PER- AND POLY-FLUOROALKYL SUBSTANCES CHARACTERIZATION STUDY WORK PLAN ADDENDUM LOWER ISSAQUAH VALLEY ISSAQUAH, WASHINGTON

Submitted by:
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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 2018, prepared by Farallon (2018) for Eastside Fire & Rescue (EFR) (Work Plan), to present the work elements and rationale to further characterize the nature and extent of per- and poly-fluoroalkyl substances (PFAS) in soil and groundwater in a portion of the Lower Issaquah Valley in Issaquah, Washington (Figure 1). This Addendum addresses Task 2 of the Interagency Agreement dated December 3, 2019 between the Washington State Department of Ecology (Ecology) (2019) 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. Characterization work described herein will further delineate select source areas of PFAS in soil; further evaluate the transport pathway from these identified source areas into groundwater at identified areas of interest; and further refine the distribution of PFAS impacts to groundwater at down-gradient locations from confirmed sources.

Although PFAS are not currently regulated as hazardous substances under federal or Washington State law, the characterization 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 characterization work described in this Addendum may be used to support future cleanup actions if determined to be in line with requirements applicable at such time.

1.1 PROJECT PROBLEM STATEMENT

The additional work proposed under the Addendum addresses selected data gaps in the characterization of the nature, extent, and migration of PFAS in soil and groundwater in the Lower Issaquah Valley. Specific objectives for the work described under the Addendum and the data that will be collected include:

- Further evaluate migration pathways between shallow and intermediate groundwater at 175 Newport Way Northwest, Issaquah Elementary School West Playfield and Dodd Fields Park, and Memorial Field;
- Evaluate PFAS impacts to soil and groundwater and subsurface conditions (e.g., lithology, hydraulic conductivity, other relevant parameters) at 175 Newport Way Northwest sufficiently to develop and evaluate potential source remediation alternatives for this area of interest;
- Further refine the nature and extent of PFAS impacts in shallow and intermediate groundwater at locations of interest and down-gradient locations on both sides of the Lower Issaquah Valley that may affect drinking water production wells;

- Further refine seasonal fluctuations in shallow and intermediate groundwater elevations and associated potential PFAS transport in shallow and intermediate groundwater on both sides of the Lower Issaquah Valley;
- Review and document the Commercial Upholstery Shop history of use, including historical business listings and other publicly available information, to confirm the potential for PFAS use; and collect shallow groundwater data to further evaluate suspected impacts;
- Collect adequate hydrostratigraphic and analytical data to support development of a groundwater model that can be used to evaluate potential source remediation alternative performance; and
- Collect initial data that can be used to evaluate potential interaction between surface water and groundwater at three locations along the primary axis of the Lower Issaquah Valley.

Data and observations generated under this Addendum will be documented in accordance with the requirements of the IAA and will include preparation of the Lower Issaquah Valley PFAS Additional Characterization Summary Report described under Task 5 of the IAA (Summary Report) and the Additional Characterization Summary Report for 175 Newport Way Northwest described under Task 7 of the IAA (175 Newport Way Northwest Summary Report). While additional data collection beyond that described in this Addendum is anticipated in the future, the data generated under this Addendum will inform the Parties regarding how to prioritize and develop additional characterization to address specific data gaps and source remediation goals for characterization and cleanup of PFAS in the Lower Issaquah Valley.

1.2 PURPOSE

The specific purposes of this Addendum are to:

- Describe proposed additional characterization work elements and their rationale;
- Identify sample locations and media in the Lower Issaquah Valley, sample quantities, analytical methods, and documentation protocols for the sampling program;
- Describe standard operating procedures (SOPs) for field sampling of soil and groundwater;
- 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 the documentation of field work, analytical and other results, and other relevant information that will be incorporated into the Summary Report (Task 5 in the IAA) and the 175 Newport Way Northwest Summary Report (Task 7 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 characterization 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 some background on PFAS and recent changes in regulatory status, and describes the environmental setting of the Lower Issaquah Valley, previous studies and existing data, areas of interest to be assessed, the project problem statement, parameters of interest, and regulatory criteria.

2.1 PER- AND POLY-FLUOROALKYL SUBSTANCES BACKGROUND

PFAS are a class of chemicals that were developed for a wide range of uses, including imparting oil and/or water repellency, firefighting, and friction and surface tension reduction, beginning in the 1940s. Due to the unique properties associated with PFAS carbon-fluorine chemistry, these chemicals have found use in a wide array of industries over the past 80 years, including aerospace, photographic imaging, metal plating, firefighting, carpet cleaning, food and beverage packaging, automotive, construction, printing, and oil and gas production (Interstate Technology Regulatory Council [ITRC] 2017).

Detailed PFAS background information on chemical development and history of use is provided in Section 2.1 of the Work Plan. Since publication of the Work Plan in August 2018, PFAS have continued to gain additional prominence in the U.S. environmental and regulatory communities. By the conclusion of 2019, the U.S. Environmental Protection Agency (EPA) had released its PFAS Action Plan (2019); announced its intention to make regulatory determinations for perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) under the Safe Drinking Water Act of 1974[1]; and began proposed rulemaking to designate PFOS and PFOA as hazardous substances under Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980[2]. Additionally, the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) has identified minimum risk levels for additional PFAS in drinking water other than PFOS and PFOA, including perfluorohexane sulfonic acid (PFHxS) at 0.517 microgram per liter (µg/l) and perfluorononanoic acid (PFNA) at 0.078 µg/l.

In November 2019, the Washington State Department of Health (2019) recommended to the Washington State Board of Health that state action levels (SALs) be set for unregulated contaminants, including PFOA, PFOS, PFHxS, PFNA, and perfluorobutanesulfonic acid (PFBS), in drinking water. Exceedance of SALs in public drinking water supplies would trigger required monitoring and public notification. SALs proposed for PFOS and PFOA in drinking water were lower than the lifetime health advisory levels originally published by EPA (2016) in 2016, and included new analytes for which Investigatory Levels were not previously established. Investigatory Levels are numerical criteria calculated by Ecology based on standard MTCA exposure scenarios for groundwater and soil for PFOS and PFOA. Investigatory Levels are not regulatory levels, therefore they are not enforceable; they were developed strictly as guidance for

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[1] Regulation Identifier No. 2040-AF93 (Office of the Federal Registrar, National Archives and Records Administration [NARA] 2019).

[2] Regulation Identifier No. 2050-AH09 (NARA 2019).

this project in the Work Plan. As of the date of this Addendum, SALs have not been adopted. Section 2.7, Regulatory Criteria provides additional detail regarding Investigatory Levels.

2.2 STUDY AREA AND SURROUNDINGS

The Lower Issaquah Valley is located 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. The City of Issaquah is in the northern portion of the Lower Issaquah Valley. Drinking water for the City of Issaquah is pumped from a system of four wells (two in the northeastern and two in the northwestern portions of Issaquah) and through service water delivery by the Cascade Water Alliance.

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 Puget Sound region is underlain by Quaternary sediments deposited by multiple glacial episodes. Deposition occurred during glacial advances and retreats, which created the existing subsurface conditions. The regional sediments consist primarily of interlayered and/or sequential deposits of alluvial clays, silts, and sands that typically are situated over deposits of glacial till that consist of silty sand to sandy silt with gravel. Outwash sediments consisting of sands, silts, clays, and gravels were deposited by rivers, streams, and post-glacial lakes during the glacial retreats and have been largely over-consolidated by the overriding ice sheets.

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 *Per- and Poly-Fluoroalkyl Substances Characterization Study Summary Report, Lower Issaquah Valley, Issaquah, Washington* dated March 27, 2019, prepared by Farallon (2019) for EFR (2019 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 between 5 and 60 feet below ground surface (bgs);

- Intermediate groundwater, encountered between depths of 60 and 120 feet bgs and that includes a poorly graded brown sand unit[3]; and
- Deep groundwater, encountered at depths greater than 120 feet bgs.

Some drinking water production wells, including City of Issaquah production well COI-PW04 and Sammamish Plateau production wells SP-PW07 and SP-PW08, are screened in intermediate groundwater. Other drinking water production wells, including the City of Issaquah production well COI-PW05 and Sammamish Plateau production well SP-PW09, are screened in deep groundwater.

2.3 SUMMARY OF PREVIOUS STUDIES AND EXISTING DATA

Detailed discussion of PFAS characterization work in Lower Issaquah Valley soil and groundwater through December 2018 is addressed in the Work Plan and the 2019 Summary Report. Previous sampling locations and soil sampling decision units are presented on Figure 2. A cross-section presenting select stratigraphic and analytical data based on characterization work completed in 2018 is provided on Figure 3.

Previous characterization work was performed by the Parties to address the following goals, as identified in the Work Plan:

- Assess areas of interest where historical operations included use of aqueous film-forming foam to identify potential points of releases of PFAS to the environment in the Lower Issaquah Valley;
- Investigate the presence of PFAS in unsaturated soil at suspected source areas and assess whether groundwater quality of shallow groundwater at and down-gradient of these areas of interest has been impacted by PFAS;
- Identify the occurrence of shallow groundwater-bearing zones, local gradients, and groundwater flow direction at areas of interest where reconnaissance groundwater analytical results, or the analytical results of groundwater samples collected from existing monitoring points, suggest that shallow groundwater has been impacted by PFAS;
- Collect synoptic area-wide groundwater quality data from monitoring and production wells screened in intermediate and deep groundwater-bearing zones to better characterize the distribution of PFAS across the Lower Issaquah Valley; and
- Compare soil and groundwater analytical results to PFAS Investigatory Levels that were calculated by Ecology (2018) to support the Lower Issaquah Valley PFAS characterization effort.

Results of characterization of soil and groundwater performed in 2018 indicated that shallow and/or vadose zone soil at all five areas of interest has been impacted with PFAS at concentrations that exceed Investigatory Levels for protection of groundwater for unsaturated soil. Additionally,

[3] City of Issaquah production well COI-PW04 is screened in the poorly graded brown sand unit.

analytical data for reconnaissance groundwater and groundwater samples confirmed that the pathway for migration of PFAS from soil to shallow groundwater is complete for each area of interest. However, the data collected under the Work Plan were not anticipated to fully characterize the nature and extent of all PFAS impacts to soil and groundwater in the Lower Issaquah Valley or at the identified areas of interest.

2.4 AREAS OF INTEREST

Detailed discussion of previously identified areas of interest is provided in Section 2.4 of the Work Plan and Section 2.5 of the 2019 Summary Report. Areas of interest previously identified and included in this Addendum include:

- Issaquah Valley Elementary West Playfield;
- Issaquah Valley Elementary East Ballfields (Dodd Fields Park);
- North of 190 East Sunset Way (Memorial Field);
- West of 135 East Sunset Way on the former rail grade (Rainier Trail Area); and
- 175 Newport Way Northwest (current EFR headquarters facility).

An additional area of interest identified for this Addendum and planned additional characterization work is a former commercial upholstery shop at the southern end of the Lower Issaquah Valley proximate to the intersection of West Sunset Way and Newport Way Northwest (Commercial Upholstery Shop), which historically offered fabric treatment services such as fabric cleaning and waterproofing. Commercial cleaning, waterproofing, and stain-proofing solutions are known to contain concentrations of PFAS ranging from 1.71 to 8.86 micrograms per gram of liquid (Knepper and Lange 2012). The Commercial Upholstery Shop was reported to operate for several decades, and previous analytical results for shallow reconnaissance groundwater samples collected during installation of monitoring well COI-MW07 indicate concentrations of PFOA and PFOS that location exceed laboratory practical quantitation limits but less than Investigatory Levels.

