment used on the Boring Log form and on the Field Report form.

## Setup

The instructions below are to be followed at each boring site:

- Don appropriate PPE as described in the site-specific Health and Safety Plan.
- Ensure that each borehole has been cleared to a minimum depth of 5 feet below ground surface using an air knife, per the Farallon health and safety policy.
- Set up a temporary sampling table adjacent to the drill rig to log and collect soil samples from the soil cores as they are recovered during drilling. During sunny conditions, consider using a portable canopy for protection from the sun. Lay plastic sheeting over the table to keep the surface clean and to prevent potential cross-contamination between borings and soil samples. Designate clean areas for decontaminated sampling equipment and laboratory-provided certified pre-cleaned soil sample containers.
- Set up 5-gallon buckets for decontaminating soil sampling equipment between samples. These decontamination buckets are separate from the buckets provided by the drillers for their split spoons and core barrels. (Refer to Farallon SOP EQ-01, Equipment Decontamination Procedures.)
- Calibrate the PID to monitor headspace for selected soil core samples in accordance with the equipment manual.

## Sample Collection and Processing

The instructions listed below are to be followed for collecting samples using lined and unlined split-spoon and tube samplers:

- Don a new pair of nitrile sampling gloves for each individual soil sample collected, and prior to decontaminating sampling equipment to avoid potential cross-contamination.



- Ensure that the drillers have properly decontaminated all drill shoes and caps prior to initiating drilling operations. Drill shoes and caps must be decontaminated between sampling intervals and stations in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures. Replace dirty or ineffective decontamination water as needed throughout the workday.
- Ensure that the drillers position the sampling rig over the sample station and remove any surface material or debris that would interfere with sampling. Note on the Field Report form any surface material removed.
- Note on the Field Report form and the Boring Log forms any difficulties encountered during drilling operations. Include the number of blow counts (if applicable) or any resistance encountered during drilling operations.
- Place the core tube, core liner, or split spoon on a new piece of aluminum foil on the sample logging/processing table. If necessary, use wood or metal stakes as shims to stabilize the tube, liner, or split spoon on the sample logging/processing table.
- If a core liner is used, split the liner open with a decontaminated utility knife, taking care not to penetrate the soil in the liner with the blade or knife.
- Briefly examine the soil sample visually for obvious signs of contamination, and take PID readings.
- Take care to:
  - **Not** collect soil in contact with the sidewalls of the sampler or liner.
  - **Always** use decontaminated stainless-steel spoons or scoops to handle the soil within a given sample interval.
  - **Always** don a new pair of nitrile gloves before processing each sample interval in each soil core to prevent cross-contamination in the soil core.
- When sampling for VOCs, collect them as soon as possible after opening the core tube, split spoon, or core liner. Use a decontaminated stainless steel spoon to collect the VOC samples with minimal disturbance to soil by placing a representative amount of soil from the length and depth of the desired sample interval directly into the laboratory-provided VOC sample container with no headspace, and seal it tightly. Follow the sample collection guidelines provided by the manufacturer or the analytical laboratory when using a plunger-type sampling device in accordance with EPA Method 5035A.
- Retain approximately 100 grams of the soil sample in a heavy resealable plastic bag or glass sample container, shake the sealed bag to volatilize the contaminants in the soil, and wait approximately 5 minutes before measuring for headspace analysis using the PID (Washington State Department of Ecology 2011). Insert the PID probe tip into a small opening in the top of the bag, and record the PID units on the Boring Log form. Reseal the bag after taking the headspace reading in case further assessment of the sample is needed. Do not puncture the resealable plastic bag to obtain headspace readings.





- If specified in the project-specific plans, photograph each section of the boring, including in the photograph notations on a white board documenting sample location identifier, date, orientation, depth, and site markers.
- Describe the soil samples in accordance with ASTM International Standard D-2488-00, *Standard Practice for Description and Identification of Soils*.
- Record on the Field Report form any deviations from the project-specified sampling procedures or from this SOP, or any obstacle encountered.
- Examine the remaining soil core sample for lithology using the Unified Soil Classification System, and record the lithology on the Boring Log form.
- Discard excess soil cuttings in a labeled waste drum or a soil bin in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste. Do not add soil to a liquid waste drum.
- Backfill the borehole, as appropriate.
- Upon completion of sampling at a boring, measure the boring's location to an on-site permanent datum, collect the location using the differential global positioning system, or have the sample location surveyed by a licensed surveyor.
- Decontaminate the soil sampling equipment, and don a new pair of sampling gloves before collecting each new soil sample.

## DOCUMENTATION

Document the soil sampling activities on the Boring Log form, the Chain of Custody form, and the Field Report form.

## REFERENCE

American Society for Testing Materials. 1989. *Standard Method for Penetration Test and Split-Barrel Sampling of Soils*. Method D-1586-11.

U.S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operation Methods*. EPA Document No. 540-P-87-001. December 1.

Washington State Department of Ecology. 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Ecology Publication No. 10-09-057. Toxics Cleanup Program. September.

## **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 personnel with the methodology for containerizing, labeling, and tracking investigation-derived waste (IDW), and communicating information to the Project Manager. IDW may include soil cuttings, purge water, development water, and/or decontamination water. This SOP has been developed in compliance with Washington State Dangerous Waste Regulations (Chapter 173-303 of the Washington Administrative Code), Oregon Hazardous Waste Management Rules (Division 100 of Chapter 340 of the Oregon Administrative Rules), Environmental Health Standards for the Management of Hazardous Waste (Division 4.5 of Title 22 of the California Code of Regulations), 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:

- 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. Use a polyethylene drum for a material suspected to be corrosive.
- Labels appropriate to the characteristics of the IDW:
  - Non-Hazardous Waste Labels: For IDW known to be nonhazardous based on previous data and waste profiles.
  - Hazardous Waste or Washington State Dangerous Waste Labels: For IDW known to be hazardous/dangerous based on previous data and waste profiles.
  - On Hold Pending Analysis Labels: 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 and/or solids samples, depending on the analysis to be performed;



- Glass or stainless steel container for homogenizing liquid samples, depending on the analysis to be performed; and
- Stainless steel hand-auger or a glass tube, depending on the medium being sampled (i.e., soil/solids or liquid).

## PROCEDURES

Follow the instructions below to inspect, label, and inventory IDW drums, and to containerize IDW:

- Inspect new drums brought to the site to ensure that they do not have dents or corrosion, and are in good condition. Lined or coated drums are preferred.
- Inspect drums remaining at the site from previous project work. Notify the Project Manager if a drum is leaking, damaged, or improperly labeled.
- Place soil and solids into separate drums from those containing 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 detected in areas of the site would cause IDW from that area to be characterized as hazardous/dangerous waste. Hazardous/dangerous waste should be drummed separate from non-hazardous/dangerous waste to minimize the amount of hazardous/dangerous waste generated.
- Use a grease pencil/paint pen and indelible ink to clearly mark the lid and the label of each drum with a unique identifier such as a number or a letter. Verify that no two drums have the same identifier marked on the lid or label, including drums remaining from previous project work.
- Inventory each Farallon-generated drum and its contents on a Waste Inventory Tracking Sheet.
- Track any waste added to an existing drum on a Waste Inventory Tracking Sheet.
- Prior to demobilizing from the site, label each drum with a complete Non-Hazardous Waste, Hazardous Waste/Washington State Dangerous Waste, On Hold Pending Analysis, or other appropriate waste label. 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 result in 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*. Samples collected in California for hazardous waste characterization are to adhere to the requirements specified in California Code of Regulations Sections 66261.21 to 66261.24 of Title 22, Characteristics of Hazardous Waste. Discuss with the Project Manager the specific analyses to be performed prior to sample collection. The instructions below are to be followed for drum sampling, using composite sampling techniques to sample soil, solids, and liquid wastes:

- Collect soil/solids samples from various locations and depths in the drum using a hand auger or other decontaminated apparatus. Place all samples into a single decontaminated stainless steel bowl using decontaminated stainless steel tools, or into a plastic bowl using plastic spoons, depending on the analyses to be performed. Homogenize the samples in the bowl.
- Place samples of the homogenized soil/solids from the bowl into sample jars for analysis.
- Collect liquid samples from the drum using a glass sampling tube. Insert the tube to the base of the drum to fill the entire tube with liquid. Place the liquid into sample jars for analysis.

## **DRUM STORAGE**

Follow the instructions below for drum storage:

- Label and store the drums in an area approved by the client.
- Store hazardous/dangerous waste drums in a secured area.
- Place hazardous/dangerous waste drums to be 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 the original field notes to the Project Manager. Provide a copy of the completed Waste Inventory Tracking Sheet to the Project Assistant for tracking.

## **REFERENCE**

U.S. Environmental Protection Agency. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Publication No. SW-846. Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015).

**APPENDIX C  
INADVERTENT DISCOVERY PLAN**

**PRE- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY WORK PLAN ADDENDUM  
Lower Issaquah Valley  
Issaquah, Washington**

**Farallon PN: 1754-004**

## Eric Buer

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**From:** Whitlam, Rob (DAHP) <Rob.Whitlam@DAHP.WA.GOV>  
**Sent:** Tuesday, October 8, 2019 2:12 PM  
**To:** Cardona-Marek, Tamara (ECY)  
**Subject:** RE: Groundwater Investigation at the City of Issaquah  
**Attachments:** 191007639.pdf

Tamara;

Thanks, our letter...  
Regards,

Rob

---

**From:** Cardona-Marek, Tamara (ECY)  
**Sent:** Tuesday, October 8, 2019 10:52 AM  
**To:** Whitlam, Rob (DAHP)  
**Subject:** Groundwater Investigation at the City of Issaquah

Good morning Rob;

My name is Tamara Cardona and I am a cleanup project manager with the Department of Ecology. This email is to seek your direction regarding potential cultural resource impacts from a proposed state-funded groundwater investigation.

The proposed groundwater investigation will occur within the City of Issaquah and consists of installing 2-inch diameter well casings using sonic drilling methods:

- Shallow Monitoring Wells. 6 locations to depths of approximately up to 40 feet below ground surface.
- Intermediate Monitoring Wells. 8 locations to depths of approximately up to 120 feet below ground surface.

Soil cuttings will be placed in properly labeled drums and disposed off-site.

An additional 17 soil borings will be advanced at 175 Newport Way to a depth of 20 feet below ground surface.

The attached figure shows the locations of the proposed wells, and two proposed piezometer locations. The piezometers are similar to a well but they are to be used for gauging the depth to groundwater.

An Inadvertent Discovery Plan has been developed for this work. Are other actions necessary with regard to potential cultural resource impacts?

Thank you in advance for reviewing this information and responding by Monday, October 21, 2019.

Regards,  
Tamara

*Tamara Cardona, PhD  
Aquatics Unit Supervisor  
Toxics Cleanup Program  
Department of Ecology*

3190 160th Ave SE  
Bellevue, WA 98008  
(425) 649-7058

## Eric Buer

---

**From:** Cardona-Marek, Tamara (ECY) <TACA461@ECY.WA.GOV>  
**Sent:** Monday, October 21, 2019 8:41 AM  
**To:** steve@snoqualmtribe.us  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** RE: Groundwater Investigation at the City of Issaquah

Good morning;

I am following up on my previous e-mail (below) regarding the proposed groundwater investigation in Issaquah. I have not received a request from you for additional actions. We plan to proceed with the proposed work following the Inadvertent Discovery Plan developed for this project. Please let me know if you have any questions.

Sincerely;  
Tamara

*Tamara Cardona, PhD*  
*Aquatics Unit Supervisor*  
*TCP/NWRO*  
*425-649-7058*

---

**From:** Cardona-Marek, Tamara (ECY)  
**Sent:** Tuesday, October 8, 2019 10:58 AM  
**To:** 'steve@snoqualmtribe.us'  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** Groundwater Investigation at the City of Issaquah

Good morning Steve Mullen-Moses;

My name is Tamara Cardona and I am a cleanup project manager with the Department of Ecology. This email is to seek your direction regarding potential cultural resource impacts from a proposed state-funded groundwater investigation.

The proposed groundwater investigation will occur within the City of Issaquah and consists of installing 2-inch diameter well casings using sonic drilling methods:

- Shallow Monitoring Wells. 6 locations to depths of approximately up to 40 feet below ground surface.
- Intermediate Monitoring Wells. 8 locations to depths of approximately up to 120 feet below ground surface.

Soil cuttings will be placed in properly labeled drums and disposed off-site.

An additional 17 soil borings will be advanced at 175 Newport Way to a depth of 20 feet below ground surface.

The attached figure shows the locations of the proposed wells, and two proposed piezometer locations. The piezometers are similar to a well but they are to be used for gauging the depth to groundwater.

An Inadvertent Discovery Plan has been developed for this work. Are other actions necessary with regard to potential cultural resource impacts?

Thank you in advance for reviewing this information and responding by Monday, October 21, 2019.

Regards,  
Tamara



*Tamara Cardona, PhD  
Aquatics Unit Supervisor  
Toxics Cleanup Program  
Department of Ecology  
3190 160th Ave SE  
Bellevue, WA 98008  
(425) 649-7058*

## Eric Buer

---

**From:** Cardona-Marek, Tamara (ECY) <TACA461@ECY.WA.GOV>  
**Sent:** Monday, October 21, 2019 8:42 AM  
**To:** klyste@stillaguamish.com  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** RE: Groundwater Investigation at the City of Issaquah

Good morning;

I am following up on my previous e-mail (below) regarding the proposed groundwater investigation in Issaquah. I have not received a request from you for additional actions. We plan to proceed with the proposed work following the Inadvertent Discovery Plan developed for this project. Please let me know if you have any questions.