2.5 PARAMETERS OF INTEREST

Previously identified areas of interest were confirmed to be sources of PFAS to groundwater based on historical uses and/or previous investigation results. The Commercial Upholstery Shop is a suspected source of PFAS to shallow groundwater, but impacts have not been confirmed with a representative groundwater sample collected from a permanent monitoring well.

Proposed additional monitoring wells and shallow borings were located to further characterize potential PFAS impacts to shallow soil and/or groundwater at selected areas of interest or in down-gradient locations. Analytical results from reconnaissance groundwater samples will be used to screen additional saturated subsurface intervals and to plan future investigation work as appropriate. Groundwater samples collected from permanently installed monitoring wells will provide representative groundwater quality data for shallow and intermediate groundwater that will be used to further evaluate the nature and extent of impacts in the Lower Issaquah Valley, migration pathways, and potential transport mechanisms.

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, the Washington State Department of Health (2019) has released proposed SALs for drinking water that are lower than the original Investigatory Levels for groundwater. Because the SALs have not been finalized, they will not be used; however, they are provided for informational purposes in Appendix B.

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 further evaluate suspected and confirmed sources in the Lower Issaquah Valley of PFAS impacts to soil and groundwater; evaluate in greater detail the fate and transport of PFAS in shallow and intermediate groundwater; and refine the conceptual site model of PFAS source(s), fate, and transport in the Lower Issaquah Valley. Data will be collected to evaluate migration pathways for PFAS from soil to groundwater and in shallow and intermediate groundwater either at or down-gradient of confirmed sources identified in the Lower Issaquah Valley.

Complete project goals are summarized as follows:

- Further evaluate and refine the nature and extent of PFAS impacts to soil and shallow and intermediate groundwater at 175 Newport Way Northwest to assess hydrogeological characteristics of the shallow and intermediate groundwater-bearing zones, support preparation of a focused evaluation of technically feasible remediation technologies at this area of interest, and identify possible future pilot testing of feasible remediation technologies;
- Characterize seasonal fluctuations in shallow groundwater and evaluate local gradients (vertical and horizontal), groundwater flow direction(s), and shallow groundwater quality at areas of interest where previous results indicate shallow groundwater is impacted by PFAS;
- Collect synoptic area-wide groundwater elevation and quality data from shallow and intermediate monitoring wells through quarterly monitoring events to further refine the distribution of PFAS across the Lower Issaquah Valley spatially and temporally and to evaluate potential migration pathways;
- Compare discrete soil and groundwater analytical results to Investigatory Levels identified in this Addendum;
- To the extent possible, estimate the extent of media that exceed Investigatory Levels, applicable action levels, or cleanup levels if promulgated prior to completion of this phase of the study;
- Review and document the Commercial Upholstery Shop history of use and potential PFAS impacts to groundwater; and

- Refine the conceptual site model for the Lower Issaquah Valley hydrogeologic stratigraphy with new information to support groundwater model development to evaluate potential source remediation alternative performance.

While the data collected under this Addendum are not expected to address all data gaps across the Lower Issaquah Valley, the current scope of work will provide appropriate additional information to plan and prioritize future investigation work as needed (see Section 1.1, Project Problem Statement).

3.2 PROJECT OBJECTIVES AND SCOPE OF WORK

Characterization of PFAS in the Lower Issaquah Valley will include discrete soil sampling, reconnaissance groundwater sampling, and groundwater sampling from borings and/or permanent monitoring wells. Specific project objectives for each area of interest are identified below. A summary of samples to be collected is presented by media in Table 3.

Soil, reconnaissance groundwater, and groundwater samples will be analyzed by Modified EPA Method 537[4]. 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 (2017) guidance.

3.2.1 Elements Common to All Areas of Interest

Work elements common to all proposed locations include coordination for subsurface investigation work such as performing utility locates, arranging for access to perform work, procuring right-of-way permits, and managing investigation-derived waste (see Section 7, Management of Investigation-Derived Waste). Specific work elements that will be performed for all areas of interest and proposed monitoring well locations are presented below. Field sampling procedures, including monitoring well construction, are addressed under Section 4, Field Procedures.

3.2.1.1 Utility Locate

Farallon will use the one-call and private utility location services to confirm the location of subsurface utilities (Farallon SOP GN-02) and to clear proposed areas where additional subsurface investigation work, including sonic and direct-push drilling, will occur. Final sampling and/or boring locations may be adjusted in the field based on access considerations, marked utility placement, and other considerations as appropriate.

[4] 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.

3.2.1.2 Monitoring Well Survey

A Washington State-licensed surveyor will survey the locations and elevations of each new monitoring well following completion of the drilling program in Washington State Plane North coordinates and the North American Vertical Datum of 1988. Screened intervals for each monitoring well will be calculated based on the surveyed elevations and construction details recorded in the field by a Farallon Field Scientist.

3.2.2 Lower Issaquah Valley Groundwater Monitoring and Surface Water Gauging

Farallon will complete two synoptic groundwater gauging events (depth-to-groundwater gauging only) and four quarterly groundwater monitoring, synoptic depth-to-groundwater gauging, and surface water gauging events scheduled between March 2020 and June 2021. Monitoring wells identified for each sampling event will be selected to further evaluate and refine the conceptual site model for shallow and intermediate groundwater. Specific data gaps that the quarterly monitoring may be tailored to address include:

- Further refining seasonal variation in groundwater quality, gradients, and flow direction at selected areas of interest;
- Evaluating vertical gradients at selected areas of interest and/or up- and down-gradient locations;
- Further refining the lateral extent and migration of PFAS impacts to shallow and intermediate groundwater; and
- Assessing the relative elevations of groundwater and surface water in the vicinity of surface water gauging stations.

Each quarterly event will include up to 25 monitoring wells selected from the shallow and intermediate groundwater monitoring well network in the Lower Issaquah Valley (Table 3[5]). Prior to each quarterly sampling event, the Parties will review and confirm the proposed monitoring wells selected for groundwater sampling based on a review of previous analytical results and groundwater elevations and the sufficiency of monitoring data coverage within each groundwater bearing zone. Synoptic groundwater gauging will be performed for all PFAS study area monitoring wells as part of each sampling event and the two depth-to-groundwater gauging only events.

3.2.3 Issaquah Valley Elementary West Playfield and Dodd Fields Park

Additional characterization work for the Issaquah Valley Elementary West Playfield and Dodd Fields Park areas of interest was developed to further refine the nature and extent of PFAS impacts to shallow and intermediate groundwater, and to evaluate potential vertical transport between shallow and intermediate groundwater. Locations selected for additional characterization and/or sampling will provide data to more thoroughly delineate the lateral extent(s) of groundwater impacts and evaluate potential migration pathways within and between shallow and intermediate

[5] Wells identified in Table 3 are preliminary pending analytical results and confirmation by the Parties.

groundwater. Specific additional work elements to be performed in association with these areas of interest include (Figure 2):

- Installation of two new intermediate monitoring wells, IES-MW06 and IES-MW10, co-located with existing shallow monitoring wells IES-MW01 and IES-MW03, respectively;
- Installation of one new shallow and intermediate monitoring well pair, IES-MW08 and IES-MW09, proximate to the proposed Issaquah Creek gauging location at the eastern end of Northwest Holly Street; and
- Installation of one new shallow monitoring well, IES-MW07, co-located with existing intermediate monitoring well COI-MW05.

The intermediate monitoring well IES-MW10, which is paired with shallow monitoring well IES-MW03, has been selected as an alternative location for the previously proposed intermediate monitoring well NWN-MW10 east of Newport Way Northwest described in Section 3.2.5.

3.2.4 Memorial Field and Rainier Trail Area

Additional characterization work for the Memorial Field and Rainier Trail areas of interest was developed to evaluate impacts to intermediate groundwater and to evaluate potential vertical transport between shallow and intermediate groundwater. Specific additional work to be performed in association with these areas of interest includes (Figure 2) the installation of one additional intermediate monitoring well, MF-MW04, co-located with existing shallow monitoring well MF-MW02.

3.2.5 175 Newport Way Northwest

Additional characterization work for the 175 Newport Way Northwest area of interest was developed to further refine the nature and extent of PFAS impacts to soil in the historical aqueous film-forming foam training area on the western portion of the property with sufficient detail to evaluate potential source remediation alternatives, to further characterize shallow and intermediate groundwater impacts, and to evaluate potential vertical transport between shallow and intermediate groundwater. Additional data collection at 175 Newport Way Northwest will include subsurface data collection for potential source remediation alternative development and/or groundwater model development (e.g., pump testing for aquifer properties). Specific additional work elements to be performed in association with 175 Newport Way Northwest include (Figure 4):

- Advancing 15 direct-push borings to a maximum depth of 20 feet bgs to collect soil and reconnaissance groundwater samples (9 borings for soil sampling only and 6 borings for soil and reconnaissance groundwater sampling);
- Installation of 3 new shallow monitoring wells (NWN-MW05, NWN-MW06, and NWN-MW07);
- Installation of 2 new intermediate monitoring wells, NWN-MW08 and NWN-MW09, co-located with existing shallow monitoring wells NWN-MW02 and NWN-MW03, respectively; and

- Installation of 2 piezometers screened at depths of approximately 15 to 25 feet bgs, and at 45 to 55 feet bgs for aquifer testing[6].

To support the assessment of the feasibility of remedial alternatives for soil at 175 Newport Way Northwest, select soil samples from the borings will be analyzed for total organic carbon content in addition to PFAS. In addition, groundwater samples collected from intermediate monitoring wells NWN-MW08 and NWN-MW09 and two of the shallow monitoring wells at 175 Newport Way Northwest will be analyzed for total organic carbon and total dissolved solids in addition to PFAS during the initial sampling event following the installation of the new monitoring wells.

Additional characterization will also be performed down-gradient of the 175 Newport Way Northwest area of interest to further refine subsurface stratigraphy (Figure 2), further refine the lateral extent of PFAS in shallow and intermediate groundwater, and evaluate the potential for vertical migration from shallow to intermediate groundwater. The additional characterization work will include:

- Installation of one new shallow monitoring well, NDS-MW01, co-located with intermediate monitoring well COI-MW06;
- Installation of one new intermediate monitoring well, NDS-MW02, at 360 Northwest Dogwood Street; and
- Installation of one shallow and intermediate monitoring well pair, NDS-MW03 and NDS-MW04, on 3rd Court Northwest.

One new intermediate monitoring well, NWN-MW10, was originally proposed north of the 175 Newport Way Northwest property but after further discussion a decision was reached by the Parties not to install a well at this location due to considerations regarding access and the proximity of subsurface utilities.

3.2.6 Eastern Lower Issaquah Valley

Additional characterization work for the Eastern Lower Issaquah Valley was developed to refine the lateral extent of impacts to intermediate groundwater and to evaluate potential cross-valley migration in intermediate groundwater that may potentially affect drinking water production wells other than City of Issaquah production well COI-PW04. Intermediate groundwater elevations and samples will also support further evaluation of potential impacts associated with the Memorial Field and Rainier Trail areas of interest. Specific additional work elements to be performed in association with the Eastern Lower Issaquah Valley include (Figure 2) the installation of two new intermediate monitoring wells, RBN-MW01 and RBN-MW02.

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6 Final screened intervals of piezometers may be adjusted based on screened intervals of adjacent shallow and intermediate monitoring wells to provide optimum resolution during aquifer testing.

3.3 TASKS REQUIRED

Characterization and related work to be performed in accordance with the IAA, or under separate oversight by City of Issaquah and EFR (Tasks 8 and 10), will be organized and tracked under the following tasks:

- **Task 1:** Project Management and Communication (IAA Task 1);
- **Task 2:** Preparation of Work Plan Addendum (IAA Task 2);
- **Task 3**: Quarterly Groundwater Monitoring (IAA Task 4);
- **Task 4**: Evaluation of Groundwater Stratification (IAA Task 3);
- **Task 5**: Evaluation of the Former Commercial Upholstery Shop (IAA Task 6);
- **Task 6**: 175 Newport Way Additional Characterization (IAA Task 7);
- **Task 7**: Data Compilation, Evaluation, and Reporting (IAA Tasks 5);
- **Task 8**: Groundwater Modeling and Evaluation (IAA Task 8);
- **Task 9**: Interim Remedial Action Plan (IAA Task 9); and
- **Task 10**: Investigation-Derived Waste Management (IAA Task 10).

For internal administration and tracking purposes, these task names and their order have been revised slightly from those listed in the IAA. For clarity, the corresponding task numbers in the IAA are listed in parentheses in the list above.

3.4 ORGANIZATION AND SCHEDULE

Farallon's Project Manager and Principal Reviewer will be Mr. Clifford Schmitt, a licensed Geologist and Hydrogeologist in Washington State. Farallon's Project QA/QC Officer will be Ms. 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.[7] To minimize disruption at the Issaquah Valley Elementary School and Issaquah School District property, invasive field work has been scheduled to be completed on weekends. Groundwater sampling will not disrupt normal school activities.

[7] There are inconsistencies with the schedule for field work and submittal of documents that need to be addressed prior to issuing the final Addendum.

Project Schedule Item	Estimated Start	Estimated Finish
Monthly Status Memoranda	02/15/20	06/15/21
Preparation of Addendum	01/20/20	03/06/20
Addendum Review and Approval	03/09/20	03/26/20
Groundwater Gauging Event	03/09/20	03/10/20
Lower Issaquah Valley Monitoring Well Installation	03/18/20	04/13/20
175 Newport Way Northwest Characterization Program	03/18/20	03/31/20
Groundwater Modeling Evaluation	To be determined	
175 Newport Way Northwest Summary Report Preparation	04/28/20	04/30/21
Groundwater Monitoring Event	06/01/20	06/05/20
Commercial Upholstery Shop Evaluation	06/01/20	06/16/20
Summary Report for Commercial Upholstery Shop	04/01/20	09/07/20
Groundwater Monitoring Event	09/07/20	09/11/20
175 Newport Way Northwest Summary Report Review and Approval	05/01/21	06/01/21
Interim Remedial Action Plan Development	09/22/20	04/30/21
Groundwater Monitoring Event	12/07/20	12/11/20
Interim Remedial Action Plan Review and Approval	05/01/21	06/01/21
Summary Report Development	02/01/21	04/30/21
Groundwater Monitoring Event	03/08/21	03/10/21
Investigation-Derived Waste Management	Ongoing with field work	
Groundwater Gauging Event	06/07/21	06/11/21
Summary Report Review and Approval	05/01/21	06/01/21

4.0 FIELD PROCEDURES

This section summarizes the protocols and procedures that will be followed for the field data collection phase of the PFAS characterization work. 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 materials with "fluoro" in the name. Low-density polyethylene sampling equipment such as pump drop tubing will be confirmed to be PFAS-free with an equipment blank. Sample containers will be certified by the laboratory as PFAS-free. The ingredients of detergents or soaps used in decontamination procedures will be reviewed to ensure that fluoro-surfactants are not listed as ingredients. The final rinse water will be laboratory-certified as PFAS-free.

4.1 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. An Inadvertent Discovery Plan (IDP) has been prepared in accordance with Ecology requirements for all work that disturbs soil (Appendix D). In the event cultural resources are discovered, work will stop while the IDP procedures are followed and the IDP-listed contacts are notified.

Soil samples will be collected from discrete depth intervals during drilling to characterize the subsurface distribution of PFAS at select locations. Selection of samples for PFAS analysis will be made based on field observations and consideration of proximate available analytical data from previous borings and/or monitoring wells. The anticipated maximum total number of soil samples to be collected from the entire set of direct-push borings is identified on Table 3. Final selection of the soil samples for submittal to the laboratory will 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. Locations may be adjusted as necessary based on access and utilities (see Section 3.2.1.1, Utility Locate).

Shallow monitoring wells will be drilled to depths of up to approximately 35 feet bgs and intermediate monitoring wells will be drilled to depths of approximately 80 feet bgs using a sonic drill rig. Soil samples will be collected on a continuous basis from a core barrel for lithologic description and potential laboratory analysis. Borings at 175 Newport Way Northwest will be installed using a direct-push drill rig. Samples will be collected continuously from the vadose zone soil using a 4- or 5-foot-long core sampler with disposable high-density polyethylene sleeves.

Soil samples will be collected from borings and handled in accordance with the requirements of Farallon SOP SL-01 (Appendix C); Section 5, Sample Handling; and Section 7, Field Documentation. Completed borings will 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).

4.2 GROUNDWATER SAMPLING

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

4.2.1 Monitoring Well Construction and Development

Monitoring well locations will be identified in advance and marked in the field. Locations may be adjusted as necessary based on access and utility locations. Farallon field staff will observe monitoring well drilling and installation and document observations as described in Section 7, Field Documentation. Monitoring well construction and development will be performed in accordance with Farallon SOPs GW-01 and GW-02 (Appendix C).

Groundwater monitoring wells will be constructed in accordance with WAC 173-160-400 and will meet Washington State requirements for resource protection well construction. Monitoring wells will be installed using 2-inch-diameter Schedule 40 polyvinyl chloride well casings with a 0.020-inch slotted well screen. Shallow monitoring well screens will be set across the top of the first-encountered groundwater-bearing unit. Intermediate groundwater monitoring wells will be screened into the brown sand unit, where encountered, or the first coarse conductive unit observed in the intermediate groundwater-bearing zone. Each monitoring well will extend a minimum of 5 feet into the water-bearing unit.

Each monitoring well filter pack will consist of 10/20 Colorado Silica Sand emplaced in the borehole annulus up to 1 foot above the top of the screen. The borehole will be sealed to within 2 feet of the surface with hydrated bentonite chips. The monitoring wells will be completed with flush-mounted steel monuments set in concrete and developed immediately following installation. Monitoring well development will consist of pumping with a whale pump until the majority of the fine-grained sediment in the well and surrounding filter pack has been removed; purge water appears visually clear; pH has stabilized to within ± 0.1 unit; conductivity has stabilized to within ± 3 percent; and dissolved oxygen has stabilized to within ± 10 percent.

4.2.2 Reconnaissance Groundwater Sampling

Reconnaissance groundwater samples will be collected at first-encountered (shallowest) groundwater and from selected deeper groundwater-bearing units, including the groundwater-bearing sand and gravel units previously observed between depths of approximately 20 and 40 feet bgs and/or in the interval directly above or below the silt unit encountered between depths of 50 and 70 feet bgs (Figure 3). The decision whether to collect a reconnaissance groundwater sample during drilling for installation of a monitoring well will be based on field observations of depth intervals and composition of coarser-grained groundwater-bearing units, the presence of fine-grained soil that may represent an aquitard, and consideration of proximate available groundwater analytical data from previous borings and/or monitoring wells. The anticipated maximum total number of reconnaissance groundwater samples to be collected from each boring is identified on Table 3. Final selection of whether to collect a reconnaissance groundwater sample from a boring and the specific interval(s) will made by the Project Manager with input from field personnel and the Principal Reviewer.

Reconnaissance groundwater sampling will be performed using either a peristaltic or bladder pump and temporary disposable well screen. Samples will be collected in accordance with EPA low-flow methodology from each boring, which will be purged until visually clear prior to sampling directly into laboratory-supplied containers.

4.2.3 Groundwater Sampling

Groundwater samples will be collected from permanent monitoring wells. Procedures for monitoring well purging and low-flow sampling are provided in Farallon SOP GW-04 (Appendix C). Farallon will record observations and field data on Field Report forms as described in Section 7, Field Documentation.

4.3 SURFACE WATER GAUGING

Three stream gauging stations will be established along Issaquah Creek (Figure 2). Surface water elevations in the creek will be determined during the groundwater monitoring events by measuring the distance to the water surface from surveyed reference points to be established at each gauging station. The reference points will be on permanent structures such as bridge abutments or beams to ensure consistency between measurements.

4.4 DECONTAMINATION PROCEDURES

Reusable equipment will be decontaminated in accordance with Farallon SOP EQ-01 (Appendix C). Final equipment rinses will be with laboratory-supplied certified PFAS-free water.

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 E.

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 identification or decision unit) and the depth of the sample stated 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

The water samples will be assigned a unique sample identifier that will include the sample location identifier (e.g., boring or well identifier), the depth interval of the sample pump inlet in feet bgs, and a "W" flag for visual 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 would be labeled FMW-04-25-W. A reconnaissance groundwater sample collected from boring FB-12 with the pump intake set at 15 feet bgs would be numbered FB-12-15-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 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 (ºC). 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 4ºC is 14 days.
- **Water Samples:** Water samples, including reconnaissance groundwater and 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 4ºC. 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 4ºC 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 integrity 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 duplicates will be collected at a rate of 1 field duplicate per 10 samples collected.

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 E.

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, and information on the potential presence of contamination.

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 activities:

- Advancing borings; and
- Installing monitoring wells.

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 E) and will be removed within 60 days.

7.2 WASTEWATER

Wastewater will be generated during monitoring well development, purging, and sampling 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 E). Analytical results will be used to generate a profile for disposal. No wastewater will remain on at the 175 Newport Way Northwest property longer than 60 days.

7.3 DISPOSABLES

Disposable personal protective clothing (e.g., Tyvek suits, rubber 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 for PFAS using Modified EPA Method 537.

8.1 SAMPLE PREPARATION METHODS

PFAS samples will be prepared in accordance with the analytical laboratory PFAS Isotope Dilution Method as specified by the analytical laboratory.

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 environmental laboratory accreditation for Modified EPA Method 537 compliant with the Quality Systems Manual (Version 5.1) and accreditation by Ecology under the requirements described in WAC 173-50, Accreditation of Environmental Laboratories (Appendix F). 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 technical memoranda and reports as identified in the IAA, including the Addendum, the Summary Report (IAA Task 5), the 175 Newport Way Northwest Summary Report (Task 7), the Interim Remedial Action Plan, a report summarizing the historical operations at the Commercial Upholstery Shop, and monthly status memoranda (Task 1). The summary reports will include appropriate background, a description and the rationale of the work performed, a summary of data QA/QC, summary figures and tables, and attachments, including analytical laboratory reports, boring logs, and other records as appropriate. Technical memoranda and reports will be prepared by qualified personnel, reviewed and approved by a Farallon Principal Reviewer, and provided to the Parties as specified under the IAA.

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. Project progress reporting will be provided monthly to the Parties under Task 1.