Sincerely;  
Tamara

*Tamara Cardona, PhD*  
*Aquatics Unit Supervisor*  
*TCP/NWRO*  
*425-649-7058*

---

**From:** Cardona-Marek, Tamara (ECY)  
**Sent:** Tuesday, October 8, 2019 10:56 AM  
**To:** 'klyste@stillaguamish.com'  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** Groundwater Investigation at the City of Issaquah

Good morning Kelly Lyste;

My name is Tamara Cardona and I am a cleanup project manager with the Department of Ecology. This email is to seek your direction regarding potential cultural resource impacts from a proposed state-funded groundwater investigation.

The proposed groundwater investigation will occur within the City of Issaquah and consists of installing 2-inch diameter well casings using sonic drilling methods:

- Shallow Monitoring Wells. 6 locations to depths of approximately up to 40 feet below ground surface.
- Intermediate Monitoring Wells. 8 locations to depths of approximately up to 120 feet below ground surface.

Soil cuttings will be placed in properly labeled drums and disposed off-site.

An additional 17 soil borings will be advanced at 175 Newport Way to a depth of 20 feet below ground surface.

The attached figure shows the locations of the proposed wells, and two proposed piezometer locations. The piezometers are similar to a well but they are to be used for gauging the depth to groundwater.

An Inadvertent Discovery Plan has been developed for this work. Are other actions necessary with regard to potential cultural resource impacts?

Thank you in advance for reviewing this information and responding by Monday, October 21, 2019.

Regards,

Tamara

*Tamara Cardona, PhD  
Aquatics Unit Supervisor  
Toxics Cleanup Program  
Department of Ecology  
3190 160th Ave SE  
Bellevue, WA 98008  
(425) 649-7058*

## Eric Buer

---

**From:** Cardona-Marek, Tamara (ECY) <TACA461@ECY.WA.GOV>  
**Sent:** Monday, October 21, 2019 8:41 AM  
**To:** ryoung@tulaliptribes-nsn.gov  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** RE: Groundwater Investigation at the City of Issaquah

Good morning;

I am following up on my previous e-mail (below) regarding the proposed groundwater investigation in Issaquah. I have not received a request from you for additional actions. We plan to proceed with the proposed work following the Inadvertent Discovery Plan developed for this project. Please let me know if you have any questions.

Sincerely;  
Tamara

*Tamara Cardona, PhD*  
*Aquatics Unit Supervisor*  
*TCP/NWRO*  
*425-649-7058*

---

**From:** Cardona-Marek, Tamara (ECY)  
**Sent:** Tuesday, October 8, 2019 10:56 AM  
**To:** 'ryoung@tulaliptribes-nsn.gov'  
**Cc:** Whitlam, Rob (DAHP)  
**Subject:** Groundwater Investigation at the City of Issaquah

Good morning Richard Young;

My name is Tamara Cardona and I am a cleanup project manager with the Department of Ecology. This email is to seek your direction regarding potential cultural resource impacts from a proposed state-funded groundwater investigation.

The proposed groundwater investigation will occur within the City of Issaquah and consists of installing 2-inch diameter well casings using sonic drilling methods:

- Shallow Monitoring Wells. 6 locations to depths of approximately up to 40 feet below ground surface.
- Intermediate Monitoring Wells. 8 locations to depths of approximately up to 120 feet below ground surface.

Soil cuttings will be placed in properly labeled drums and disposed off-site.

An additional 17 soil borings will be advanced at 175 Newport Way to a depth of 20 feet below ground surface.

The attached figure shows the locations of the proposed wells, and two proposed piezometer locations. The piezometers are similar to a well but they are to be used for gauging the depth to groundwater.

An Inadvertent Discovery Plan has been developed for this work. Are other actions necessary with regard to potential cultural resource impacts?

Thank you in advance for reviewing this information and responding by Monday, October 21, 2019.

Regards,

Tamara

*Tamara Cardona, PhD  
Aquatics Unit Supervisor  
Toxics Cleanup Program  
Department of Ecology  
3190 160th Ave SE  
Bellevue, WA 98008  
(425) 649-7058*

**From:** [Cardona-Marek, Tamara \(ECY\)](#)  
**To:** [Eric Buer](#)  
**Subject:** Cultural Resources  
**Date:** Wednesday, January 22, 2020 7:45:27 AM  
**Attachments:** [RE Groundwater Investigation at the City of Issaquah.msg](#)  
[RE Groundwater Investigation at the City of Issaquah.msg](#)  
[RE Groundwater Investigation at the City of Issaquah.msg](#)  
[RE Groundwater Investigation at the City of Issaquah.msg](#)

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Eric;

The attached emails include:

- Emails to tribal representatives
- Email response from Department of Archaeology and Historic Preservation (includes a letter)

No response was received from the tribal representatives.

Let me know if you think I missed anything.

Tamara

*Tamara Cardona, PhD  
Aquatics Unit Supervisor  
Toxics Cleanup Program  
Department of Ecology  
3190 160th Ave SE  
Bellevue, WA 98008  
(425) 649-7058*

## **PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS<sup>1</sup>**

PROJECT TITLE: Lower Issaquah Valley Perfluoroalkyl Substances Investigation

COUNTY WASHINGTON: King

Section, Township, Range: Sections 27, 28, 33, and 31 in Township 24 North,  
Range 06 East, Washington Meridian.

### **1. INTRODUCTION**

The following Inadvertent Discovery Plan (IDP) outlines procedures to perform in the event of discovering archaeological materials or human remains, in accordance with state and federal laws.

### **2. RECOGNIZING CULTURAL RESOURCES**

A cultural resource discovery could be prehistoric or historic. Examples include:

- a. An accumulation of shell, burned rocks, or other food related materials.
- b. Bones or small pieces of bone.
- c. An area of charcoal or very dark stained soil with artifacts.
- d. Stone tools or waste flakes (i.e. an arrowhead. or stone chips).
- e. Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years.
- f. Buried railroad tracks, decking, or other industrial materials.

When in doubt, assume the material is a cultural resource.

### **3. ON-SITE RESPONSIBILITIES**

**STEP 1: *Stop Work.*** If any employee, contractor or subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work must stop immediately. Notify the appropriate party(s). Leave the surrounding area untouched, and provide a demarcation adequate to provide the total security, protection, and integrity of the discovery. The discovery location must be secured at all times by a temporary fence or other onsite security.

**STEP 2: *Notify Archaeological Monitor or Licensed Archaeologist.*** If there is an Archaeological Monitor for the project, notify that person. If there is a monitoring plan in place, the monitor will follow the outlined procedure.

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<sup>1</sup> If you need this document in a format for the visually impaired, call Water Quality Reception at Ecology, (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

STEP 3: *Notify the Project Manager* of this project and contact the Ecology Staff Project Manager, or other applicable contacts:

Project Manager: Farallon Consulting Name: Eric Buer Phone: (425) 295-0849 Email: ebuer@farallonconsulting.com	Ecology Staff Project Manager Name: Priscilla Tomlinson Phone: (206)549-0104 Email: ptom461@ecy.wa.gov
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**Assigned Alternates:**

Assigned Project Manager Alternate: Name: Vince Tilotta Phone: (510)879-6804 Email: vtilotta@farallonconsulting.com	Ecology Cultural Resource Specialist (Alternate): Name: Jing Song Phone:(206)594-0100 email: jing.song@ecy.wa.gov
--	---

The Project Manager or applicable staff will make all calls and necessary notifications. **If human remains are encountered**, treat them with dignity and respect at all times. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed. **Do not call 911 or speak with the media. Do not take pictures unless directed to do so by DAHP. See Section 5.**

**4. FURTHER CONTACTS AND CONSULTATION**

**A. Project Manager’s Responsibilities:**

- *Protect Find:* The Project Manager is responsible for taking appropriate steps to protect the discovery site. All work will stop immediately in a surrounding area adequate to provide for the complete security of location, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material as set forth in this document.
- *Direct Construction Elsewhere on-Site:* The Project Manager may direct construction away from cultural resources to work in other areas prior to contacting the concerned parties.
- *Contact Senior Staff:* If the Senior Staff person has not yet been contacted, the Project Manager must do so.

**B. Senior Staff Responsibilities:**

- *Identify Find:* The Senior Staff (or a delegated Cultural Resource Specialist), will ensure that a qualified professional archaeologist examines the area to determine if there is an archaeological find.



- If it is determined not to be of archaeological, historical, or human remains, work may proceed with no further delay.
  - If it is determined to be an archaeological find, the Senior Staff or Cultural Resource Specialist will continue with all notifications.
  - If the find may be human remains or funerary objects, the Senior Staff or Cultural Resource Specialist will ensure that a qualified physical anthropologist examines the find. **If it is determined to be human remains, the procedure described in Section 5 will be followed.**
- *Notify DAHP:* The Senior Staff (or a delegated Cultural Resource Specialist) will contact the involved federal agencies (if any) and the Washington Department of Archaeology and Historic Preservation (DAHP).
  - *Notify Tribes:* If the discovery may be of interest to Native American Tribes, the DAHP and Ecology Supervisor or Coordinator will coordinate with the interested and/or affected tribes.

**General Contacts**

**State Agencies:**

Washington State Department of Ecology Northwest Regional Office 3190 – 160th Ave. SE Bellevue, WA 98008-5452 Phone (425) 649-7000
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**Department of Archaeology and Historic Preservation:**

Dr. Allyson Brooks State Historic Preservation Officer 360-586-3066	Rob Whitlam, Ph.D. Staff Archaeologist 360-586-3050
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The DAHP or appropriate Ecology Staff will contact the interested and affected Tribes for a specific project.

**Further Activities**

- Archaeological discoveries will be documented as described in Section 6.
- Construction in the discovery area may resume as described in Section 7.

**5. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL**

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be

treated with dignity and respect. Do not take photographs by any means, unless you are pre-approved to do so.

*If the project occurs on federal lands or receives federal funding (e.g., national forest or park, military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 apply, and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.*

If the project occurs on non-federal lands, the Project Manager will comply with applicable state and federal laws, and the following procedure:

**A. In all cases you must notify a law enforcement agency or Medical Examiner/Coroner's Office:**

In addition to the actions described in Sections 3 and 4, the Project Manager will immediately notify the local law enforcement agency or medical examiner/coroner's office.

The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human, whether the discovery site constitutes a crime scene, and will then notify DAHP.

Enter contact information below:

Issaquah Police Department  
(425) 837-3200

**B. Participate in Consultation:**

Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation.

**C. Further Activities:**

- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.
- When consultation and documentation activities are complete, construction in the discovery area may resume as described in Section 7.

## **6. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS**

Archaeological deposits discovered during construction will be assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

Project staff will ensure the proper documentation and field assessment will be made of any discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and a contracted consultant (if any).

All prehistoric and historic cultural material discovered during project construction will be recorded by a professional archaeologist on a cultural resource site or isolate form using standard and approved techniques. Site overviews, features, and artifacts will be photographed; stratigraphic profiles and soil/sediment descriptions will be prepared for minimal subsurface exposures. Discovery locations will be documented on scaled site plans and site location maps.

Cultural features, horizons and artifacts detected in buried sediments may require further evaluation using hand-dug test units. Units may be dug in controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. A test excavation unit or small trench might also be used to determine if an intact occupation surface is present. Test units will be used only when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. Excavations will be conducted using state-of-the-art techniques for controlling provenience, and the chronology of ownership, custody and location recorded with precision.

Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock will be recorded for each probe on a standard form. Test excavation units will be recorded on unit-level forms, which include plan maps for each excavated level, and material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all artifacts recovered from the level. A stratigraphic profile will be drawn for at least one wall of each test excavation unit.

Sediments excavated for purposes of cultural resources investigation will be screened through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

All prehistoric and historic artifacts collected from the surface and from probes and excavation units will be analyzed, catalogued, and temporarily curated. Ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology and the affected tribes.

Within 90 days of concluding fieldwork, a technical report describing any and all monitoring and resultant archaeological excavations will be provided to the Project Manager, who will forward the report for review and delivery to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s).

*If assessment activity exposes human remains (burials, isolated teeth, or bones), the process described in Section 5 will be followed.*

## **7. PROCEEDING WITH WORK**

Work outside the discovery location may continue while documentation and assessment of the cultural resources proceed. A professional archaeologist must determine the boundaries of the discovery location. In consultation with Ecology, DAHP and any affected tribes, the Project Manager will determine the appropriate level of documentation and treatment of the resource. If there is a federal nexus, Section 106 consultation and associated federal laws will make the final determinations about treatment and documentation.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Manager, DAHP, any affected tribes, Ecology (and the federal agencies, if any) determine that compliance with state and federal law is complete.

## **8. RECIPIENT/PROJECT PARTNER RESPONSIBILITY**

The Project Recipient/Project Partner is responsible for developing an IDP. The IDP must be immediately available onsite, be implemented to address any discovery, and be available by request by any party. The Project Manager and staff will review the IDP during a project kickoff or pre-construction meeting.

*We recommend that you print images in color for accuracy.*

# Implement the IDP / UDP if ...

You see chipped stone artifacts.



- Glass-like material
- Angular
- “Unusual” material for area
- “Unusual” shape
- Regularity of flaking
- Variability of size



# Implement the IDP / UDP if ...

You see ground or pecked stone artifacts.



- Striations or scratching
- Unusual or unnatural shapes
- Unusual stone
- Etching
- Perforations
- Pecking
- Regularity in modifications
- Variability of size, function, and complexity

# Implement the IDP / UDP if ...

You see bone or shell artifacts.



- Often smooth
- Unusual shape
- Carved
- Often pointed if used as a tool
- Often wedge shaped like a “shoehorn”



# Implement the IDP / UDP if ...

You see bone or shell artifacts.



- Often smooth
- Unusual shape
- Perforated
- Variability of size





# Implement the IDP / UDP if ...

You see fiber or wood artifacts.