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 Lower Issaquah Valley and areas of interest depicting sampling locations and chemical concentrations for individual and groups of chemicals. Figures will also include augmenting the existing cross-sections from the 2019 Summary Report with the hydrogeologic information and data collected during this phase of the characterization study.

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

Farallon Consulting, L.L.C. (Farallon). 2018. *Per- And Poly-Fluoroalkyl Substances Characterization Study Work Plan, Lower Issaquah Valley, Issaquah, Washington*. Prepared for Eastside Fire & Rescue. August 6.

———. 2019. *Per- and Poly-Fluoroalkyl Substances Characterization Study Summary Report, Lower Issaquah Valley, Issaquah, Washington.* Prepared for Eastside Fire & Rescue. March 27.

Interstate Technology Regulatory Council (ITRC). 2017. *History and Use of Per- and Polyfluoroalkyl Substances (PFAS)*. November.

Knepper, T.P. and F.T. Lange, ed. 2012. *The Handbook of Environmental Chemistry 17: Polyfluorinated Chemicals and Transformation Products.* Springer. New York, New York. p. 35.

Office of the Federal Registrar, National Archives and Records Administration (NARA). 2019. *Federal Registrar*. Vol. 84(247): pp. 71090.

U.S. Climate Data. 2016. Climate Data for the Snoqualmie Falls, Washington Meteorological Station No. 457773. <https://www.usclimatedata.com/>. (July 16, 2018.)

U.S. Department of Defense. 2017. *Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories*. Version 5.1. Environmental Data Quality Workgroup.

U.S. Environmental Protection Agency (EPA). 2016. *Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate*. EPA Administrative Record EPAHQ-OW-2014-0138. May 19.

———. 2019. *EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan.* EPA Publication No. 823R18004. February.

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.

———. 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.

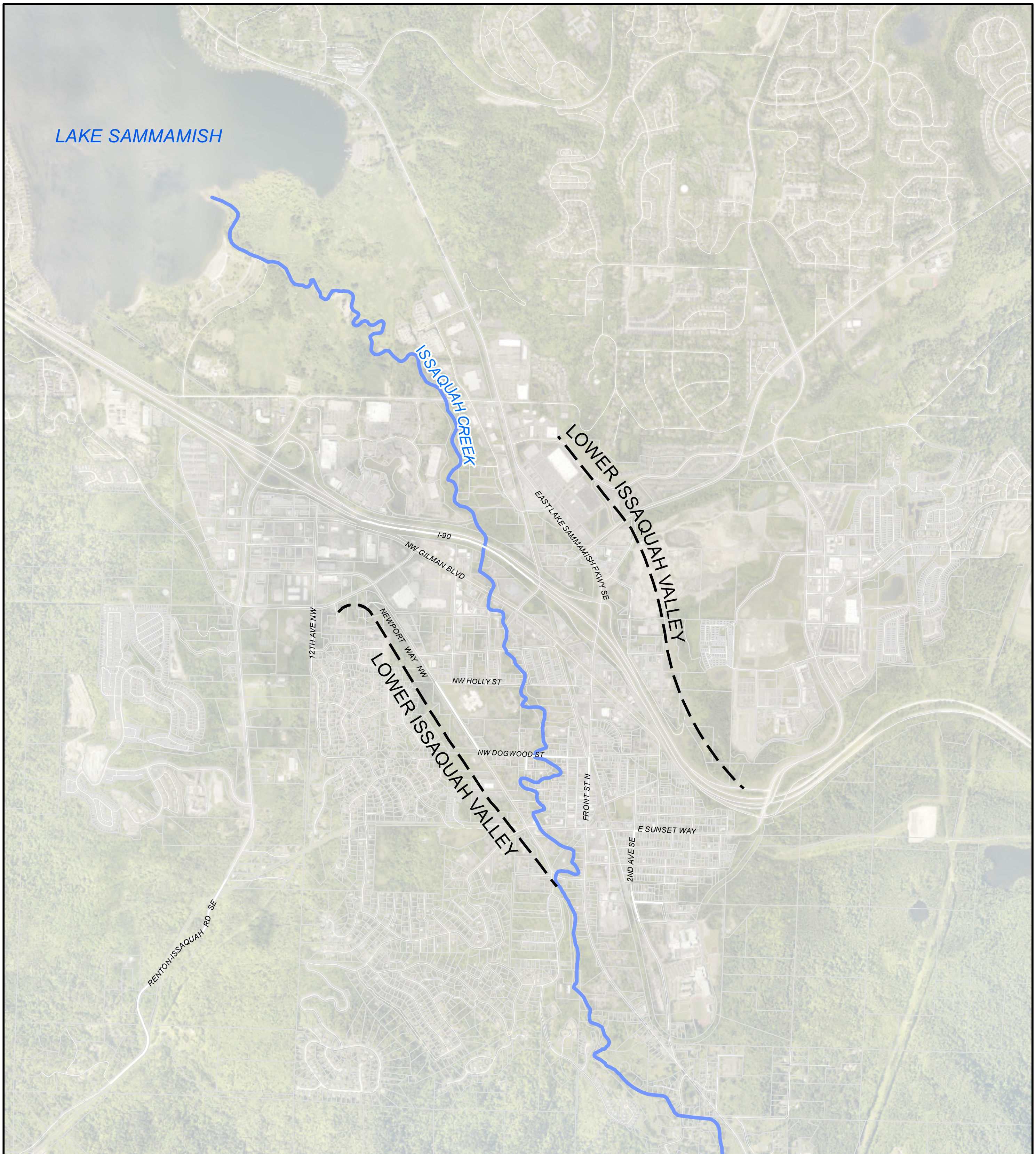
Washington State Department of Health. 2019. *Criteria to Adopt State Action Levels*. November.

Western Regional Climate Center. 2016. Greater Seattle Area Climate Data. <https://wrcc.dri.edu/>. (July 16, 2018.)

FIGURES

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

Farallon PN: 1754-004



LEGEND

ISSAQUAH CREEK

LOWER ISSAQUAH VALLEY

N

0 2,500

SCALE IN FEET

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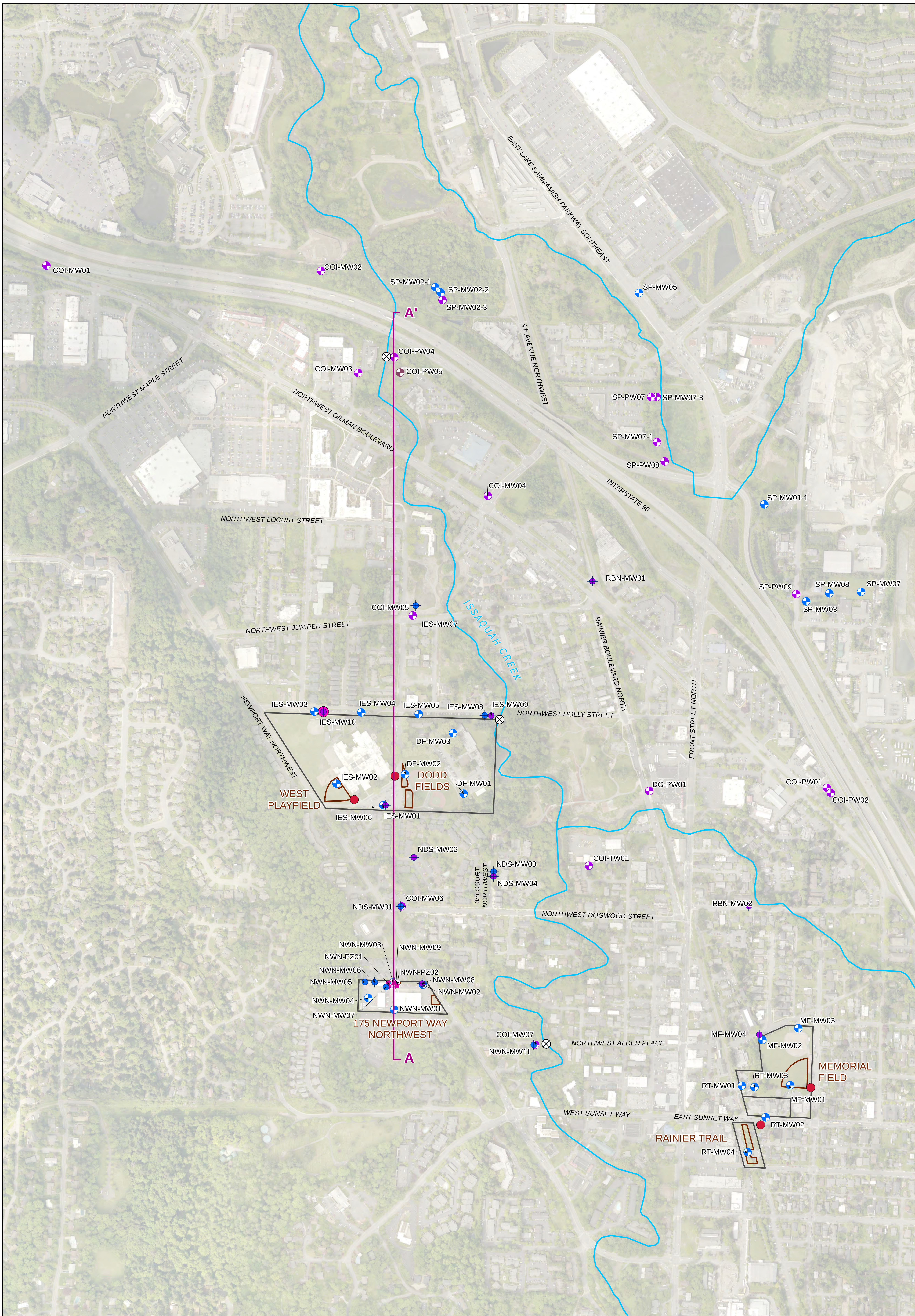
FIGURE 1

ISSAQUAH VALLEY AND VICINITY
PFAS CHARACTERIZATION STUDY
WORK PLAN ADDENDUM
LOWER ISSAQUAH VALLEY
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-004

Drawn By: jjones | Checked By: EB | Date: 3/5/2020 | Disc Reference:

Document Path: Q:\Projects\1754 EastsideFireRescue\1754-004 2019 Biennium PFAS Invest\Task_004_EvalGWStratification\Mapfiles\Figure-01_Vicinity.mxd



LEGEND

- PROPOSED PIEZOMETER
- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- STREAM GAUGING STATION
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- FIRE HYDRANT
- KING COUNTY PARCEL
- MIS DECISION UNIT
- PROPOSED LOCATION TO BE CONFIRMED BASED ON BORING LOGS COMPLETED
- A A' LINE OF CROSS-SECTION

NOTES
MIS = MULTI-INCREMENTAL SAMPLE
1. ALL LOCATIONS ARE APPROXIMATE
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION

N

0 300
SCALE IN FEET

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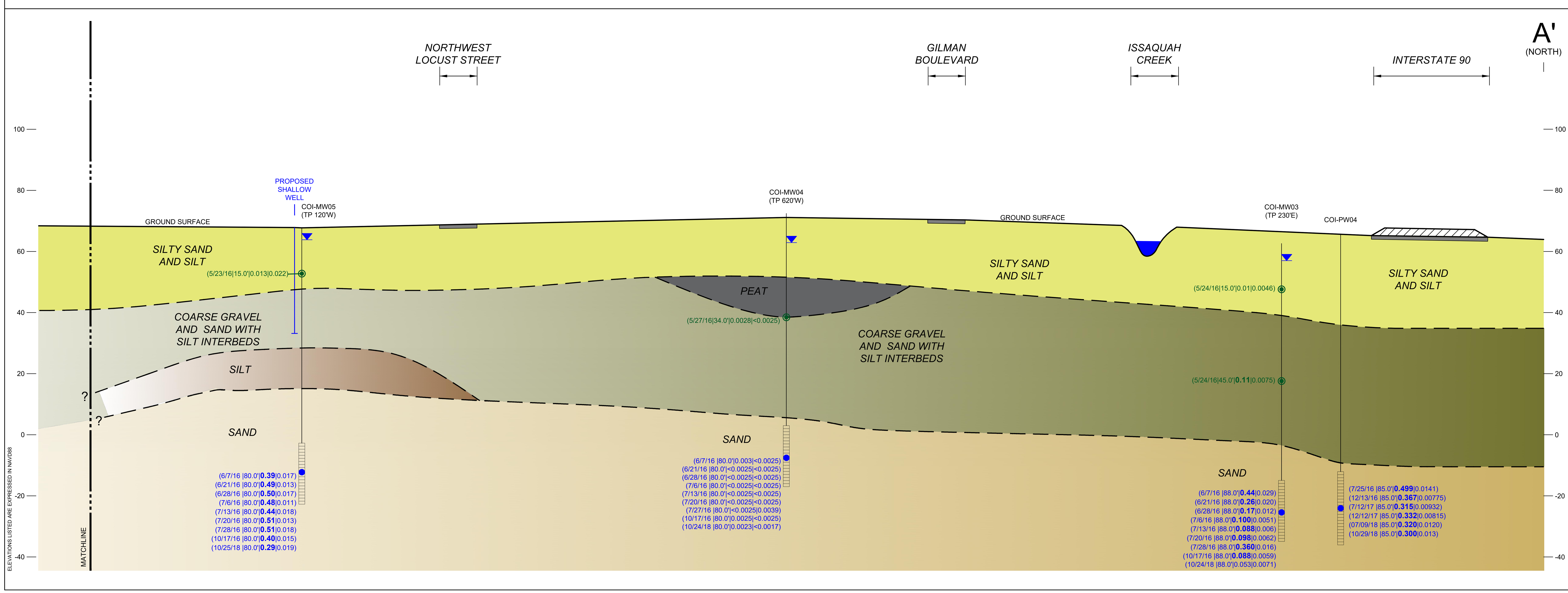
FIGURE 2

LOWER ISSAQUAH VALLEY SAMPLING LOCATIONS
PFAS CHARACTERIZATION STUDY
WORK PLAN ADDENDUM
LOWER ISSAQUAH VALLEY
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-004

Drawn By: jjones | Checked By: EB | Date: 3/26/2020 | Disc Reference:

Document Path: Q:\Projects\1754 EastsideFireRescue\1754-004 2019 Biennium PFAS Invest\Task_004_EvalGWStratification\Mapfiles\Figure-02_LIVSamples.mxd



LEGEND

IES-MW04 (TP 220'E)	BORING OR MONITORING WELL LOCATION TRANSPOSED (TP) IN FEET, EAST (E) OR WEST (W), TO CROSS-SECTION LINE.
	STRATIGRAPHIC CONTACT/DASHED WHERE INFERRED
	GROUNDWATER LEVEL (10/26/2018)
	RECONNAISSANCE GROUNDWATER SAMPLE
	GROUNDWATER SAMPLE
	WELL SCREEN INTERVAL
	PROPOSED SHALLOW WELL
	PROPOSED INTERMEDIATE WELL

<DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED

BOLD	DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS
PFOS	PERFLUOROOCTANE SULFONIC ACID
PFOA	PERFLUOROOCTANOIC ACID
BGS	BELOW GROUND SURFACE
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
(05/26/2016|35.0'|<0.0025|<0.0025)	RECONNAISSNCE GROUNDWATER RESULTS LISTED AS (DATE SAMPLED|DEPTH BGS|PFOS|PFOA) IN MICROGRAMS PER LITER
(6/7/16 |88.0'|0.44|0.029)	GROUNDWATER RESULTS LISTED AS (DATE SAMPLED|DEPTH BGS|PFOS|PFOA) IN MICROGRAMS PER LITER

NOTES
1) ALL LOCATIONS ARE APPROXIMATE
2) FIGURES WERE PRODUCED IN COLOR. GRASCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION
3) ELEVATIONS LISTED ARE EXPRESSED IN NAVD88

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FIGURE 3

CROSS-SECTION A-A'
PFAS CHARACTERIZATION STUDY
WORK PLAN ADDENDUM
LOWER ISSAQUAH VALLEY
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-004

Drawn By: NM | Checked By: EB | Date: 3/5/2020 | Disk Reference: X-SEC-A-A'

R:\Projects\1754-004\CAD\1754-004-X-SEC.dwg 2020/03/05 1:47 PM (Nick Miller)

LEGEND

- PROPOSED PIEZOMETER
- PROPOSED BORING - SOIL SAMPLING
- PROPOSED BORING - RECONNAISSANCE GROUNDWATER AND SOIL SAMPLING
- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- BORING
- SHALLOW MONITORING WELL
- KING COUNTY PARCEL
- MIS DECISION UNIT
- (66.59) GROUNDWATER ELEVATION (10/26/2018) REPORTED IN FEET - NORTH AMERICAN VERTICAL DATUM OF 1988
- 66.00 APPROXIMATE GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- APPROXIMATE FLOW DIRECTION

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

AFFF = AQUEOUS FILM-FORMING SOLUTION
MIS = MULTI-INCREMENTAL SAMPLE
PFAS = PER- AND POLY- FLUOROALKYL SUBSTANCES
PFOA = PERFLUOROOCTANOIC ACID
PFOS = PERFLUOROOCTANE SULFONIC ACID
BOLD = DENOTE CONCENTRATIONS EXCEEDING THE APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVEL OF 0.070 MICROGRAM PER LITER
< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED
BGS = BELOW GROUND SURFACE

N

0 20

SCALE IN FEET

FARALLON CONSULTING

Quality Service for Environmental Solutions | farallonconsulting.com

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

FIGURE 4

PROPOSED ADDITIONAL CHARACTERIZATION
175 NEWPORT WAY NORTHWEST
PFAS CHARACTERIZATION STUDY
WORK PLAN ADDENDUM
LOWER ISSAQUAH VALLEY
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-004

Drawn By: jjones | Checked By: EB | Date: 3/5/2020 | Disc Reference:

Document Path: Q:\Projects\1754 EastsideFireRescue\1754-004 2019 Biennium PFAS Invest\Task_004_EvalGWStratification\Mapfiles\Figure-04_ProposedCharacterization.mxd

TABLES

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

Farallon PN: 1754-004

Table 1
Soil Reporting Limits and Investigatory Levels
PFAS Characterization Study Work Plan Addendum
Issaquah, Washington
Farallon PN: 1754-004

Analyte	Typical Reporting Limit (mg/kg)[1]	Ecology Investigatory Levels for Soil (mg/kg)[2]			
		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

[1]Representative range of reporting limits from Lower Issaquah Valley PFAS Characterization Study investigation results (2018).

[2]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 Investigatory Levels
PFAS Characterization Study Work Plan Addendum
Issaquah, Washington
Farallon PN: 1754-004

Analyte	Typical Reporting Limit[1] (µg/l)	Ecology Drinking Water Investigatory Level[2] (µg/l)
PFBS	0.0041 - 0.0083	--
PFHxS	0.0041 - 0.0083	--
PFOA[3]	0.0016 - 0.0033	0.070
PFOS[3]	0.0041 - 0.0083	
PFNA	0.0041 - 0.0083	--

NOTES:
-- denotes no value currently available.
[1]Representative range of reporting limits from Lower Issaquah Valley PFAS Characterization Study investigation results (2018).
[2]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.
[3]Drinking water and human contact investigatory levels apply both to PFOS and PFOA individually, and the sum of both chemicals.

Ecology = Washington State Department of Ecology
DOH = Washington State Department of Health
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 Study Sampling 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	Reconnaissance Groundwater	Monitoring Well Installation Groundwater	Quarterly Groundwater Sample[1]	Quality Control Sample Location[2]	Field Duplicate Sample Location
Issaquah Valley Elementary West Playfield	IES-MW01	Shallow Well	--	--	--	4	--	--
	IES-MW02	Shallow Well	--	--	--	4	--	--
	IES-MW03	Shallow Well	--	--	--	--	--	--
	IES-MW04	Shallow Well	--	--	--	--	--	--
	IES-MW06	Intermediate Well	--	3	1	4	--	--
	IES-MW07	Intermediate Well	--	1	1	2	--	--
	IES-MW08	Shallow Well	--	1	1	2	--	--
	IES-MW09	Intermediate Well	--	3	1	4	--	--
	IES-MW10*	Intermediate Well	--	3	1	4	--	--
Dodd Fields Park	IES-MW05	Shallow Well	--	--	--	--	--	--
	DF-MW01	Shallow Well	--	--	--	--	--	--
	DF-MW02	Shallow Well	--	--	--	2	--	--
	DF-MW03	Shallow Well	--	--	--	--	--	--
Memorial Field	MF-MW01	Shallow Well	--	--	--	--	--	--
	MF-MW02	Shallow Well	--	--	--	2	--	--
	MF-MW03	Shallow Well	--	--	--	--	--	--
	MF-MW04	Intermediate Well	--	3	1	4	--	--
Rainier Trail Area	RT-MW01	Shallow Well	--	--	--	--	--	--
	RT-MW02	Shallow Well	Previously Decommissioned					
	RT-MW03	Shallow Well	--	--	--	--	--	--
	RT-MW04	Shallow Well	--	--	--	2	--	--
175 Newport Way Northwest	NWN-MW01	Shallow Well	--	--	--	2	--	--
	NWN-MW02	Shallow Well	--	--	--	2	--	--
	NWN-MW03	Shallow Well	--	--	--	4	--	--
	NWN-MW04	Shallow Well	--	--	--	4	4	4
	NWN-MW05	Shallow Well	3	1	1	4	--	--
	NWN-MW06	Shallow Well	3	1	1	4	--	--
	NWN-MW07	Shallow Well	3	1	1	4	1	1
	NWN-MW08	Intermediate Well	1	1	1	4	--	--
	NWN-MW09	Intermediate Well	--	2	1	4	--	--
	NWN-PZ01	Piezometer	--	--	--	--	--	--
	NWN-PZ02	Piezometer	--	--	--	--	--	--
	NWN Direct Push Borings	Shallow Boring	45	6	--	--	6	2

Table 3
Characterization Study Sampling 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	Reconnaissance Groundwater	Monitoring Well Installation Groundwater	Quarterly Groundwater Sample[1]	Quality Control Sample Location[2]	Field Duplicate Sample Location
Lower Valley Wells	COI-MW02	Intermediate Well	--	--	--	--	--	--
	COI-MW03	Intermediate Well	--	--	--	2	--	--
	COI-MW04	Intermediate Well	--	--	--	--	--	--
	COI-MW05	Intermediate Well	--	--	--	4	--	--
	COI-MW06	Intermediate Well	--	--	--	4	4	4
	COI-MW07	Intermediate Well	--	--	--	4	--	--
	NDS-MW01	Shallow Well	--	--	1	4	--	--
	NDS-MW02	Intermediate Well	--	--	1	2	--	--
	NDS-MW03	Shallow Well	--	--	1	2	--	--
	NDS-MW04	Intermediate Well	--	--	1	4	--	--
	NWN-MW11	Shallow Well	--	--	1	4	--	--
	RBN - MW01	Intermediate Well	--	--	1	4	--	--
	RBN - MW02	Intermediate Well	--	--	1	4	--	--
Total Samples Collected			**55**	**26**	**18**	**104**	**15**	**11**

NOTES:

Cells shaded in green indicate locations proposed as part of 2020 and 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.