- Wet environments needed for preservation
- Variability of size, function, and complexity
- Rare



# Implement the IDP / UDP if ...

You see historic period artifacts.



# Implement the IDP / UDP if ...

You see strange, different or interesting looking dirt, rocks, or



- Human activities leave traces in the ground that may or may not have artifacts associated with them
- “Unusual” accumulations of rock (especially fire-cracked rock)
- “Unusual” shaped accumulations of rock (e.g., similar to a fire ring)
- Charcoal or charcoal-stained soils
- Oxidized or burnt-looking soils
- Accumulations of shell
- Accumulations of bones or artifacts
- Look for the “unusual” or out of place (e.g., rock piles or accumulations in areas with few rock)

# Implement the IDP / UDP if ...

You see strange, different or interesting looking dirt, rocks, or



- “Unusual” accumulations of rock (especially fire-cracked rock)
- “Unusual” shaped accumulations of rock (e.g., similar to a fire ring)
- Look for the “unusual” or out of place (e.g., rock piles or accumulations in areas with few rock)

# Implement the IDP / UDP if ...

You see strange, different or interesting looking dirt, rocks, or



Layers of shell  
midden

Historic Debris

- Often have a layered or “layer cake” appearance
- Often associated with black or blackish soil
- Often have very crushed and compacted shells



**Implement the IDP / UDP if ...**

**You see historic foundations or buried structures.**



**APPENDIX D**  
**FARALLON FIELD DOCUMENTATION FORMS**

PRE- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY WORK PLAN ADDENDUM  
Lower Issaquah Valley  
Issaquah, Washington

Farallon PN: 1754-004













# THIS CONTAINER ON **HOLD** PENDING ANALYSIS

**CONTENTS** Soil from borings FB01 and FB02

**ORIGIN OF MATERIALS** Subsurface Investigation

**ADDRESS** 1234 Site Address

**CONTACT** Farallon Consulting - (425) 295-0800

**DO NOT TAMPER WITH CONTAINER  
AUTHORIZED PERSONNEL ONLY**

 **BRADY** BRADYID.COM

# NON- HAZARDOUS WASTE

## OPTIONAL INFORMATION

Client Name

**SHIPPER**

1234 Site Address

**ADDRESS**

Seattle, Washington 98101

**CITY, STATE, ZIP**

Purge Water (FMW-2)

**CONTENTS**

# HAZARDOUS WASTE

**FEDERAL LAW PROHIBITS IMPROPER DISPOSAL**  
IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY  
AUTHORITY, OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

ACCUMULATION  
START DATE First Day Waste Added

E.P.A.  
WASTE NO. WAD00000000

D.O.T. PROPER  
SHIPPING NAME Added by transporter

AND

U.N. OR  
N.A. NO. Added by transporter

GENERATOR  
NAME Client Name

ADDRESS 1234 Site Address

CITY Seattle STATE Washington

E.P.A.  
I.D. NO. WAD000000000 MANIFEST  
DOCUMENT NO. Added by transporter

## HAZARDOUS WASTE HANDLE WITH CARE

**WASHINGTON STATE DANGEROUS WASTE  
WA. STATE LAW PROHIBITS IMPROPER DISPOSAL**

**IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY  
AUTHORITY, AND THE WASHINGTON STATE DEPT. OF ECOLOGY  
(NOT REGULATED BY U.S. E.P.A. 40 CFR PART 261)**

**ACCUMULATION.**  
**START DATE** First day waste added **STATE WASTE** WT01  
**CODES**

**SHIPPING NAME** Added by transporter

**AND** \_\_\_\_\_

**CONSTITUENTS** Lead, Chromium

**GENERATOR**  
**NAME** Client Name

**ADDRESS** 1234 Site Address

**CITY** Seattle **STATE** Washington

**E.P.A. / STATE**  
**I.D. NO.** WAD000000000 **MANIFEST** Added by transporter  
**DOCUMENT NO.**

**WASHINGTON STATE DANGEROUS WASTE  
HANDLE WITH CARE**







ALS Environmental  
 1317 South 13th Ave  
 Kelso, WA 98626  
 (Tel) 360.577.7222  
 (Fax) 360.636.1068

# Chain of Custody Form

Page \_\_\_\_\_ of \_\_\_\_\_

Customer Information		Project Information					Parameter/Method Request for Analysis											
Purchase Order		Project Name					A											
Work Order		Project Number					B											
Company Name		Bill To Company					C											
Send Report To		Invoice Attn.					D											
Address		Address					E											
							F											
City/State/Zip		City/State/Zip					G											
Phone		Phone					H											
Fax		Fax					I											
e-Mail Address							J											
No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold	
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
Sampler(s): Please Print & Sign		Shipment Method:		Required Turnaround Time: (Check Box)					<input checked="" type="checkbox"/> Other _____					Results Due Date:				
				<input type="checkbox"/> 10 Wk Days <input type="checkbox"/> 5 Wk Days <input type="checkbox"/> 3 Wk Days <input type="checkbox"/> 2 Wk Days <input type="checkbox"/> 24 Hour														
Relinquished by:		Date:	Time:	Received by:		Date:	Time:	Notes:										
								ALS Cooler ID		Cooler Temp		QC Package: (Check Box Below)						
Relinquished by:		Date:	Time:	Received by (Laboratory):		Date:	Time:					<input type="checkbox"/> Level II: Standard QC		<input type="checkbox"/> Level III: Raw Data				
Logged by (Laboratory):		Date:	Time:	Checked by (Laboratory):								<input type="checkbox"/> TRRP LRC		<input type="checkbox"/> TRRP Level IV				
												<input type="checkbox"/> Level IV: SW846 Methods/CLP like						
												<input type="checkbox"/> Other: _____						
Preservative Key: 1-HCl   2-HNO <sub>3</sub> 3-H <sub>2</sub> SO <sub>4</sub> 4-NaOH   5-Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 6-NaHSO <sub>4</sub> 7-Other   8-4°C							Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.											

**APPENDIX E**  
**LABORATORY ACCREDITATION CERTIFICATES**

PRE- AND POLY-FLUOROALKYL SUBSTANCES  
CHARACTERIZATION STUDY WORK PLAN ADDENDUM

Lower Issaquah Valley  
Issaquah, Washington

Farallon PN: 1754-004



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

*Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:*

***ALS Environmental-Kelso***  
***1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626***

*(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of ISO/IEC 17025:2017 “General Requirements for the competence of Testing and Calibration Laboratories” and the DoD Quality Systems Manual for Environmental Laboratories Version 5.3 May 2019 and is accredited in accordance with the:*

### **United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)**

***This accreditation demonstrates technical competence for the defined scope:  
Chemical and Environmental Testing  
(As detailed in the supplement)***

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body’s duty to observe and comply with the said rules.

For PJLA:

*Initial Accreditation Date:*                      *Issue Date:*                      *Expiration Date:*  
July 19, 2011                                      July 10, 2020                                      July 10, 2022

Tracy Szerszen  
President

*Accreditation No.:*                                      *Certificate No.:*  
65188    L20-395

Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48084

*The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: [www.pjilabs.com](http://www.pjilabs.com)*



# Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

## ALS Environmental-Kelso

1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626  
Contact Name: Bob Dirirnz Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 1631E	CVAFS	Mercury (Low level)
Aqueous	EPA 1664A	Gravimetry	Hexane Extractable Material (HEM)
Aqueous	EPA 1664A	Gravimetry	Total Petroleum Hydrocarbons (TPH)
Aqueous	EPA 180.1	Turbidimetry	Turbidity
Aqueous	SM 2340B	Calculation by 6010	Hardness as CaCO <sub>3</sub>
Aqueous	EPA 245.1	CVAA	Mercury
Aqueous	EPA 300.0	IC	Bromide
Aqueous	EPA 300.0	IC	Chloride
Aqueous	EPA 300.0	IC	Fluoride
Aqueous	EPA 300.0	IC	Nitrate
Aqueous	EPA 300.0	IC	Nitrite as N
Aqueous	EPA 300.0	IC	Sulfate
Aqueous	EPA 353.2	Colorimetry	Nitrate + Nitrite as N
Aqueous	EPA 7196A	Colorimetry	Chromium VI
Aqueous	EPA 7470A	CVAA	Mercury
Aqueous	EPA 8260C SIM	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,1,2-Trichloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,1-Dichloroethene
Aqueous	EPA 8260C SIM	GC-MS	1,2-Dibromoethane
Aqueous	EPA 8260C SIM	GC-MS	1,2-Dichloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,4-Dichlorobenzene
Aqueous	EPA 8260C SIM	GC-MS	Bromodichloromethane
Aqueous	EPA 8260C SIM	GC-MS	Carbon Tetrachloride
Aqueous	EPA 8260C SIM	GC-MS	Chlorodibromomethane
Aqueous	EPA 8260C SIM	GC-MS	Chloroform
Aqueous	EPA 8260C SIM	GC-MS	Chloromethane
Aqueous	EPA 8260C SIM	GC-MS	cis-1,2-Dichloroethene
Aqueous	EPA 8260C SIM	GC-MS	Dichloromethane (Methylene Chloride)
Aqueous	EPA 8260C SIM	GC-MS	Tetrachloroethene
Aqueous	EPA 8260C SIM	GC-MS	trans-1,2-Dichloroethene
Aqueous	EPA 8260C SIM	GC-MS	Trichloroethene
Aqueous	EPA 8260C SIM	GC-MS	Vinyl chloride
Aqueous	EPA 9020B	Titrimetry	Total Organic Halides (TOX)
Aqueous	EPA 9040C	Potentiometry	pH



# Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

## ALS Environmental-Kelso

1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626  
 Contact Name: Bob Dirinzo Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

Matrix	Standard/Method	Technology	Analyte
Aqueous	Kelada-01	Colormetric	Cyanide
Aqueous	SM 2130B	Turbidimetry	Turbidity
Aqueous	SM 2320B	Titrimetry	Total Alkalinity (as CaCO <sub>3</sub> )
Aqueous	SM 2510B	Potentiometry	Specific Conductance
Aqueous	SM 2540B	Gravimetry	Solids, Total
Aqueous	SM 2540C	Gravimetry	Solids, Total Dissolved
Aqueous	SM 2540D	Gravimetry	Solids, Total Suspended
Aqueous	SM 4500-CN- G	Colorimetry	Cyanide, Amenable
Aqueous	SM 4500-P-E	Colorimetry	ortho-phosphorous
Aqueous	SM 4500-S2 D	Titrimetry	Sulfide
Aqueous	SM 4500-CN E	Colorimetry	Total Cyanide
Aqueous	SM4500-NH3 G	Colorimetry	Ammonia
Aqueous	SM5220C	Titrimetry	Chemical Oxygen Demand (COD)
Aqueous	SM5310C	UV-VIS Spectrophotometry	Total Organic Carbons (TOC)
Drinking Water	EPA 504.1	GC-ECD	1,2-Dibromo-3-chloropropane (DBCP)
Drinking Water	EPA 504.1	GC-ECD	1,2-Dibromoethane (EDB)
Drinking Water	EPA 524.2	GC-MS	1,1,1,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC-MS	1,1,1-Trichloroethane
Drinking Water	EPA 524.2	GC-MS	1,1,2,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloroethane
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	1,2,3-Trichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2,3-Trichloropropane
Drinking Water	EPA 524.2	GC-MS	1,2,4-Trichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2,4-Trimethylbenzene
Drinking Water	EPA 524.2	GC-MS	1,2-Dibromoethane (EDB)
Drinking Water	EPA 524.2	GC-MS	1,2-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2-Dichloroethane
Drinking Water	EPA 524.2	GC-MS	1,2-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	1,3,5-Trimethylbenzene
Drinking Water	EPA 524.2	GC-MS	1,3-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,3-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	1,4-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	2,2-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	2-Chlorotoluene
Matrix	Standard/Method	Technology	Analyte



# Certificate of Accreditation: Supplement

## ISO/IEC 17025:2005 and DoD-ELAP

### ALS Environmental-Kelso

1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626  
Contact Name: Bob Diriranzo Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

Drinking Water	EPA 524.2	GC-MS	4-Chlorotoluene
Drinking Water	EPA 524.2	GC-MS	4-Isopropyltoluene
Drinking Water	EPA 524.2	GC-MS	Benzene
Drinking Water	EPA 524.2	GC-MS	Bromobenzene
Drinking Water	EPA 524.2	GC-MS	Bromochloromethane
Drinking Water	EPA 524.2	GC-MS	Bromodichloromethane
Drinking Water	EPA 524.2	GC-MS	Bromoform
Drinking Water	EPA 524.2	GC-MS	Bromomethane
Drinking Water	EPA 524.2	GC-MS	Carbon Tetrachloride
Drinking Water	EPA 524.2	GC-MS	Chlorobenzene
Drinking Water	EPA 524.2	GC-MS	Chlorodibromomethane
Drinking Water	EPA 524.2	GC-MS	Chloroethane
Drinking Water	EPA 524.2	GC-MS	Chloroform
Drinking Water	EPA 524.2	GC-MS	Chloromethane
Drinking Water	EPA 524.2	GC-MS	cis-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	cis-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	Dibromomethane
Drinking Water	EPA 524.2	GC-MS	Dichlorodifluoromethane
Drinking Water	EPA 524.2	GC-MS	Dichloromethane (Methylene Chloride)
Drinking Water	EPA 524.2	GC-MS	Ethylbenzene
Drinking Water	EPA 524.2	GC-MS	Hexachlorobutadiene
Drinking Water	EPA 524.2	GC-MS	Isopropylbenzene
Drinking Water	EPA 524.2	GC-MS	Naphthalene
Drinking Water	EPA 524.2	GC-MS	n-Butylbenzene
Drinking Water	EPA 524.2	GC-MS	n-Propylbenzene
Drinking Water	EPA 524.2	GC-MS	sec-Butylbenzene
Drinking Water	EPA 524.2	GC-MS	Styrene
Drinking Water	EPA 524.2	GC-MS	tert-butylbenzene
Drinking Water	EPA 524.2	GC-MS	Tetrachloroethene
Drinking Water	EPA 524.2	GC-MS	Toluene
Drinking Water	EPA 524.2	GC-MS	trans-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	trans-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	Trichloroethene
Drinking Water	EPA 524.2	GC-MS	Trichlorofluoromethane (Freon 11)



# Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

## ALS Environmental-Kelso

1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626  
Contact Name: Bob Diriranzo Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

Matrix	Standard/Method	Technology	Analyte
Drinking Water	EPA 524.2	GC-MS	Vinyl chloride
Drinking Water	EPA 524.2	GC-MS	Xylenes, total
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorobutanesulfonic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorodecanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorododecanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluoroheptanoic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorohexanesulfonic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorohexanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorononanoic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorooctanesulfonic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorooctanoic Acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorotetradecanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluorotridecanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	Perfluoroundecanoic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	N-Ethylperfluoro-1-octanesulfonamidoacetic acid
Drinking Water	EPA 537 1.1	HPLC/MS/MS	N-Methylperfluoro-1-octanesulfonamidoacetic acid
Solid	ASTM D422-63 (2007)	Gravimetric	Particle Size
Solid	ASTM D4129-05M, Lloyd Kahn	Coulmetry	Total Organic Carbons (TOC)
Solid	EPA 160.3M	Gravimetry	Solids, Total
Solid	EPA 1631E	CVFAS	Mercury (low level)
Solid	EPA 9045D	Potentiometry	pH
Solid	EPA 9056A	IC	Nitrate as N
Solid	EPA 9071A	Gravimetry	Hexane Extractable Material (HEM)
Solid	PSEP	Gravimetry	Particle Size
Solid	SOP-GEN-AVS	Colorimetry	Acid Volatile Sulfides
Aqueous/Solid	ASTM D 1426-93B	Potentiometry	Nitrogen, Total Kjeldahl (TKN)
Aqueous/Solid	EPA 1020A	Physical Property	Ignitability
Aqueous/Solid	EPA 350.1	Colorimetry	Ammonia
Aqueous/Solid	EPA 365.3	Colorimetry	Total Phosphorus
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Aluminum
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Antimony
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Arsenic
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Barium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Beryllium





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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Boron
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Cadmium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Calcium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Chromium, total
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Cobalt
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Copper
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Iron
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Lead
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Magnesium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Manganese
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Molybdenum
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Nickel
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Potassium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Selenium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Silver
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Sodium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Strontium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Thallium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Tin
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Titanium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Vanadium
Aqueous/Solid	EPA 6010B, C, D/200.7	ICP	Zinc
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Aluminum
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Antimony
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Arsenic
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Barium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Beryllium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Boron
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Cadmium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Chromium, total
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Cobalt
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Copper
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Iron
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Lead
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Manganese



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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Molybdenum
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Nickel
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Selenium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Silver
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Strontium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Thallium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Tin
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Titanium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Vanadium
Aqueous/Solid	EPA 6020, A, B /200.8	ICP-MS	Zinc
Aqueous	EPA 6020, A, B /200.8	ICP-MS	Calcium
Aqueous	EPA 6020, A, B /200.8	ICP-MS	Potassium
Aqueous	EPA 6020, A, B /200.8	ICP-MS	Magnesium
Aqueous	EPA 6020, A, B /200.8	ICP-MS	Sodium
Aqueous/Solid	EPA 8015C/AK103-RRO-NWTPH-Rx	GC-FID	Residual Range Organics (RRO)
Aqueous/Solid	EPA 8015C; AK101-GRO; NWTPH-Gx	GC-FID	Gasoline Range Organics (GRO)
Aqueous/Solid	EPA 8015C; AK102-DRO; NWTPH-Dx	GC-FID	Diesel Range Organics (DRO)
Aqueous/Solid	EPA 8081A, B	GC-ECD	Aldrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Alpha-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	alpha-Chlordane
Aqueous/Solid	EPA 8081A, B	GC-ECD	Chlordane (total)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDD (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDE (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDT (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	delta-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	Dieldrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan I
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan II
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan sulfate
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin aldehyde
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin ketone



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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8081A, B	GC-ECD	gamma-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	gamma-Chlordane
Aqueous/Solid	EPA 8081A, B	GC-ECD	Heptachlor
Aqueous/Solid	EPA 8081A, B	GC-ECD	Heptachlor Epoxide (beta)
Aqueous/Solid	EPA 8081A, B	GC-ECD	Methoxychlor
Aqueous/Solid	EPA 8081A, B	GC-ECD	Toxaphene (total)
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDD
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDE
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDT
Aqueous/Solid	EPA 8081B	GC-ECD	Chlorpyrifos
Aqueous/Solid	EPA 8081B	GC-ECD	cis-Nonachlor
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachlorobenzene
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachlorobutadiene
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachloroethane
Aqueous/Solid	EPA 8081B	GC-ECD	Isodrin
Aqueous/Solid	EPA 8081B	GC-ECD	Mirex
Aqueous/Solid	EPA 8081B	GC-ECD	Oxychlordane
Aqueous/Solid	EPA 8081B	GC-ECD	trans-Nonachlor
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (PCB 206)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB 195)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4',5,5',6,6' Decachlorobiphenyl (PCB 209)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB 170)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB 183)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4,4',6,6'-Heptachlorobiphenyl (PCB 184)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB 187)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,4',5-Pentachlorobiphenyl (PCB 90)



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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,5'-Tetrachlorobiphenyl (PCB 44)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',5-Trichlorobiphenyl (PCB 18)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3',4,4',6-Hexachlorobiphenyl (PCB 158)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3',4,4',5,5' Hexachlorobiphenyl (PCB 167)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3',4,4',5',6-Hexachlorobiphenyl (PCB 168)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3',4,4',5-Pentachlorobiphenyl (PCB 123)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,4,4'-Tetrachlorobiphenyl (PCB 60)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3',4,4'-Tetrachlorobiphenyl (PCB 66)
Aqueous/Solid	EPA 8082A	GC-ECD	2,4,4'-Trichlorobiphenyl (PCB 28)
Aqueous/Solid	EPA 8082A	GC-ECD	2,4'-Dichlorobiphenyl (PCB 8)
Aqueous/Solid	EPA 8082A	GC-ECD	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)
Aqueous/Solid	EPA 8082A	GC-ECD	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
Aqueous/Solid	EPA 8082A	GC-ECD	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)
Aqueous/Solid	EPA 8082A	GC-ECD	3,4,4',5-Tetrachlorobiphenyl (PCB 81)
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1016
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1221
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1232
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1242
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1248
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1254
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1260
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1262
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1268
Aqueous/Solid	EPA 8151A	GC-ECD	2,4,5-T
Aqueous/Solid	EPA 8151A	GC-ECD	2,4-D
Aqueous/Solid	EPA 8151A	GC-ECD	2,4-DB
Aqueous/Solid	EPA 8151A	GC-ECD	Dalapon



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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8151A	GC-ECD	Dicamba
Aqueous/Solid	EPA 8151A	GC-ECD	Dichloroprop
Aqueous/Solid	EPA 8151A	GC-ECD	Dinoseb
Aqueous/Solid	EPA 8151A	GC-ECD	MCPA
Aqueous/Solid	EPA 8151A	GC-ECD	MCPPP
Aqueous/Solid	EPA 8151A	GC-ECD	Silvex (2,4,5-TP)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1,1,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1,1-Trichloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1,2-Trichloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1-Dichloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2-Dibromoethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2-Dichloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,3,5-Trimethylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,3-Dichloropropane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1-phenylpropane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	2,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	2-Butanone (MEK)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	2-Chloroethylvinylether
Aqueous/Solid	EPA 8260B, C, D	GC-MS	2-Chlorotoluene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	2-Hexanone
Aqueous/Solid	EPA 8260B, C, D	GC-MS	4-Chlorotoluene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	4-Isopropyltoluene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	4-Methyl-2-pentanone (MIBK)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Acetone
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Acetonitrile
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Acrolein
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Acrylonitrile
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Benzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Bromobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Bromochloromethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Bromodichloromethane



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<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Bromoform
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Bromomethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Carbon disulfide
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Carbon Tetrachloride
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Chlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Chlorodibromomethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Chloroethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Chloroform
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Chloromethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Dibromomethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Dichlorodifluoromethane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Dichloromethane (Methylene Chloride)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Di-isopropylether (DIPE)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	ETBE
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Ethylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Freon 11
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Freon 113
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Isopropylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Methyl-tert-butylether (MTBE)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Naphthalene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	n-Butylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	n-Propylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	sec-Butylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Styrene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	tert-amylmethylether (TAME)
Aqueous/Solid	EPA 8260B, C, D	GC-MS	tert-Butyl alcohol
Aqueous/Solid	EPA 8260B, C, D	GC-MS	tert-butylbenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Tetrachloroethene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Toluene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Trichloroethene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Trichlorofluoromethane (Freon 11)



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<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Vinyl acetate
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Vinyl chloride
Aqueous/Solid	EPA 8260B, C, D	GC-MS	Xylene, total
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1-Dichloroethene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,1-Dichloropropene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2,3-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2,3-Trichloropropane
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C, D	GC-MS	1,2,4-Trimethylbenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4,5-Trichlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4,6-Trichlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4-Dichlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4-Dimethylphenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4-Dinitrophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,4-Dinitrotoluene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,6-Dinitrotoluene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Chloronaphthalene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Chlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Methyl-4,6-Dinitrophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Methylphenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Nitroaniline
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2-Nitrophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	3,3-Dichlorobenzidine
Aqueous/Solid	EPA 8270C, D, E	GC-MS	3-Nitroaniline
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Bromophenyl-phenylether
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Chloro-3-methylphenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Chloroaniline
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Chlorophenyl-phenylether
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Methylphenol (and/or 3-Methylphenol)
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Nitroaniline
Aqueous/Solid	EPA 8270C, D, E	GC-MS	4-Nitrophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Acenaphthene



# Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

## ALS Environmental-Kelso

1317 South 13<sup>th</sup> Avenue, Kelso, WA 98626  
Contact Name: Bob Dirirnzio Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Acenaphthylene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Aniline
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Anthracene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzidine
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzo(b)fluoranthene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzo(k)fluoranthene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzoic acid
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Benzyl alcohol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	bis(2-Chloroethoxy)methane
Aqueous/Solid	EPA 8270C, D, E	GC-MS	bis(2-Chloroethyl)ether
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,2'-oxybis(1-Chloropropane)
Aqueous/Solid	EPA 8270C, D, E	GC-MS	bis(2-ethylhexy)phthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Butyl benzyl phthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Carbazole
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Chrysene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Dibenzofuran
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Diethyl phthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Dimethylphthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	di-n-butylphthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Di-n-octylphthalate
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Fluoranthene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Fluorene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Hexachlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Hexachlorocyclopentadiene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Hexachloroethane
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Indeno(1,2,3, cd)pyrene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Isophorone
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Naphthalene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Nitrobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	N-Nitrosodimethylamine
Aqueous/Solid	EPA 8270C, D, E	GC-MS	N-Nitroso-di-n-propylamine





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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	EPA 8270C, D, E	GC-MS	N-Nitrosodiphenylamine
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Pentachlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Pentachlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Phenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Pyrene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	Pyridine
Aqueous/Solid	EPA 8270C, D, E	GC-MS	2,3,4,6-Tetrachlorophenol
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1,2,4,5-Tetrachlorobenzene
Aqueous/Solid	EPA 8270C, D, E	GC-MS	1- Methylnaphthalene
Aqueous/Solid	EPA 8270 SIM	GC-MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Acenaphthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Acenaphthylene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(b)fluoranthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(k)fluoranthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Chrysene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Fluoranthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Fluorene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Indeno(1,2,3, cd)pyrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Naphthalene
Aqueous/Solid	EPA 8270 SIM	GC-MS	p-Dioxane
Aqueous/Solid	EPA 8270 SIM	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Pyrene
Aqueous/Solid	EPA 9012B	Colorimetry	Total Cyanide
Aqueous/Solid	EPA 9030B	Distillation	Sulfide
Aqueous/Solid	EPA 9056A	IC	Bromide
Aqueous/Solid	EPA 9056A	IC	Chloride
Aqueous/Solid	EPA 9056A	IC	Fluoride
Aqueous/Solid	EPA 9056A	IC	Sulfate
Aqueous/Solid	EPA 9060A	UV-VIS Spectrophotometry	Total Organic Carbons (TOC)



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*Accreditation is granted to the facility to perform the following testing:*

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	4:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	6:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	8:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Ethylperfluorooctanesulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Ethylperfluorooctanesulfonamidoethanol
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamidoethanol
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluoroheptane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorooctane Sulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorotetradecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorotridecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorobutane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorobutanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorodecane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorodecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorododecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluoroheptanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorohexane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorohexanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorononanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorooctane sulfonic acid



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**ALS Environmental-Kelso**

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*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluorooctanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluoropentanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	Perfluoroundecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Ethylperfluorooctanesulfonamidoacetic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamidoacetic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	PFPeS
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	PFNS
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15	LC/MS/MS	10:2 FTS
Aqueous/Solid	SOC-Butyl	GC-FPD	Di-n-butyltin
Aqueous/Solid	SOC-Butyl	GC-FPD	n-Butyltin
Aqueous/Solid	SOC-Butyl	GC-FPD	Tetra-n-butyltin
Aqueous/Solid	SOC-Butyl	GC-FPD	Tri-n-butyltin



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## ALS Environmental-Kelso

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Contact Name: Bob Dirirnz Phone: 801-502-8041