[1]Draft counts only, final locations to be confirmed as part of planned Executive Committee meetings.

[2]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
CHARACTERICATION STUDY WORK PLAN ADDENDUM
LOWER ISSAQUAH VALLEY
ISSAQUAH, WASHINGTON

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

Farallon PN: 1754-004

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

April 3, 2020

Prepared by:

Paul Grabau, L.G., L.H.G.
Principal Hydrogeologist

Reviewed by:

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Principal Hydrogeologist

TABLE OF CONTENTS

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 55 subsurface vadose zone soil samples from 15 borings and 4 monitoring wells to further evaluate the pathway for PFAS migration from soil to groundwater at four areas of interest;
- Collect up to 26 reconnaissance groundwater samples from 11 monitoring wells and 6 borings to evaluate potential impacts to groundwater quality from historical training and other operations at four areas of interest, and to inform and guide monitoring well installation and screen construction;
- Collect 1 initial groundwater sample from each of the of the 18 new monitoring wells to evaluate groundwater quality and potential PFAS impacts;
- Collect groundwater samples from the existing and newly installed monitoring wells on a semiannual and/or quarterly basis for four quarters, for a total 104 samples not including field duplicates and QC samples, to evaluate groundwater quality and potential PFAS impacts;
- Perform synoptic measurement of groundwater levels at the Lower Issaquah Valley monitoring well network to evaluate groundwater gradient and flow direction;
- Perform synoptic measurement of surface water elevations at three gauging stations along Issaquah Creek in the Lower Issaquah Valley to evaluate the relative elevations of surface water in the creek to groundwater levels at nearby monitoring wells;
- 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_1 = the larger of the two duplicate results (i.e., the higher detected concentration)

C_2 = 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_{sa} = measured concentration in spiked aliquot

M_{ua} = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

Target control limits for accuracy have been set at 70 to 130 %R in laboratory control samples. These limits were based on Ecology values in the Ecology PFAS Survey.

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.

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

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 technical memoranda and reports as identified in the Interagency Agreement dated December 3, 2019, executed between Ecology (2019) and Eastside Fire & Rescue (IAA), including the Work Plan, the Lower Issaquah Valley PFAS Characterization Summary Report (IAA Task 5), the 175 Newport Way Northwest Additional Characterization Summary Report (Task 7), the Interim Remedial Action Plan (Task 9), and monthly status memoranda (Task 1). The summary reports will include appropriate background, a description and the rationale of the work performed, 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 areas of interest where historical operations included use of aqueous film-forming foam to identify potential points of release for PFAS to the environment;
- Assess the presence of PFAS in shallow soil and groundwater at areas of interest (potential points of release) in the Lower Issaquah Valley, and identify potential direct contact exposure to surface soil and migration pathways from soil to groundwater;
- Further characterize the nature and extent of PFAS in groundwater below the shallowest water-bearing zone at the Lower Issaquah Valley; and
- Collect data that can be directly compared against Ecology Investigatory Levels for sampled media.

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
PROPOSED STATE ACTION LEVELS

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

Farallon PN: 1754-004

Table B1
Groundwater Reporting Limits and State Action Levels
PFAS Characterization Study Work Plan Addendum
Issaquah, Washington
Farallon PN: 1754-004

Analyte	Typical Reporting Limit[1] (µg/l)	DOH Drinking Water State Action Level[2] (µg/l)
PFBS	0.0041 - 0.0083	1.3
PFHxS	0.0041 - 0.0083	0.070
PFOA[4]	0.0016 - 0.0033	0.010
PFOS[4]	0.0041 - 0.0083	0.015
PFNA	0.0041 - 0.0083	0.014

NOTES:

[1]Representative range of reporting limits from Lower Issaquah Valley PFAS Characterization Study investigation results (2018).

[2]DOH proposed State Action Levels for drinking water in November 2019, Section 315 of Chapter 246-290 of the Washington Administrative Code.

DOH = Washington State Department of Health

µg/l = micrograms per liter

PFBS = perfluorobutanesulfonic acid

PFHxS = perfluorohexane sulfonic acid

PFNA = perfluorononanoic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonic acid

APPENDIX C
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. 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:

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

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$_{casing}$ (X) (gallons per linear foot)	Volume$_{annulus}$ (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; <u>OR</u>
    - 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 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 ±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:

Minimum purge volume = 2*[500 milliliters + M*(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 D
INADVERTENT DISCOVERY PLAN

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

Farallon PN: 1754-004

DEPARTMENT OF ECOLOGY
State of Washington

PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS[1]

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.

[1] 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) 394-4418 Email: ebuer@farallonconsulting.com	Ecology Staff Project Manager Name: Tamara Cardona Phone: (425)649-7058 Email: TACA461@ecy.wa.gov

Assigned Alternates:

Assigned Project Manager Alternate: Name: Clifford Schmitt Phone: (425)295-0800 Email:cschmitt@farallonconsulting.com	Ecology Cultural Resource Specialist (Alternate): Name: Priscilla Tomlinson Phone:(425)649-7135 email: ptom461@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

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

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 ¼-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"

Bone Awls from Oregon and Bone Wedge from California

Implement the IDP / UDP if …

You see bone or shell artifacts.

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

Tooth Pendant and Bone Pendants from Oregon and Washington

Implement the IDP / UDP if …

You see fiber or wood artifacts.

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

Artifacts from Mud Bay, Olympia, Washington

Implement the IDP / UDP if …

You see historic period artifacts.

Artifacts from Downtown Seattle, Alaskan Way Viaduct (Upper Left and Lower) and Unknown Site (Upper Right)

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)

Site on Muckleshoot Indian Reservation, near WSDOT ROW along SR 164

Implement the IDP / UDP if …

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

- 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.

45KI924, In WSDOT ROW for SR 99 Tunnel

Eric Buer

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@snoqualmietribe.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@snoqualmietribe.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.
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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:
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• 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.

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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.
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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

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

APPENDIX E
FARALLON FIELD DOCUMENTATION FORMS

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

Farallon PN: 1754-004

FIELD REPORT

Page ___ of ___

Date: ____________ **Project #:** ________________________________ **Task #:**______________

Project: ___________________________________ **Site Address:** __________________________________

Client: ____________________________________ **Contractor:** ____________________________________

Weather: _________________________________ **Temp:** ___________

Equipment Used: ____

Hours: ________ _________ **Mileage:** _________ **Project Manager:** _______________________________

Contractor *Staff*

Prepared By: ______________________________ **Reviewed By:** __________________________________

Comments:

FIELD REPORT (continued)

Page ___ of ___

Project: ______________________________ **Date:** ____________ **Project #:** _____________ **Task #:**_______

FARALLON CONSULTING

Log of Boring:

Page __ of __

Client: **Project:** **Location:**	**Date/Time Started:** **Sampler Type:** **Date/Time Completed:** **Drive Hammer (lbs.):** **Equipment:** **Depth of Water ATD (feet bgs):**
Farallon PN:	**Drilling Company:** **Total Boring Depth (feet bgs):**
Logged By:	**Drilling Foreman:** **Total Well Depth (feet bgs):** **Drilling Method:**

Depth (feet bgs)	Sample Interval	Lithologic Description	USCS	USGS Graphic	% Recovery	Blow Counts 8/8/8	PID (ppm*)	Sample ID	Sample Analyzed	Boring/Well Construction Details
0										
5										
10										
15										
20										

Well Construction Information

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

LOW-FLOW WELL PURGING AND SAMPLING DATA

WELL NO:

DATE: | PROJECT NAME: | PROJECT NO:

WEATHER CONDITIONS:

WELL DIAMETER (IN.) ☐ 1 ☐ 2 ☐ 4 ☐ 6 ☐ OTHER ________________

SAMPLE TYPE: ☐ GROUNDWATER ☐ WASTEWATER ☐ SURFACE WATER ☐ OTHER

WELL DEPTH (TOC) FT. | DEPTH TO WATER BEFORE PURGING (TOC) FT.

LENGTH OF WATER FT. | CALCULATED ONE WELL VOLUME[1]: __ GAL.

DEPTH OF SAMPLE POINT FT. | ESTIMATED VOLUME PURGED GAL.

EQUIP. DECON. ☐ ALCONOX WASH ☐ LIQUINOX WASH ☐ DIST/DEION 1 RINSE ☐ DIST/DEION 2 RINSE ☐ OTHER

CONTAINER PRESERVATION: ☐ LAB PRESERVED ☐ FIELD PRESERVED

WATER ANALYZER: | PUMP TYPE: | TUBING:

ACTUAL TIME (min)	FLOW RATE (ml/min)	DEPTH TO WATER (feet)	TEMP ☐ °F ☐ °C 3%	SPECIFIC CONDUCT. (mS/cm) 3%	pH +/- 0.1	DISS. OXYGEN (mg/l) <0.5 mg/L or 10% for > 0.5 mg/L	TURBIDITY (NTU) <5 NTU or 10% for > 5 NTU	ORP (mV) +/- 10 mV	REMARKS (EVIDENT ODOR, COLOR, PID)
	INITIAL		--	--	--	--	--	--	

DEPTH TO WATER AFTER PURGING (TOC) FT. | SAMPLE FILTERED ☐ YES ☐ NO SIZE ______

NOTES:

SAMPLE TIME: ID#

DUPLICATE ☐ TIME: ID#:

EQUIP. BLANK: ☐ TIME: ID#:

PREPARED BY:

[1] A 1 FOOT LENGTH OF WATER = 0.05 GAL IN 1" DIA. PIPE 0.17 GAL IN 2" DIA PIPE 0.65 GAL IN 4" DIA PIPE 1.5 GAL IN 6" DIA PIPE

Sheet _____ of _____

Soil Sample Data Log

Date: ________________ **Project Name:** ________________________________ **Farallon P/N:** ________________________

PID Model & Serial No: ________________________________ **Calibration Date/Standard:** ________________________

Headspace Container: ☐ 16 oz glass ☐ 8 oz glass ☐ Zip-loc ☐ Other

Sample Method: ☐ Hand auger ☐ Direct push ☐ Split spoon ☐ Corer ☐ Other

Equip Decon: ☐ Tap water wash ☐ DIST/DEION 1 Rinse ☐ Isopropanol ☐ Analyte-free final rinse ☐ Tap water final rinse

☐ Alconox wash ☐ Liquinox Wash ☐ DIST/DEION 2 rinse ☐ Other solvent ☐ DIST/DEION final rinse ☐Air Dry

Test Pit/Boring Location	Sample ID	Time	Depth	PID	Odor	Sheen Tare Weight	Staining Field Weight	Containers	Lithological Description Remarks

2 oz = two-ounce jars

4 oz = four-ounce jars

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

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

29-HML-S (Rev. 10/96)

Published by J. J. KELLER & ASSOCIATES, INC., Neenah, WI • USA • (800) 327-6868

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 CODES: WT01

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 DOCUMENT NO.: Added by transporter

WASHINGTON STATE DANGEROUS WASTE

HANDLE WITH CARE

FORM NO. 1275281

WASTE INVENTORY TRACKING SHEET

Project Number: ______________________ **Page:** ________ of ________

Project Name: ______________________ **Generation Date:** ______________________

Project Address: ______________________ **Prepared By:** ______________________

Field Work Description: ______________________ **Date Waste Removed:** ______________________

Project Manager: ______________________ **Waste Transporter:** ______________________

Waste Disposal Location:

Unique Container ID	Container Size	% Capacity Used	Contents (Soil/GW/Decon Water)/ Origin (Boring or Well ID)	Date(s) Accumulated	Labeling (Contents Under Test/ Haz/Non-Haz/Other-Specify)	Sampled (Y/N)	Comments

NOTES: Contents should be specified and include identification of well/boring, media, source, depth of soil (if applicable), and any other helpful information.