*Accreditation is granted to the facility to perform the following testing:*

<b>Matrix</b>	<b>Standard/Method</b>	<b>Technology</b>	<b>Analyte</b>
Aqueous	EPA 1640	Reductive Metals Precipitation	Prep Method
Aqueous	EPA 3010A	Acid Digestion	Metals Digestion
Aqueous	EPA 3020A	Acid Digestion	Metals Digestion
Aqueous	EPA 3510C	Separatory Liquid- Liquid Extraction	Extractable Prep
Aqueous	EPA 3511	Microextraction	Extractable Prep
Aqueous	EPA 3520C	Continuous Liquid- Liquid Extraction	Extractable Prep
Aqueous	EPA 3535A	Solid Phase Extraction	Prep Method
Aqueous	EPA 5030B	Purge and Trap	Volatile Prep
Aqueous	SOP-MET-DIG	Acid Digestion	Metals Digestion
Solid	EPA 3050B	Acid Digestion	Metals Digestion
Solid	EPA 3060	Alkaline Digestion	Alkaline Digestion for Cr (VI) only
Solid	EPA 3541	Automated Soxhlet Extraction	Extractable Prep
Solid	EPA 3546	Microwave Extraction	Extractable Prep
Solid	EPA 3550B	Ultrasonic Extraction	Extractable Prep
Solid	EPA 5035A	Purge and Trap	Voc Organics
Solid	EPA 5050	Bomb Digestion	Prep Method
Solid	EPA 9013	Midi-Distillation	Cyanides
Solid	SOP-GEN-AVS	Acid Digestion	Simultaneously Extracted Metals
Aqueous/Solids	ASTM D3590-89	Digestion	TKN
Aqueous/Solids	EPA 1311	TCLP Extraction	Physical Extraction
Aqueous/Solids	EPA 1312	SPLP Extraction	Physical Extraction
Aqueous/Solids	EPA 3620C	Florisil Clean Up	Extractable Cleanup
Aqueous/Solids	EPA 3630C	Silica Gel Clean Up	Extractable Prep
Aqueous/Solids	EPA 3640A	Gel-Permeation Clean Up	Extractable Cleanup
Aqueous/Solids	EPA 3660	Sulfur Clean Up	Extractable Prep
Aqueous/Solids	EPA 3665A	Acid Clean Up	Extractable Cleanup

The State of  
Department



Washington  
of Ecology

**ALS Environmental - Kelso**  
**Kelso, 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 9, 2020 and shall expire July 8, 2021.

Witnessed under my hand on July 06, 2020.

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Rebecca Wood  
Lab Accreditation Unit Supervisor

Laboratory ID  
**C544**

# WASHINGTON STATE DEPARTMENT OF ECOLOGY

## ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

### SCOPE OF ACCREDITATION

#### ALS Environmental - Kelso

#### Kelso, WA

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. EPA is the U.S. Environmental Protection Agency. SM is "Standard Methods for the Examination of Water and Wastewater." SM refers to EPA approved method versions. ASTM is the American Society for Testing and Materials. USGS is the U.S. Geological Survey. AOAC is the Association of Official Analytical Chemists. Other references are described in notes.

Matrix/Analyte	Method	Notes
<b>Drinking Water</b>		
Chloride	EPA 300.0_2.1_1993	
Fluoride	EPA 300.0_2.1_1993	
Nitrate	EPA 300.0_2.1_1993	
Nitrite	EPA 300.0_2.1_1993	
Sulfate	EPA 300.0_2.1_1993	
Bromate	EPA 300.1_1_1997	
Bromide	EPA 300.1_1_1997	
Chlorate	EPA 300.1_1_1997	
Chlorite	EPA 300.1_1_1997	
Cyanide, Total	EPA 335.4_1_1993	
Nitrate	EPA 353.2_2_1993	
Nitrite	EPA 353.2_2_1993	
Color	SM 2120 B-2011	
Alkalinity	SM 2320 B-2011	
Specific Conductance	SM 2510 B-2011	
Solids, Total Dissolved	SM 2540 C-2011	
Cyanide, Total	SM 4500-CN <sup>-</sup> E-2011	
Fluoride	SM 4500-F <sup>-</sup> C-2011	
pH	SM 4500-H <sup>+</sup> B-2011	1
Orthophosphate	SM 4500-P E-2011	
Total Organic Carbon	SM 5310 C-2011	
Aluminum	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	

ALS Environmental - Kelso

Matrix/Analyte	Method	Notes
<b>Drinking Water</b>		
Calcium	EPA 200.7_4.4_1994	
Chromium	EPA 200.7_4.4_1994	
Copper	EPA 200.7_4.4_1994	
Hardness, Total (as CaCO3)	EPA 200.7_4.4_1994	
Iron	EPA 200.7_4.4_1994	
Magnesium	EPA 200.7_4.4_1994	
Manganese	EPA 200.7_4.4_1994	
Nickel	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	
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	
Nickel	EPA 200.8_5.4_1994	
Selenium	EPA 200.8_5.4_1994	
Silver	EPA 200.8_5.4_1994	
Thallium	EPA 200.8_5.4_1994	
Uranium	EPA 200.8_5.4_1994	
Zinc	EPA 200.8_5.4_1994	
Mercury	EPA 245.1_3_1994	
1,2,3-Trichloropropane	EPA 504.1_1.1_1995	
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504.1_1.1_1995	
Dibromochloropropane	EPA 504.1_1.1_1995	
Bromoacetic acid (MBAA, BAA)	EPA 552.2_1_1995	5
Bromochloroacetic acid (BCAA)	EPA 552.2_1_1995	5
Chloroacetic acid (MCAA, CAA)	EPA 552.2_1_1995	5
Dibromoacetic acid (DBAA)	EPA 552.2_1_1995	5
Dichloroacetic acid (DCAA)	EPA 552.2_1_1995	5

ALS Environmental - Kelso

Matrix/Analyte	Method	Notes
<b>Drinking Water</b>		
Total haloacetic acids (HAA5)	EPA 552.2_1_1995	5
Trichloroacetic acid (TCAA)	EPA 552.2_1_1995	5
1,1,1,2-Tetrachloroethane	EPA 524.2_4.1_1995	
1,1,1-Trichloroethane	EPA 524.2_4.1_1995	
1,1,2,2-Tetrachloroethane	EPA 524.2_4.1_1995	
1,1,2-Trichloroethane	EPA 524.2_4.1_1995	
1,1-Dichloroethane	EPA 524.2_4.1_1995	
1,1-Dichloroethylene	EPA 524.2_4.1_1995	
1,1-Dichloropropene	EPA 524.2_4.1_1995	
1,2,3-Trichlorobenzene	EPA 524.2_4.1_1995	
1,2,3-Trichloropropane	EPA 524.2_4.1_1995	
1,2,4-Trichlorobenzene	EPA 524.2_4.1_1995	
1,2,4-Trimethylbenzene	EPA 524.2_4.1_1995	
1,2-Dibromo-3-chloropropane (DBCP)	EPA 524.2_4.1_1995	
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 524.2_4.1_1995	
1,2-Dichlorobenzene	EPA 524.2_4.1_1995	
1,2-Dichloroethane (Ethylene dichloride)	EPA 524.2_4.1_1995	
1,2-Dichloropropane	EPA 524.2_4.1_1995	
1,3,5-Trimethylbenzene	EPA 524.2_4.1_1995	
1,3-Dichlorobenzene	EPA 524.2_4.1_1995	
1,3-Dichloropropane	EPA 524.2_4.1_1995	
1,4-Dichlorobenzene	EPA 524.2_4.1_1995	
2,2-Dichloropropane	EPA 524.2_4.1_1995	
2-Butanone (Methyl ethyl ketone, MEK)	EPA 524.2_4.1_1995	
2-Chlorotoluene	EPA 524.2_4.1_1995	
2-Hexanone	EPA 524.2_4.1_1995	
4-Chlorotoluene	EPA 524.2_4.1_1995	
4-Isopropyltoluene (p-Cymene)	EPA 524.2_4.1_1995	
4-Methyl-2-pentanone (MIBK)	EPA 524.2_4.1_1995	
Acetone	EPA 524.2_4.1_1995	
Benzene	EPA 524.2_4.1_1995	
Bromobenzene	EPA 524.2_4.1_1995	
Bromochloromethane	EPA 524.2_4.1_1995	
Bromodichloromethane	EPA 524.2_4.1_1995	
Bromoform	EPA 524.2_4.1_1995	
Carbon disulfide	EPA 524.2_4.1_1995	
Carbon tetrachloride	EPA 524.2_4.1_1995	



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Matrix/Analyte	Method	Notes
<b>Drinking Water</b>		
Chlorobenzene	EPA 524.2_4.1_1995	
Chlorodibromomethane	EPA 524.2_4.1_1995	
Chloroethane (Ethyl chloride)	EPA 524.2_4.1_1995	
Chloroform	EPA 524.2_4.1_1995	
cis-1,2-Dichloroethylene	EPA 524.2_4.1_1995	
cis-1,3-Dichloropropene	EPA 524.2_4.1_1995	
Dibromomethane	EPA 524.2_4.1_1995	
Dichlorodifluoromethane (Freon-12)	EPA 524.2_4.1_1995	
Dichloromethane (DCM, Methylene chloride)	EPA 524.2_4.1_1995	
Ethylbenzene	EPA 524.2_4.1_1995	
Hexachlorobutadiene	EPA 524.2_4.1_1995	
Isopropylbenzene	EPA 524.2_4.1_1995	
m+p-xylene	EPA 524.2_4.1_1995	
Methyl bromide (Bromomethane)	EPA 524.2_4.1_1995	
Methyl chloride (Chloromethane)	EPA 524.2_4.1_1995	
Methyl tert-butyl ether (MTBE)	EPA 524.2_4.1_1995	
Naphthalene	EPA 524.2_4.1_1995	
n-Butylbenzene	EPA 524.2_4.1_1995	
n-Propylbenzene	EPA 524.2_4.1_1995	
o-Xylene	EPA 524.2_4.1_1995	
sec-Butylbenzene	EPA 524.2_4.1_1995	
Styrene	EPA 524.2_4.1_1995	
tert-Butylbenzene	EPA 524.2_4.1_1995	
Tetrachloroethylene (Perchloroethylene)	EPA 524.2_4.1_1995	
Toluene	EPA 524.2_4.1_1995	
Total Trihalomethanes	EPA 524.2_4.1_1995	
trans-1,2-Dichloroethylene	EPA 524.2_4.1_1995	
trans-1,3-Dichloropropylene	EPA 524.2_4.1_1995	
Trichloroethene (Trichloroethylene)	EPA 524.2_4.1_1995	
Trichlorofluoromethane (Freon 11)	EPA 524.2_4.1_1995	
Vinyl chloride	EPA 524.2_4.1_1995	
Xylene (total)	EPA 524.2_4.1_1995	
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	EPA 537_1.1_2009	3
N-Methylperfluorooctane sulfonamido acetic acid (NMeFOSAA)	EPA 537_1.1_2009	3
Perfluorobutane sulfonate (PFBS)	EPA 537_1.1_2009	3
Perfluorodecanoic acid (PFDA)	EPA 537_1.1_2009	3
Perfluorododecanoic acid (PFDoA)	EPA 537_1.1_2009	3

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Matrix/Analyte	Method	Notes
<b>Drinking Water</b>		
Perfluoroheptanoic acid (PFHpA)	EPA 537_1.1_2009	3
Perfluorohexane sulfonate (PFHxS)	EPA 537_1.1_2009	3
Perfluorohexanoic acid (PFHxA)	EPA 537_1.1_2009	3
Perfluorononanoic acid (PFNA)	EPA 537_1.1_2009	3
Perfluorooctane sulfonate (PFOS)	EPA 537_1.1_2009	3
Perfluorooctanoic acid (PFOA)	EPA 537_1.1_2009	3,5
Perfluorotetradecanoic acid (PFTeDA)	EPA 537_1.1_2009	3,5
Perfluorotridecanoic acid (PFTrDA)	EPA 537_1.1_2009	3
Perfluoroundecanoic acid (PFUnA)	EPA 537_1.1_2009	3
Heterotrophic Bacteria	SM 9215 B (PCA)	
Fecal coliform-count	SM 9222 D (mFC)-06	
Total coli/E.coli - detect	SM 9223 B Colilert 18® (PA)	
E.coli-count	SM 9223 B Colilert 18® QTray®	
Total coli/E.coli - detect	SM 9223 B Colilert® 24 (PA)	
E.coli-count	SM 9223 B Colilert® 24 QTray®	
<b>Non-Potable Water</b>		
Nitrogen, Total Kjeldahl	ASTM D1426-08B	
Formaldehyde	ASTM D19	
Solids, Total Volatile	EPA 160.4_1971	5
Adsorbable Organic Halides (AOX)	EPA 1650C_1997	
n-Hexane Extractable Material (O&G)	EPA 1664A (SGT-HEM)	
n-Hexane Extractable Material (O&G)	EPA 1664A_1_1999	
Turbidity	EPA 180.1_2_1993	
Bromide	EPA 300.0_2.1_1993	
Chloride	EPA 300.0_2.1_1993	
Fluoride	EPA 300.0_2.1_1993	
Nitrate	EPA 300.0_2.1_1993	
Nitrite	EPA 300.0_2.1_1993	
Sulfate	EPA 300.0_2.1_1993	
Cyanide, Total	EPA 335.4_1_1993	
Ammonia	EPA 350.1_2_1993	
Nitrate	EPA 353.2_2_1993	
Nitrate + Nitrite	EPA 353.2_2_1993	
Nitrite	EPA 353.2_2_1993	
Orthophosphate	EPA 365.3_1978	
Phosphorus, total	EPA 365.3_1978	
Phenolics, Total	EPA 420.1_1978	