Container ID should be unique when compared against other nearby containers. Special waste labels may include flammable, corrosive, dangerous when wet, and/or oxidizer.

Location of Drums (sketch or describe):

FARALLON CONSULTING

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

Chain of Custody Form

Page ______ of ______

ALS Project Manager:		ALS Work Order #:	

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) ☑ Other ________ ☐ 10 Wk Days ☐ 5 Wk Days ☐ 3 Wk Days ☐ 2 Wk Days ☐ 24 Hour	Results Due Date:

Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Notes:		
Relinquished by:	Date:	Time:	Received by (Laboratory):	Date:	Time:	ALS Cooler ID	Cooler Temp	QC Package: (Check Box Below) ☐ Level II: Standard QC ☐ Level III: Raw Data
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):					☐ TRRP LRC ☐ TRRP Level IV
								☐ Level IV: SW846 Methods/CLP like
								☐ Other: ________

Preservative Key: **1**-HCl **2**-HNO_3 **3**-H_2SO_4 **4**-NaOH **5**-$Na_2S_2O_3$ **6**-$NaHSO_4$ **7**-Other **8**-4°C

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.

APPENDIX F
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 13th Avenue, Kelso, WA 98626

(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the DoD Quality Systems Manual for Environmental Laboratories Version 5.1.1 February 2018 and is accredited is 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	March 8, 2018	June 30, 2020
Revision Date:	*Accreditation No.:*	*Certificate No.:*
September 22, 2019	65188	L18-128-R2

Tracy Szerszen
President/Operations Manager

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.pjlabs.com

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

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 CaCO3)
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 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

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

Matrix	Standard/Method	Technology	Analyte
Aqueous	SM 2130B	Turbidimetry	Turbidity
Aqueous	SM 2320B	Titrimetry	Total Alkalinity (as CaCO3)
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

Certificate of Accreditation: Supplement

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Matrix	Standard/Method	Technology	Analyte
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)

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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	Perflurorohexanoic 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 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 7471A, B	CVAA	Mercury
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/200.7	ICP	Aluminum
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Antimony
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Arsenic
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Barium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Beryllium

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

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ALS Environmental-Kelso

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Molybdenum
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Nickel
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Selenium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Silver
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Strontium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Thallium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Tin
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Titanium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Vanadium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Zinc
Aqueous/Solid	EPA 7742	AA, Borohydride Reduction; GFAA	Selenium
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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Matrix	Standard/Method	Technology	Analyte
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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Matrix	Standard/Method	Technology	Analyte
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 8260B, C	GC-MS	1,1,1,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,1-Trichloroethane

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,2-Trichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dibromoethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3,5-Trimethylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1-phenylpropane
Aqueous/Solid	EPA 8260B, C	GC-MS	2,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Butanone (MEK)
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Chloroethylvinylether
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Hexanone
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Isopropyltoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Methyl-2-pentanone (MIBK)
Aqueous/Solid	EPA 8260B, C	GC-MS	Acetone
Aqueous/Solid	EPA 8260B, C	GC-MS	Acetonitrile
Aqueous/Solid	EPA 8260B, C	GC-MS	Acrolein
Aqueous/Solid	EPA 8260B, C	GC-MS	Acrylonitrile
Aqueous/Solid	EPA 8260B, C	GC-MS	Benzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromochloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromodichloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromoform
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Carbon disulfide
Aqueous/Solid	EPA 8260B, C	GC-MS	Carbon Tetrachloride
Aqueous/Solid	EPA 8260B, C	GC-MS	Chlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Chlorodibromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloroethane

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloroform
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC-MS	Dibromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Dichlorodifluoromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Dichloromethane (Methylene Chloride)
Aqueous/Solid	EPA 8260B, C	GC-MS	Di-isopropylether (DIPE)
Aqueous/Solid	EPA 8260B, C	GC-MS	ETBE
Aqueous/Solid	EPA 8260B, C	GC-MS	Ethylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Freon 11
Aqueous/Solid	EPA 8260B, C	GC-MS	Freon 113
Aqueous/Solid	EPA 8260B, C	GC-MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8260B, C	GC-MS	Isopropylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Methyl-tert-butylether (MTBE)
Aqueous/Solid	EPA 8260B, C	GC-MS	Naphthalene
Aqueous/Solid	EPA 8260B, C	GC-MS	n-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	n-Propylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	sec-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Styrene
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-amylmethylether (TAME)
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-Butyl alcohol
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Tetrachloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	Toluene
Aqueous/Solid	EPA 8260B, C	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC-MS	Trichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	Trichlorofluoromethane (Freon 11)
Aqueous/Solid	EPA 8260B, C	GC-MS	Vinyl acetate
Aqueous/Solid	EPA 8260B, C	GC-MS	Vinyl chloride
Aqueous/Solid	EPA 8260B, C	GC-MS	Xylene, total
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloroethene

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626

Contact Name: Carl Degner Phone: 360-577-7222

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

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

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ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

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

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

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8270C, D	GC-MS	Pentachlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	Pentachlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Phenol
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyridine
Aqueous/Solid	EPA 8270C, D	GC-MS	2,3,4,6-Tetrachlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	1,2,4,5-Tetrachlorobenzene
Aqueous/Solid	EPA 8270C, D	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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ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626

Contact Name: Carl Degner Phone: 360-577-7222

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Hexafluropropylene Oxide Dimer Acid (HFPO-DA)
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	4:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	6:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	8:2 Fluorotelomersulfonate
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Ethylperfluorooctanesulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Ethylperfluorooctanesulfonamidoethanol
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamidoethanol
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluoroheptane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorooctane Sulfonamide
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorotetradecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorotridecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorobutane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorobutanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorodecane sulfonic acid

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1317 South 13th Avenue, Kelso, WA 98626

Contact Name: Carl Degner Phone: 360-577-7222

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorodecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorododecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluoroheptanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorohexane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorohexanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorononanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorooctane sulfonic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluorooctanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluoropentanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	Perfluoroundecanoic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Ethylperflurooctanesulfonamidoacetic acid
Aqueous/Solid	PFAS by LCMSMS Compliant with QSM 5.1 Table B-15	LC/MS/MS	N-Methylperfluorooctanesulfonamidoacetic acid
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

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626

Contact Name: Carl Degner Phone: 360-577-7222

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

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 1640	Reductive Metals Precipitation	Prep Method
Aqueous	EPA 3010A	Acid Digestion	Metals Digestion
Aqueous	EPA 3020A	Acid Digestion	Metals Digestion
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 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 Washington
Department 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, 2019 and shall expire July 8, 2020.

Witnessed under my hand on July 24, 2019

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
Drinking Water		
Turbidity	EPA 180.1_2_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	
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^- E-2011	5
Fluoride	SM 4500-F^- C-2011	
pH	SM 4500-H+ B-2011	1
Orthophosphate	SM 4500-P E-2011	

Matrix/Analyte	Method	Notes
Drinking Water		
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	
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	

Matrix/Analyte	Method	Notes
Drinking Water		
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	EPA 552.2_1_1995	
Bromochloroacetic acid	EPA 552.2_1_1995	
Chloroacetic acid	EPA 552.2_1_1995	
Dibromoacetic acid	EPA 552.2_1_1995	
Dichloroacetic acid	EPA 552.2_1_1995	
Total haloacetic acids (HAA5)	EPA 552.2_1_1995	
Trichloroacetic acid	EPA 552.2_1_1995	
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	

Matrix/Analyte	Method	Notes
Drinking Water		
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	
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	

Matrix/Analyte	Method	Notes
Drinking Water		
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	
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	EPA 537_1.1_2009	3
N-Methylperfluorooctane sulfonamido acetic acid	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
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
Perfluorotetradecanoic acid (PFTDA)	EPA 537_1.1_2009	3
Perfluorotridecanoic acid (PFTriDA)	EPA 537_1.1_2009	3
Perfluoroundecanoic acid (PFUnDA)	EPA 537_1.1_2009	3
Heterotrophic Bacteria	SM 9215 B (PCA)	

Matrix/Analyte	Method	Notes
Drinking Water		
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®	
Non-Potable Water		
Nitrogen, Total Kjeldahl	ASTM D1426-08B	
Solids, Total Volatile	EPA 160.4_1971	
Adsorbable Organic Halides (AOX)	EPA 1650_C_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	
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	

Matrix/Analyte	Method	Notes
Non-Potable Water		
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¯ C-2011	
Cyanide, Total	SM 4500-CN¯ E-2011	
Cyanides, Amenable to Chlorination	SM 4500-CN¯ G-2011	
Fluoride	SM 4500-F¯ C-2011	
pH	SM 4500-H+ B-2011	1
Ammonia	SM 4500-NH3 E-2011	
Ammonia	SM 4500-NH3 G-2011	
Sulfide	SM 4500-S2¯ D-2011	
Sulfide	SM 4500-S2¯ 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	
Anionic Surfactants (MBAS)	SM 5540 C-2011	
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	

Matrix/Analyte	Method	Notes
Non-Potable Water		
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	
Hardness, Total (as CaCO3)	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	

Matrix/Analyte	Method	Notes
Non-Potable Water		
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	
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

Matrix/Analyte	Method	Notes
Non-Potable Water		
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
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 sufonamido acetic acid	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamide (EtFOSA)	ALS LCP-PFC	3
N-Ethylperfluorooctanesulfonamidoethanol (EtFOSE)	ALS LCP-PFC	3

Matrix/Analyte	Method	Notes
Non-Potable Water		
N-Methylperfluorooctane sulfonamide (MeFOSA)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamido acetic acid	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
Perfluorotridecanoic acid (PFTRIA)	ALS LCP-PFC	3
Perfluoroundecanoic acid (PFUDA)	ALS LCP-PFC	3
2,3,4,6-Tetrachlorophenol	EPA 1653_A_1997	
2,4,5-Trichlorophenol	EPA 1653_A_1997	
2,4,6-Trichlorophenol	EPA 1653_A_1997	
3,4,5-Trichlorocatechol	EPA 1653_A_1997	
3,4,5-Trichloroguaiacol	EPA 1653_A_1997	
3,4,6-Trichlorocatechol	EPA 1653_A_1997	
3,4,6-Trichloroguaiacol	EPA 1653_A_1997	
4,5,6-Trichloroguaiacol	EPA 1653_A_1997	
Pentachlorophenol	EPA 1653_A_1997	
Tetrachlorocatechol	EPA 1653_A_1997	
Tetrachloroguaiacol	EPA 1653_A_1997	
Trichlorosyringol	EPA 1653_A_1997	