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Matrix/Analyte	Method	Notes
<b>Non-Potable Water</b>		
Chlorophyll a	SM 10200H-2011	3
Color	SM 2120 B-2011	
Acidity	SM 2310 B-2011	
Alkalinity	SM 2320 B-2011	
Hardness (calc.)	SM 2340 B-2011	
Hardness, Total (as CaCO3)	SM 2340 C-2011	
Specific Conductance	SM 2510 B-2011	
Solids, Total	SM 2540 B-2011	
Solids, Total Dissolved	SM 2540 C-2011	
Solids, Total Suspended	SM 2540 D-2011	
Solids, Settleable	SM 2540 F-2011	
Chromium, Hexavalent	SM 3500-Cr B-2011	
Chloride	SM 4500-Cl <sup>-</sup> C-2011	5
Cyanide, Total	SM 4500-CN <sup>-</sup> E-2011	
Cyanides, Amenable to Chlorination	SM 4500-CN <sup>-</sup> G-2011	
Fluoride	SM 4500-F <sup>-</sup> C-2011	
pH	SM 4500-H <sup>+</sup> B-2011	1
Ammonia	SM 4500-NH3 E-2011	
Ammonia	SM 4500-NH3 G-2011	
Sulfide	SM 4500-S2 <sup>-</sup> D-2011	
Sulfide	SM 4500-S2 <sup>-</sup> F-2011	
Biochemical Oxygen Demand (BOD)	SM 5210 B-2011	
Chemical Oxygen Demand (COD)	SM 5220 C-2011	
Total Organic Carbon	SM 5310 C-2011	5
Tannin & Lignin	SM 5550 B-93	
Methyl Mercury	EPA 1630	
Mercury	EPA 1631 E-02	
Arsenic	EPA 1632A 1998	
Arsenic (III)	EPA 1632A 1998	
Arsenic (V)	EPA 1632A 1998	
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	

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Matrix/Analyte	Method	Notes
<b>Non-Potable Water</b>		
Calcium	EPA 200.7_4.4_1994	
Chromium	EPA 200.7_4.4_1994	
Cobalt	EPA 200.7_4.4_1994	
Copper	EPA 200.7_4.4_1994	
Hardness, Total (as CaCO <sub>3</sub> )	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	
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	
Cadmium	EPA 200.8_5.4_1994	
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	
Manganese	EPA 200.8_5.4_1994	
Molybdenum	EPA 200.8_5.4_1994	
Nickel	EPA 200.8_5.4_1994	
Selenium	EPA 200.8_5.4_1994	

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Non-Potable Water</b>		
Silver	EPA 200.8_5.4_1994	
Thallium	EPA 200.8_5.4_1994	
Tin	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	
4,4'-DDD	EPA 608.3	3,8
4,4'-DDE	EPA 608.3	3,8
4,4'-DDT	EPA 608.3	3,8
Alachlor	EPA 608.3	3,8
Aldrin	EPA 608.3	3,8
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608.3	3,8
alpha-Chlordane	EPA 608.3	3,8
Aroclor-1016 (PCB-1016)	EPA 608.3	3,8
Aroclor-1221 (PCB-1221)	EPA 608.3	3,8
Aroclor-1232 (PCB-1232)	EPA 608.3	3,8
Aroclor-1242 (PCB-1242)	EPA 608.3	3,8
Aroclor-1248 (PCB-1248)	EPA 608.3	3,8
Aroclor-1254 (PCB-1254)	EPA 608.3	3,8
Aroclor-1260 (PCB-1260)	EPA 608.3	3,8
Atrazine	EPA 608.3	3,8
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608.3	3,8
Chlordane (tech.)	EPA 608.3	3,8
delta-BHC	EPA 608.3	3,8
Dieldrin	EPA 608.3	3,8
Endosulfan I	EPA 608.3	3,8
Endosulfan II	EPA 608.3	3,8
Endosulfan sulfate	EPA 608.3	3,8
Endrin	EPA 608.3	3,8
Endrin aldehyde	EPA 608.3	3,8
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 608.3	3,8
gamma-Chlordane	EPA 608.3	3,8
Heptachlor	EPA 608.3	3,8
Heptachlor epoxide	EPA 608.3	3,8
Hexachlorobenzene	EPA 608.3	3,8
Hexachlorocyclopentadiene	EPA 608.3	3,8
Methoxychlor	EPA 608.3	3,8

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Non-Potable Water</b>		
Metribuzin	EPA 608.3	3,8
Propachlor (Ramrod)	EPA 608.3	3,8
Simazine	EPA 608.3	3,8
Toxaphene (Chlorinated camphene)	EPA 608.3	3,8
Trifluralin (Treflan)	EPA 608.3	3,8
Organo-tins	Krone 1988	
Methanol	NCASI 94.03	
2-Butanone (Methyl ethyl ketone, MEK)	NCASI DI/HAPS-99.01	
Acetaldehyde	NCASI DI/HAPS-99.01	
Methanol	NCASI DI/HAPS-99.01	
Propionaldehyde	NCASI DI/HAPS-99.01	
10:2 Fluorotelomersulfonate (10:2FTS)	ALS LCP-PFC	3
4:2 Fluorotelomersulfonate (4:2FTS)	ALS LCP-PFC	3
6:2 Fluorotelomersulfonate (6:2FTS)	ALS LCP-PFC	3
8:2 Fluorotelomersulfonate (8:2FTS)	ALS LCP-PFC	3
HFPO-DA	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamide (EtFOSA)	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	ALS LCP-PFC	3
N-Ethylperfluorooctanesulfonamidoethanol (EtFOSE)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamide (MeFOSA)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamido acetic acid (NMeFOSAA)	ALS LCP-PFC	3
N-Methylperfluorooctanesulfonamidoethanol (MeFOSE)	ALS LCP-PFC	3
Perfluorobutane sulfonate (PFBS)	ALS LCP-PFC	3
Perfluorobutyric acid (PFBA)	ALS LCP-PFC	3
Perfluorodecane sulfonate (PFDS)	ALS LCP-PFC	3
Perfluorodecanoic acid (PFDA)	ALS LCP-PFC	3
Perfluorododecanoic acid (PFDoA)	ALS LCP-PFC	3
Perfluoroheptane sulfonic acid (PFHpS)	ALS LCP-PFC	3
Perfluoroheptanoic acid (PFHpA)	ALS LCP-PFC	3
Perfluorohexane sulfonate (PFHxS)	ALS LCP-PFC	3
Perfluorohexanoic acid (PFHxA)	ALS LCP-PFC	3
Perfluorononanoic acid (PFNA)	ALS LCP-PFC	3
Perfluorooctane sulfonamide (PFOSA)	ALS LCP-PFC	3
Perfluorooctane sulfonate (PFOS)	ALS LCP-PFC	3
Perfluorooctanoic acid (PFOA)	ALS LCP-PFC	3
Perfluoropentanoic acid (PFPeA)	ALS LCP-PFC	3
Perfluorotetradecanoic acid (PFTeDA)	ALS LCP-PFC	3

ALS Environmental - Kelso

Matrix/Analyte	Method	Notes
<b>Non-Potable Water</b>		
Perfluorotridecanoic acid (PFTTrDA)	ALS LCP-PFC	3
Perfluoroundecanoic acid (PFUnA)	ALS LCP-PFC	3
2,3,4,6-Tetrachlorophenol	EPA 1653A_1997	
2,4,5-Trichlorophenol	EPA 1653A_1997	
2,4,6-Trichlorophenol	EPA 1653A_1997	
3,4,5-Trichlorocatechol	EPA 1653A_1997	
3,4,5-Trichloroguaiacol	EPA 1653A_1997	
3,4,6-Trichlorocatechol	EPA 1653A_1997	
3,4,6-Trichloroguaiacol	EPA 1653A_1997	
4,5,6-Trichloroguaiacol	EPA 1653A_1997	
Pentachlorophenol	EPA 1653A_1997	
Tetrachlorocatechol	EPA 1653A_1997	
Tetrachloroguaiacol	EPA 1653A_1997	
Trichlorosyringol	EPA 1653A_1997	
Acetaminophen	EPA 1694_2007	
Caffeine	EPA 1694_2007	
Fluoxetine	EPA 1694_2007	
Gemfibrozil	EPA 1694_2007	
Ibuprofen	EPA 1694_2007	
Naproxen	EPA 1694_2007	
Triclosan	EPA 1694_2007	
Trimethoprim	EPA 1694_2007	
1,1,1,2-Tetrachloroethane	EPA 624.1	3,9
1,1,1-Trichloroethane	EPA 624.1	3,9
1,1,2,2-Tetrachloroethane	EPA 624.1	3,9
1,1,2-Trichloroethane	EPA 624.1	3,9
1,1-Dichloroethane	EPA 624.1	3,9
1,1-Dichloroethylene	EPA 624.1	3,9
1,2-Dichlorobenzene	EPA 624.1	3,9
1,2-Dichloroethane (Ethylene dichloride)	EPA 624.1	3,9
1,2-Dichloropropane	EPA 624.1	3,9
1,3-Dichlorobenzene	EPA 624.1	3,9
1,4-Dichlorobenzene	EPA 624.1	3,9
2-Butanone (Methyl ethyl ketone, MEK)	EPA 624.1	3,9
2-Chloroethyl vinyl ether	EPA 624.1	3,9
Acetone	EPA 624.1	3,9
Acetonitrile	EPA 624.1	3,9

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Non-Potable Water</b>		
Acrolein (Propenal)	EPA 624.1	3,9
Acrylonitrile	EPA 624.1	3,9
Benzene	EPA 624.1	3,9
Bromodichloromethane	EPA 624.1	3,9
Bromoform	EPA 624.1	3,9
Carbon tetrachloride	EPA 624.1	3,9
Chlorobenzene	EPA 624.1	3,9
Chlorodibromomethane	EPA 624.1	3,9
Chloroethane (Ethyl chloride)	EPA 624.1	3,9
Chloroform	EPA 624.1	3,9
cis-1,3-Dichloropropene	EPA 624.1	3,9
Dichloromethane (DCM, Methylene chloride)	EPA 624.1	3,9
Ethylbenzene	EPA 624.1	3,9
Methyl bromide (Bromomethane)	EPA 624.1	3,9
Methyl chloride (Chloromethane)	EPA 624.1	3,9
Methyl tert-butyl ether (MTBE)	EPA 624.1	3,9
Methylene chloride (Dichloromethane)	EPA 624.1	3,9
Styrene	EPA 624.1	3,9
Tetrachloroethylene (Perchloroethylene)	EPA 624.1	3,9
Toluene	EPA 624.1	3,9
trans-1,2-Dichloroethylene	EPA 624.1	3,9
trans-1,3-Dichloropropylene	EPA 624.1	3,9
Trichloroethene (Trichloroethylene)	EPA 624.1	3,9
Trichlorofluoromethane (Freon 11)	EPA 624.1	3,9
Vinyl chloride	EPA 624.1	3,9
1,2,4-Trichlorobenzene	EPA 625.1	3,10
1,2-Diphenylhydrazine	EPA 625.1	3,10
2,4,6-Trichlorophenol	EPA 625.1	3,10
2,4-Dichlorophenol	EPA 625.1	3,10
2,4-Dimethylphenol	EPA 625.1	3,10
2,4-Dinitrophenol	EPA 625.1	3,10
2,4-Dinitrotoluene (2,4-DNT)	EPA 625.1	3,10
2,6-Dinitrotoluene (2,6-DNT)	EPA 625.1	3,10
2-Chloronaphthalene	EPA 625.1	3,10
2-Chlorophenol	EPA 625.1	3,10
2-Nitrophenol	EPA 625.1	3,10
3,3'-Dichlorobenzidine	EPA 625.1	3,10



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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Non-Potable Water</b>		
4,6-Dinitro-2-methylphenol	EPA 625.1	3,10
4-Bromophenyl phenyl ether (BDE-3)	EPA 625.1	3,10
4-Chloro-3-methylphenol	EPA 625.1	3,10
4-Chlorophenyl phenylether	EPA 625.1	3,10
4-Nitrophenol	EPA 625.1	3,10
Acenaphthene	EPA 625.1	3,10
Acenaphthylene	EPA 625.1	3,10
Anthracene	EPA 625.1	3,10
Atrazine	EPA 625.1	3,10
Benzidine	EPA 625.1	3,10
Benzo(a)anthracene	EPA 625.1	3,10
Benzo(a)pyrene	EPA 625.1	3,10
Benzo(g,h,i)perylene	EPA 625.1	3,10
Benzo(k)fluoranthene	EPA 625.1	3,10
Benzo[b]fluoranthene	EPA 625.1	3,10
Benzoic acid	EPA 625.1	3,10
Biphenyl	EPA 625.1	3,10
bis(2-Chloroethoxy)methane	EPA 625.1	3,10
bis(2-Chloroethyl) ether	EPA 625.1	3,10
bis(2-Chloroisopropyl) ether	EPA 625.1	3,10
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625.1	3,10
Butyl benzyl phthalate	EPA 625.1	3,10
Carbazole	EPA 625.1	3,10
Chrysene	EPA 625.1	3,10
Dibenz(a,h) anthracene	EPA 625.1	3,10
Diethyl phthalate	EPA 625.1	3,10
Dimethyl phthalate	EPA 625.1	3,10
Di-n-butyl phthalate	EPA 625.1	3,10
Di-n-octyl phthalate	EPA 625.1	3,10
Fluoranthene	EPA 625.1	3,10
Fluorene	EPA 625.1	3,10
Hexachlorobenzene	EPA 625.1	3,10
Hexachlorobutadiene	EPA 625.1	3,10
Hexachlorocyclopentadiene	EPA 625.1	3,10
Hexachloroethane	EPA 625.1	3,10
Indeno(1,2,3-cd) pyrene	EPA 625.1	3,10
Isophorone	EPA 625.1	3,10

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Matrix/Analyte	Method	Notes
<b>Non-Potable Water</b>		
Naphthalene	EPA 625.1	3,10
Nitrobenzene	EPA 625.1	3,10
N-Nitrosodimethylamine	EPA 625.1	3,10
N-Nitroso-di-n-propylamine	EPA 625.1	3,10
N-Nitrosodiphenylamine	EPA 625.1	3,10
Pentachlorophenol	EPA 625.1	3,10
Phenanthrene	EPA 625.1	3,10
Phenol	EPA 625.1	3,10
Pyrene	EPA 625.1	3,10
Pyridine	EPA 625.1	3,10
Heterotrophic Bacteria	SM 9215 B (PCA)	
Fecal coliform-count	SM 9221 B+E1+C (LTB/BGB/EC-MPN)	
Total coliforms-count	SM 9221 B+E1+C (LTB/BGB/EC-MPN)	
E.coli-count	SM 9221 B+F+C (LTB/BGB/EC Mug-MPN)	
Total coliforms-count	SM 9221 B+F+C (LTB/BGB/EC Mug-MPN)	
Total coliforms-count	SM 9222 B (mEndo)	2,3
Fecal coliform-count	SM 9222 D (mFC)-06	
E.coli-count	SM 9223 B Colilert 18® QTray®	
E.coli-count	SM 9223 B Colilert® 24 QTray®	
Enterococci	SM 9230 D Enterolert®	
<b>Solid and Chemical Materials</b>		
Nitrogen, Total Kjeldahl	ASTM D1426-08B	
Nitrogen, Total Kjeldahl	ASTM D3590-02	
Total Organic Carbon	ASTM D4129-05	
Solids, Total Volatile	EPA 160.4_1971	
Ammonia	EPA 350.1_2_1993	
Nitrate	EPA 353.2_2_1993	
Nitrite	EPA 353.2_2_1993	
Orthophosphate	EPA 365.3_1978	
Phosphorus, total	EPA 365.3_1978	
Chromium, Hexavalent	EPA 7196A_1_1992	
Cyanide, Total	EPA 9012 B-04	
Sulfide	EPA 9030B_2_1996	
pH	EPA 9045D_2002	
Chloride	EPA 9056A_(02/07)	
Fluoride	EPA 9056A_(02/07)	
Nitrate	EPA 9056A_(02/07)	

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Matrix/Analyte	Method	Notes
<b>Solid and Chemical Materials</b>		
Sulfate	EPA 9056A_(02/07)	
Total Organic Carbon	EPA 9060A_1_2004	
n-Hexane Extractable Material (O&G)	EPA 9071 B_2_1999	
Solids, Total	SM 2540 B-2011	
Solids, Total, Fixed and Volatile	SM 2540 G-2011	3,5
Chemical Oxygen Demand (COD)	SM 5220 C-2011	2
Methyl Mercury	EPA 1630	
Arsenic	EPA 1632A 1998	
Arsenic (III)	EPA 1632A 1998	
Arsenic (V)	EPA 1632A 1998	
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	
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	2
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	
Vanadium	EPA 200.7_4.4_1994	

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Matrix/Analyte	Method	Notes
<b>Solid and Chemical Materials</b>		
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	
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	
Manganese	EPA 200.8_5.4_1994	
Molybdenum	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	
Thallium	EPA 200.8_5.4_1994	
Uranium	EPA 200.8_5.4_1994	
Vanadium	EPA 200.8_5.4_1994	
Zinc	EPA 200.8_5.4_1994	
Aluminum	EPA 6010D_(7/14)	
Antimony	EPA 6010D_(7/14)	
Arsenic	EPA 6010D_(7/14)	
Barium	EPA 6010D_(7/14)	
Beryllium	EPA 6010D_(7/14)	
Boron	EPA 6010D_(7/14)	
Cadmium	EPA 6010D_(7/14)	
Calcium	EPA 6010D_(7/14)	
Chromium	EPA 6010D_(7/14)	
Cobalt	EPA 6010D_(7/14)	
Copper	EPA 6010D_(7/14)	
Iron	EPA 6010D_(7/14)	
Lead	EPA 6010D_(7/14)	
Magnesium	EPA 6010D_(7/14)	
Manganese	EPA 6010D_(7/14)	
Molybdenum	EPA 6010D_(7/14)	

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Matrix/Analyte	Method	Notes
<b>Solid and Chemical Materials</b>		
Nickel	EPA 6010D_(7/14)	
Potassium	EPA 6010D_(7/14)	
Selenium	EPA 6010D_(7/14)	
Silver	EPA 6010D_(7/14)	
Sodium	EPA 6010D_(7/14)	
Thallium	EPA 6010D_(7/14)	
Vanadium	EPA 6010D_(7/14)	
Zinc	EPA 6010D_(7/14)	
Aluminum	EPA 6020B_(7/14)	
Antimony	EPA 6020B_(7/14)	
Arsenic	EPA 6020B_(7/14)	
Barium	EPA 6020B_(7/14)	
Beryllium	EPA 6020B_(7/14)	
Cadmium	EPA 6020B_(7/14)	
Chromium	EPA 6020B_(7/14)	
Cobalt	EPA 6020B_(7/14)	
Copper	EPA 6020B_(7/14)	
Lead	EPA 6020B_(7/14)	
Manganese	EPA 6020B_(7/14)	
Molybdenum	EPA 6020B_(7/14)	
Nickel	EPA 6020B_(7/14)	
Selenium	EPA 6020B_(7/14)	
Silver	EPA 6020B_(7/14)	
Thallium	EPA 6020B_(7/14)	
Tin	EPA 6020B_(7/14)	
Vanadium	EPA 6020B_(7/14)	
Zinc	EPA 6020B_(7/14)	
Arsenic	EPA 7062	
Mercury, Liquid Waste	EPA 7470A_1_1994	2
Mercury, Solid Waste	EPA 7471B_(1/98)	
Selenium	EPA 7742	
Ethylene glycol	EPA 8015C_(11/00)	
Propylene glycol	EPA 8015C_(11/00)	
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)	

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Matrix/Analyte	Method	Notes
<b>Solid and Chemical Materials</b>		
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)	
Chlordane (tech.)	EPA 8081B_(2/07)	
delta-BHC	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)	
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B_(2/07)	
gamma-Chlordane	EPA 8081B_(2/07)	
Heptachlor	EPA 8081B_(2/07)	
Heptachlor epoxide	EPA 8081B_(2/07)	
Hexachlorobenzene	EPA 8081B_(2/07)	
Isodrin	EPA 8081B_(2/07)	
Methoxychlor	EPA 8081B_(2/07)	
Mirex	EPA 8081B_(2/07)	
Permethrin (total)	EPA 8081B_(2/07)	
Toxaphene (Chlorinated camphene)	EPA 8081B_(2/07)	
trans-Nonachlor	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)	
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)	
Dalapon	EPA 8151A_(1/98)	
Dicamba	EPA 8151A_(1/98)	
Dichloroprop (Dichlorprop)	EPA 8151A_(1/98)	

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Matrix/Analyte	Method	Notes
<b>Solid and Chemical Materials</b>		
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)	
Silvex (2,4,5-TP)	EPA 8151A_(1/98)	
Organo-tins	Krone 1988	
Diesel range organics (DRO)	WDOE NWTPH-Dx_(1997)	
Gasoline range organics (GRO)	WDOE NWTPH-Gx_(1997)	
6:2 Fluorotelomersulfonate (6:2FTS)	ALS LCP-PFC	3
8:2 Fluorotelomersulfonate (8:2FTS)	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamide (EtFOSA)	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	ALS LCP-PFC	3
N-Ethylperfluorooctanesulfonamidoethanol (EtFOSE)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamide (MeFOSA)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamido acetic acid (NMeFOSAA)	ALS LCP-PFC	3
N-Methylperfluorooctanesulfonamidoethanol (MeFOSE)	ALS LCP-PFC	3
Perfluorobutane sulfonate (PFBS)	ALS LCP-PFC	3
Perfluorodecane sulfonate (PFDS)	ALS LCP-PFC	3
Perfluorodecanoic acid (PFDA)	ALS LCP-PFC	3
Perfluorododecanoic acid (PFDoA)	ALS LCP-PFC	3
Perfluoroheptane sulfonic acid (PFHpS)	ALS LCP-PFC	3
Perfluoroheptanoic acid (PFHpA)	ALS LCP-PFC	3
Perfluorohexane sulfonate (PFHxS)	ALS LCP-PFC	3
Perfluorohexanoic acid (PFHxA)	ALS LCP-PFC	3
Perfluorononanoic acid (PFNA)	ALS LCP-PFC	3
Perfluorooctane sulfonamide (PFOSA)	ALS LCP-PFC	3
Perfluorooctane sulfonate (PFOS)	ALS LCP-PFC	3
Perfluorooctanoic acid (PFOA)	ALS LCP-PFC	3
Perfluoropentanoic acid (PFPeA)	ALS LCP-PFC	3
Perfluorotetradecanoic acid (PFTeDA)	ALS LCP-PFC	3
Perfluorotridecanoic acid (PFTrDA)	ALS LCP-PFC	3
Perfluoroundecanoic acid (PFUnA)	ALS LCP-PFC	3
1,1,1,2-Tetrachloroethane	EPA 8260D_4_(6/18)	3,6
1,1,1-Trichloro-2,2,2-trifluoroethane	EPA 8260D_4_(6/18)	3,6
1,1,1-Trichloroethane	EPA 8260D_4_(6/18)	3,6
1,1,2,2-Tetrachloroethane	EPA 8260D_4_(6/18)	3,6
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260D_4_(6/18)	3,6

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
1,1,2-Trichloroethane	EPA 8260D_4_(6/18)	3,6
1,1-Dichloroethane	EPA 8260D_4_(6/18)	3,6
1,1-Dichloroethylene	EPA 8260D_4_(6/18)	3,6
1,1-Dichloropropene	EPA 8260D_4_(6/18)	3,6
1,2,3-Trichlorobenzene	EPA 8260D_4_(6/18)	3,6
1,2,3-Trichloropropane	EPA 8260D_4_(6/18)	3,6
1,2,3-Trimethylbenzene	EPA 8260D_4_(6/18)	3,6
1,2,4-Trichlorobenzene	EPA 8260D_4_(6/18)	3,6
1,2,4-Trimethylbenzene	EPA 8260D_4_(6/18)	3,6
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260D_4_(6/18)	3,6
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260D_4_(6/18)	3,6
1,2-Dichlorobenzene	EPA 8260D_4_(6/18)	3,6
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260D_4_(6/18)	3,6
1,2-Dichloropropane	EPA 8260D_4_(6/18)	3,6
1,3,5-Trimethylbenzene	EPA 8260D_4_(6/18)	3,6
1,3-Dichlorobenzene	EPA 8260D_4_(6/18)	3,6
1,3-Dichloropropane	EPA 8260D_4_(6/18)	3,6
1,3-Dichloropropene	EPA 8260D_4_(6/18)	3,6
1,4-Dichloro-2-butene	EPA 8260D_4_(6/18)	3,6
1,4-Dichlorobenzene	EPA 8260D_4_(6/18)	3,6
1,4-Dioxane (1,4- Diethyleneoxide)	EPA 8260D_4_(6/18)	3,6
1-Chlorohexane	EPA 8260D_4_(6/18)	3,6
2,2-Dichloro-1,1,1-trifluoroethane (Freon 123)	EPA 8260D_4_(6/18)	3,6
2,2-Dichloropropane	EPA 8260D_4_(6/18)	3,6
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260D_4_(6/18)	3,6
2-Chloroethyl vinyl ether	EPA 8260D_4_(6/18)	3,6
2-Chlorotoluene	EPA 8260D_4_(6/18)	3,6
2-Hexanone	EPA 8260D_4_(6/18)	3,6
2-Methylpentane (Isohexane)	EPA 8260D_4_(6/18)	3,6
2-Nitropropane	EPA 8260D_4_(6/18)	3,6
3-Methylpentane	EPA 8260D_4_(6/18)	3,6
4-Bromofluorobenzene	EPA 8260D_4_(6/18)	3,6
4-Chlorotoluene	EPA 8260D_4_(6/18)	3,6
4-Isopropyltoluene (p-Cymene)	EPA 8260D_4_(6/18)	3,6
4-Methyl-2-pentanone (MIBK)	EPA 8260D_4_(6/18)	3,6
Acetone	EPA 8260D_4_(6/18)	3,6
Acetonitrile	EPA 8260D_4_(6/18)	3,6



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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
Acrolein (Propenal)	EPA 8260D_4_(6/18)	3,6
Acrylonitrile	EPA 8260D_4_(6/18)	3,6
Allyl chloride (3-Chloropropene)	EPA 8260D_4_(6/18)	3,6
Benzene	EPA 8260D_4_(6/18)	3,6
Bromobenzene	EPA 8260D_4_(6/18)	3,6
Bromochloromethane	EPA 8260D_4_(6/18)	3,6
Bromodichloromethane	EPA 8260D_4_(6/18)	3,6
Bromoform	EPA 8260D_4_(6/18)	3,6
Carbon disulfide	EPA 8260D_4_(6/18)	3,6
Carbon tetrachloride	EPA 8260D_4_(6/18)	3,6
Chlorobenzene	EPA 8260D_4_(6/18)	3,6
Chlorodibromomethane	EPA 8260D_4_(6/18)	3,6
Chloroethane (Ethyl chloride)	EPA 8260D_4_(6/18)	3,6
Chloroform	EPA 8260D_4_(6/18)	3,6
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260D_4_(6/18)	3,6
cis & trans-1,2-Dichloroethene	EPA 8260D_4_(6/18)	3,6
cis-1,2-Dichloroethylene	EPA 8260D_4_(6/18)	3,6
cis-1,3-Dichloropropene	EPA 8260D_4_(6/18)	3,6
cis-1,4-Dichloro-2-butene	EPA 8260D_4_(6/18)	3,6
Cyclohexane	EPA 8260D_4_(6/18)	3,6
Dibromochloropropane	EPA 8260D_4_(6/18)	3,6
Dibromofluoromethane	EPA 8260D_4_(6/18)	3,6
Dibromomethane	EPA 8260D_4_(6/18)	3,6
Dichlorodifluoromethane (Freon-12)	EPA 8260D_4_(6/18)	3,6
Dichlorofluoromethane (Freon 21)	EPA 8260D_4_(6/18)	3,6
Diethyl ether	EPA 8260D_4_(6/18)	3,6
Ethanol	EPA 8260D_4_(6/18)	3,6
Ethyl acetate	EPA 8260D_4_(6/18)	3,6
Ethyl acrylate	EPA 8260D_4_(6/18)	3,6
Ethyl methacrylate	EPA 8260D_4_(6/18)	3,6
Ethyl tert-Butyl alcohol	EPA 8260D_4_(6/18)	3,6
Ethylbenzene	EPA 8260D_4_(6/18)	3,6
Ethylene oxide	EPA 8260D_4_(6/18)	3,6
Ethyl-t-butylether (ETBE)	EPA 8260D_4_(6/18)	3,6
Hexachlorobutadiene	EPA 8260D_4_(6/18)	3,6
Iodomethane (Methyl iodide)	EPA 8260D_4_(6/18)	3,6
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260D_4_(6/18)	3,6

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260D_4_(6/18)	3,6
Isopropylbenzene	EPA 8260D_4_(6/18)	3,6
m+p-xylene	EPA 8260D_4_(6/18)	3,6
Methacrylonitrile	EPA 8260D_4_(6/18)	3,6
Methyl acetate	EPA 8260D_4_(6/18)	3,6
Methyl acrylate	EPA 8260D_4_(6/18)	3,6
Methyl bromide (Bromomethane)	EPA 8260D_4_(6/18)	3,6
Methyl chloride (Chloromethane)	EPA 8260D_4_(6/18)	3,6
Methyl methacrylate	EPA 8260D_4_(6/18)	3,6
Methyl tert-butyl ether (MTBE)	EPA 8260D_4_(6/18)	3,6
Methylcyclohexane	EPA 8260D_4_(6/18)	3,6
Methylcyclopentane	EPA 8260D_4_(6/18)	3,6
Methylene chloride (Dichloromethane)	EPA 8260D_4_(6/18)	3,6
Naphthalene	EPA 8260D_4_(6/18)	3,6
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260D_4_(6/18)	3,6
n-Butylbenzene	EPA 8260D_4_(6/18)	3,6
n-Heptane	EPA 8260D_4_(6/18)	3,6
n-Hexane	EPA 8260D_4_(6/18)	3,6
n-Octane	EPA 8260D_4_(6/18)	3,6
n-Propanol (1-Propanol)	EPA 8260D_4_(6/18)	3,6
n-Propylbenzene	EPA 8260D_4_(6/18)	3,6
o-Xylene	EPA 8260D_4_(6/18)	3,6
Propionitrile (Ethyl cyanide)	EPA 8260D_4_(6/18)	3,6
sec-Butylbenzene	EPA 8260D_4_(6/18)	3,6
Styrene	EPA 8260D_4_(6/18)	3,6
tert-amylmethylether (TAME)	EPA 8260D_4_(6/18)	3,6
tert-Butyl alcohol	EPA 8260D_4_(6/18)	3,6
tert-Butylbenzene	EPA 8260D_4_(6/18)	3,6
Tetrachloroethylene (Perchloroethylene)	EPA 8260D_4_(6/18)	3,6
Tetrahydrofuran (THF)	EPA 8260D_4_(6/18)	3,6
Toluene	EPA 8260D_4_(6/18)	3,6
trans-1,2-Dichloroethylene	EPA 8260D_4_(6/18)	3,6
trans-1,3-Dichloropropylene	EPA 8260D_4_(6/18)	3,6
trans-1,4-Dichloro-2-butene	EPA 8260D_4_(6/18)	3,6
Trichloroethene (Trichloroethylene)	EPA 8260D_4_(6/18)	3,6
Trichlorofluoromethane (Freon 11)	EPA 8260D_4_(6/18)	3,6
Vinyl acetate	EPA 8260D_4_(6/18)	3,6

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
Vinyl chloride	EPA 8260D_4_(6/18)	3,6
Xylene (total)	EPA 8260D_4_(6/18)	3,6
1,2,4,5-Tetrachlorobenzene	EPA 8270E_6_(6/18)	3,7
1,2,4-Trichlorobenzene	EPA 8270E_6_(6/18)	3,7
1,2-Dichlorobenzene	EPA 8270E_6_(6/18)	3,7
1,2-Diphenylhydrazine	EPA 8270E_6_(6/18)	3,7
1,3-Dichlorobenzene	EPA 8270E_6_(6/18)	3,7
1,4-Dichlorobenzene	EPA 8270E_6_(6/18)	3,7
2,3,4,6-Tetrachlorophenol	EPA 8270E_6_(6/18)	3,7
2,4,5-Trichlorophenol	EPA 8270E_6_(6/18)	3,7
2,4,6-Trichlorophenol	EPA 8270E_6_(6/18)	3,7
2,4-Dichlorophenol	EPA 8270E_6_(6/18)	3,7
2,4-Dimethylphenol	EPA 8270E_6_(6/18)	3,7
2,4-Dinitrophenol	EPA 8270E_6_(6/18)	3,7
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270E_6_(6/18)	3,7
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270E_6_(6/18)	3,7
2-Chloronaphthalene	EPA 8270E_6_(6/18)	3,7
2-Chlorophenol	EPA 8270E_6_(6/18)	3,7
2-Methylnaphthalene	EPA 8270E_6_(6/18)	3,7
2-Methylphenol (o-Cresol)	EPA 8270E_6_(6/18)	3,7
2-Nitroaniline	EPA 8270E_6_(6/18)	3,7
2-Nitrophenol	EPA 8270E_6_(6/18)	3,7
3,3'-Dichlorobenzidine	EPA 8270E_6_(6/18)	3,7
3-Nitroaniline	EPA 8270E_6_(6/18)	3,7
4,6-Dinitro-2-methylphenol	EPA 8270E_6_(6/18)	3,7
4-Bromophenyl phenyl ether (BDE-3)	EPA 8270E_6_(6/18)	3,7
4-Chloro-3-methylphenol	EPA 8270E_6_(6/18)	3,7
4-Chloroaniline	EPA 8270E_6_(6/18)	3,7
4-Chlorophenyl phenylether	EPA 8270E_6_(6/18)	3,7
4-Nitroaniline	EPA 8270E_6_(6/18)	3,7
4-Nitrophenol	EPA 8270E_6_(6/18)	3,7
Acenaphthene	EPA 8270E_6_(6/18)	3,7
Acenaphthylene	EPA 8270E_6_(6/18)	3,7
Acetophenone	EPA 8270E_6_(6/18)	3,7
Aniline	EPA 8270E_6_(6/18)	3,7
Anthracene	EPA 8270E_6_(6/18)	3,7
Atrazine	EPA 8270E_6_(6/18)	3,7

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<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
Benzidine	EPA 8270E_6_(6/18)	3,7
Benzo(a)anthracene	EPA 8270E_6_(6/18)	3,7
Benzo(a)pyrene	EPA 8270E_6_(6/18)	3,7
Benzo(g,h,i)perylene	EPA 8270E_6_(6/18)	3,7
Benzo(k)fluoranthene	EPA 8270E_6_(6/18)	3,7
Benzo[b]fluoranthene	EPA 8270E_6_(6/18)	3,7
Benzoic acid	EPA 8270E_6_(6/18)	3,7
Benzyl alcohol	EPA 8270E_6_(6/18)	3,7
Biphenyl	EPA 8270E_6_(6/18)	3,7
bis(2-Chloroethoxy)methane	EPA 8270E_6_(6/18)	3,7
bis(2-Chloroethyl) ether	EPA 8270E_6_(6/18)	3,7
bis(2-Chloroisopropyl) ether	EPA 8270E_6_(6/18)	3,7
Butyl benzyl phthalate	EPA 8270E_6_(6/18)	3,7
Carbazole	EPA 8270E_6_(6/18)	3,7
Chrysene	EPA 8270E_6_(6/18)	3,7
Di(2-ethylhexyl)phthalate	EPA 8270E_6_(6/18)	3,7
Dibenzofuran	EPA 8270E_6_(6/18)	3,7
Diethyl phthalate	EPA 8270E_6_(6/18)	3,7
Dimethyl phthalate	EPA 8270E_6_(6/18)	3,7
Di-n-butyl phthalate	EPA 8270E_6_(6/18)	3,7
Di-n-octyl phthalate	EPA 8270E_6_(6/18)	3,7
Fluoranthene	EPA 8270E_6_(6/18)	3,7
Fluorene	EPA 8270E_6_(6/18)	3,7
Hexachlorobutadiene	EPA 8270E_6_(6/18)	3,7
Hexachlorocyclopentadiene	EPA 8270E_6_(6/18)	3,7
Hexachloroethane	EPA 8270E_6_(6/18)	3,7
Indeno(1,2,3-cd) pyrene	EPA 8270E_6_(6/18)	3,7
Isophorone	EPA 8270E_6_(6/18)	3,7
m+p Cresol	EPA 8270E_6_(6/18)	3,7
Naphthalene	EPA 8270E_6_(6/18)	3,7
Nitrobenzene	EPA 8270E_6_(6/18)	3,7
N-Nitrosodimethylamine	EPA 8270E_6_(6/18)	3,7
N-Nitroso-di-n-propylamine	EPA 8270E_6_(6/18)	3,7
N-Nitrosodiphenylamine	EPA 8270E_6_(6/18)	3,7
Pentachlorophenol	EPA 8270E_6_(6/18)	3,7
Phenanthrene	EPA 8270E_6_(6/18)	3,7
Phenol	EPA 8270E_6_(6/18)	3,7

ALS Environmental - Kelso

<b>Matrix/Analyte</b>	<b>Method</b>	<b>Notes</b>
<b>Solid and Chemical Materials</b>		
Pyrene	EPA 8270E_6_(6/18)	3,7
Pyridine	EPA 8270E_6_(6/18)	3,7
1,4-Dioxane (1,4- Diethyleneoxide)	EPA 8270E_6_(6/18) SIM	3,7
1-Methylnaphthalene	EPA 8270E_6_(6/18) SIM	3,7
2-Methylnaphthalene	EPA 8270E_6_(6/18) SIM	3,7
Acenaphthene	EPA 8270E_6_(6/18) SIM	3,7
Acenaphthylene	EPA 8270E_6_(6/18) SIM	3,7
Anthracene	EPA 8270E_6_(6/18) SIM	3,7
Benzo(a)anthracene	EPA 8270E_6_(6/18) SIM	3,7
Benzo(a)pyrene	EPA 8270E_6_(6/18) SIM	3,7
Benzo(g,h,i)perylene	EPA 8270E_6_(6/18) SIM	3,7
Benzo(k)fluoranthene	EPA 8270E_6_(6/18) SIM	3,7
Benzo[b]fluoranthene	EPA 8270E_6_(6/18) SIM	3,7
Chrysene	EPA 8270E_6_(6/18) SIM	3,7
Dibenz(a,h) anthracene	EPA 8270E_6_(6/18) SIM	3,7
Dibenzofuran	EPA 8270E_6_(6/18) SIM	3,7
Fluoranthene	EPA 8270E_6_(6/18) SIM	3,7
Fluorene	EPA 8270E_6_(6/18) SIM	3,7
Indeno(1,2,3-cd) pyrene	EPA 8270E_6_(6/18) SIM	3,7
Naphthalene	EPA 8270E_6_(6/18) SIM	3,7
Pentachlorophenol	EPA 8270E_6_(6/18) SIM	3,7
Phenanthrene	EPA 8270E_6_(6/18) SIM	3,7
Pyrene	EPA 8270E_6_(6/18) SIM	3,7
Carbaryl (Sevin)	EPA 8321B_2_(2/07)	
Fecal coliform-count	SM 9221 B+E1+C (LTB/BGB/EC-MPN)	2
Total coliforms-count	SM 9222 B (mEndo)	3
Fecal coliform-count	SM 9222 D (mFC)-06	2
Particle Size Distribution	ASTM D422	5
Ignitability	EPA 1020A_1_1992	
Corrosivity	EPA 1110A-02	
Particle Size Distribution	PSEP 1986 Wet Sieve	5

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Matrix/Analyte	Method	Notes
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**Accredited Parameter Note Detail**

(1) Accreditation does not apply to compliance testing due to the sample holding time requirement for pH. (2) Accreditation is limited to liquid matrix only. (3) Interim accreditation pending the successful completion of an on-site audit to verify method capabilities (WAC 173-50-100). (5) Provisional accreditation pending submittal of acceptable Proficiency Testing (PT) results (WAC 173-50-110). (6) Provisional accreditation pending laboratory update from EPA Method 8260C to the new method EPA 8260D. (7) Provisional accreditation pending laboratory update from EPA Method 8270D to the new method EPA 8270E. (8) Provisional accreditation pending laboratory update from EPA Method 608 to the new method EPA 608.3. (9) Provisional accreditation pending laboratory update from EPA Method 624 to the new method EPA 624.1. (10) Provisional accreditation pending laboratory update from EPA Method 625 to the new method EPA 625.1.



07/09/2020

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Authentication Signature  
Rebecca Wood, Lab Accreditation Unit Supervisor

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Date