Matrix/Analyte	Method	Notes
Non-Potable Water		
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
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

Matrix/Analyte	Method	Notes
Non-Potable Water		
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
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

Matrix/Analyte	Method	Notes
Non-Potable Water		
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

Matrix/Analyte	Method	Notes
Non-Potable Water		
Hexachloroethane	EPA 625.1	3,10
Indeno(1,2,3-cd) pyrene	EPA 625.1	3,10
Isophorone	EPA 625.1	3,10
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)	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®	
Solid and Chemical Materials		
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	5

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
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	
Chloride	EPA 9056A_(02/07)	
Fluoride	EPA 9056A_(02/07)	
Nitrate	EPA 9056A_(02/07)	
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	
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	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
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	
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	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
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)	
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)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
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)	
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)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
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)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Dichloroprop (Dichlorprop)	EPA 8151A_(1/98)	
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151A_(1/98)	
MCPA	EPA 8151A_(1/98)	
MCPP	EPA 8151A_(1/98)	
Pentachlorophenol	EPA 8151A_(1/98)	
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 sufonamido acetic acid	ALS LCP-PFC	3
N-Ethylperfluorooctane sulfonamide (EtFOSA)	ALS LCP-PFC	3
N-Ethylperfluorooctanesulfonamidoethanol (EtFOSE)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamide (MeFOSA)	ALS LCP-PFC	3
N-Methylperfluorooctane sulfonamido acetic acid	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

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Perfluorotridecanoic acid (PFTRIA)	ALS LCP-PFC	3
Perfluoroundecanoic acid (PFUDA)	ALS LCP-PFC	3
1,1,1,2-Tetrachloroethane	EPA 8260C_(8/06)	
1,1,1-Trichloro-2,2,2-trifluoroethane	EPA 8260C_(8/06)	
1,1,1-Trichloroethane	EPA 8260C_(8/06)	
1,1,2,2-Tetrachloroethane	EPA 8260C_(8/06)	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	EPA 8260C_(8/06)	
1,1,2-Trichloroethane	EPA 8260C_(8/06)	
1,1-Dichloroethane	EPA 8260C_(8/06)	
1,1-Dichloroethylene	EPA 8260C_(8/06)	
1,1-Dichloropropene	EPA 8260C_(8/06)	
1,2,3-Trichlorobenzene	EPA 8260C_(8/06)	
1,2,3-Trichloropropane	EPA 8260C_(8/06)	
1,2,3-Trimethylbenzene	EPA 8260C_(8/06)	
1,2,4-Trichlorobenzene	EPA 8260C_(8/06)	
1,2,4-Trimethylbenzene	EPA 8260C_(8/06)	
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260C_(8/06)	
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260C_(8/06)	
1,2-Dichlorobenzene	EPA 8260C_(8/06)	
1,2-Dichloroethane (Ethylene dichloride)	EPA 8260C_(8/06)	
1,2-Dichloropropane	EPA 8260C_(8/06)	
1,3,5-Trimethylbenzene	EPA 8260C_(8/06)	
1,3-Dichlorobenzene	EPA 8260C_(8/06)	
1,3-Dichloropropane	EPA 8260C_(8/06)	
1,3-Dichloropropene	EPA 8260C_(8/06)	
1,4-Dichloro-2-butene	EPA 8260C_(8/06)	
1,4-Dichlorobenzene	EPA 8260C_(8/06)	
1,4-Dioxane (1,4- Diethyleneoxide)	EPA 8260C_(8/06)	
1-Chlorohexane	EPA 8260C_(8/06)	
2,2-Dichloro-1,1,1-trifluoroethane (Freon 123)	EPA 8260C_(8/06)	
2,2-Dichloropropane	EPA 8260C_(8/06)	
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2-Chloroethyl vinyl ether	EPA 8260C_(8/06)	
2-Chlorotoluene	EPA 8260C_(8/06)	
2-Hexanone	EPA 8260C_(8/06)	
2-Methylpentane (Isohexane)	EPA 8260C_(8/06)	
2-Nitropropane	EPA 8260C_(8/06)	
3-Methylpentane	EPA 8260C_(8/06)	
4-Bromofluorobenzene	EPA 8260C_(8/06)	
4-Chlorotoluene	EPA 8260C_(8/06)	
4-Isopropyltoluene (p-Cymene)	EPA 8260C_(8/06)	
4-Methyl-2-pentanone (MIBK)	EPA 8260C_(8/06)	
Acetone	EPA 8260C_(8/06)	
Acetonitrile	EPA 8260C_(8/06)	
Acrolein (Propenal)	EPA 8260C_(8/06)	
Acrylonitrile	EPA 8260C_(8/06)	
Allyl chloride (3-Chloropropene)	EPA 8260C_(8/06)	
Benzene	EPA 8260C_(8/06)	
Bromobenzene	EPA 8260C_(8/06)	
Bromochloromethane	EPA 8260C_(8/06)	
Bromodichloromethane	EPA 8260C_(8/06)	
Bromoform	EPA 8260C_(8/06)	
Carbon disulfide	EPA 8260C_(8/06)	
Carbon tetrachloride	EPA 8260C_(8/06)	
Chlorobenzene	EPA 8260C_(8/06)	
Chlorodibromomethane	EPA 8260C_(8/06)	
Chloroethane (Ethyl chloride)	EPA 8260C_(8/06)	
Chloroform	EPA 8260C_(8/06)	
Chloroprene (2-Chloro-1,3-butadiene)	EPA 8260C_(8/06)	
cis & trans-1,2-Dichloroethene	EPA 8260C_(8/06)	
cis-1,2-Dichloroethylene	EPA 8260C_(8/06)	
cis-1,3-Dichloropropene	EPA 8260C_(8/06)	
cis-1,4-Dichloro-2-butene	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Cyclohexane	EPA 8260C_(8/06)	
Dibromochloropropane	EPA 8260C_(8/06)	
Dibromofluoromethane	EPA 8260C_(8/06)	
Dibromomethane	EPA 8260C_(8/06)	
Dichlorodifluoromethane (Freon-12)	EPA 8260C_(8/06)	
Dichlorofluoromethane (Freon 21)	EPA 8260C_(8/06)	
Diethyl ether	EPA 8260C_(8/06)	
Ethanol	EPA 8260C_(8/06)	
Ethyl acetate	EPA 8260C_(8/06)	
Ethyl acrylate	EPA 8260C_(8/06)	
Ethyl methacrylate	EPA 8260C_(8/06)	
Ethyl tert-Butyl alcohol	EPA 8260C_(8/06)	
Ethylbenzene	EPA 8260C_(8/06)	
Ethylene oxide	EPA 8260C_(8/06)	
Ethyl-t-butylether (ETBE)	EPA 8260C_(8/06)	
Hexachlorobutadiene	EPA 8260C_(8/06)	
Iodomethane (Methyl iodide)	EPA 8260C_(8/06)	
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260C_(8/06)	
Isopropyl alcohol (2-Propanol, Isopropanol)	EPA 8260C_(8/06)	
Isopropylbenzene	EPA 8260C_(8/06)	
m+p-xylene	EPA 8260C_(8/06)	
Methacrylonitrile	EPA 8260C_(8/06)	
Methyl acetate	EPA 8260C_(8/06)	
Methyl acrylate	EPA 8260C_(8/06)	
Methyl bromide (Bromomethane)	EPA 8260C_(8/06)	
Methyl chloride (Chloromethane)	EPA 8260C_(8/06)	
Methyl methacrylate	EPA 8260C_(8/06)	
Methyl tert-butyl ether (MTBE)	EPA 8260C_(8/06)	
Methylcyclohexane	EPA 8260C_(8/06)	
Methylcyclopentane	EPA 8260C_(8/06)	
Methylene chloride (Dichloromethane)	EPA 8260C_(8/06)	
Naphthalene	EPA 8260C_(8/06)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
n-Butyl alcohol (1-Butanol, n-Butanol)	EPA 8260C_(8/06)	
n-Butylbenzene	EPA 8260C_(8/06)	
n-Heptane	EPA 8260C_(8/06)	
n-Hexane	EPA 8260C_(8/06)	
n-Octane	EPA 8260C_(8/06)	
n-Propanol (1-Propanol)	EPA 8260C_(8/06)	
n-Propylbenzene	EPA 8260C_(8/06)	
o-Xylene	EPA 8260C_(8/06)	
Propionitrile (Ethyl cyanide)	EPA 8260C_(8/06)	
sec-Butylbenzene	EPA 8260C_(8/06)	
Styrene	EPA 8260C_(8/06)	
tert-amylmethylether (TAME)	EPA 8260C_(8/06)	
tert-Butyl alcohol	EPA 8260C_(8/06)	
tert-Butylbenzene	EPA 8260C_(8/06)	
Tetrachloroethylene (Perchloroethylene)	EPA 8260C_(8/06)	
Tetrahydrofuran (THF)	EPA 8260C_(8/06)	
Toluene	EPA 8260C_(8/06)	
trans-1,2-Dichloroethylene	EPA 8260C_(8/06)	
trans-1,3-Dichloropropylene	EPA 8260C_(8/06)	
trans-1,4-Dichloro-2-butene	EPA 8260C_(8/06)	
Trichloroethene (Trichloroethylene)	EPA 8260C_(8/06)	
Trichlorofluoromethane (Freon 11)	EPA 8260C_(8/06)	
Vinyl acetate	EPA 8260C_(8/06)	
Vinyl chloride	EPA 8260C_(8/06)	
Xylene (total)	EPA 8260C_(8/06)	
1,2,4,5-Tetrachlorobenzene	EPA 8270D_(2/07)	
1,2,4-Trichlorobenzene	EPA 8270D_(2/07)	
1,2-Dichlorobenzene	EPA 8270D_(2/07)	
1,2-Diphenylhydrazine	EPA 8270D_(2/07)	
1,3-Dichlorobenzene	EPA 8270D_(2/07)	
1,4-Dichlorobenzene	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
2,3,4,6-Tetrachlorophenol	EPA 8270D_(2/07)	
2,4,5-Trichlorophenol	EPA 8270D_(2/07)	
2,4,6-Trichlorophenol	EPA 8270D_(2/07)	
2,4-Dichlorophenol	EPA 8270D_(2/07)	
2,4-Dimethylphenol	EPA 8270D_(2/07)	
2,4-Dinitrophenol	EPA 8270D_(2/07)	
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D_(2/07)	
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D_(2/07)	
2-Chloronaphthalene	EPA 8270D_(2/07)	
2-Chlorophenol	EPA 8270D_(2/07)	
2-Methylnaphthalene	EPA 8270D_(2/07)	
2-Methylphenol (o-Cresol)	EPA 8270D_(2/07)	
2-Nitroaniline	EPA 8270D_(2/07)	
2-Nitrophenol	EPA 8270D_(2/07)	
3,3'-Dichlorobenzidine	EPA 8270D_(2/07)	
3-Nitroaniline	EPA 8270D_(2/07)	
4,6-Dinitro-2-methylphenol	EPA 8270D_(2/07)	
4-Bromophenyl phenyl ether (BDE-3)	EPA 8270D_(2/07)	
4-Chloro-3-methylphenol	EPA 8270D_(2/07)	
4-Chloroaniline	EPA 8270D_(2/07)	
4-Chlorophenyl phenylether	EPA 8270D_(2/07)	
4-Nitroaniline	EPA 8270D_(2/07)	
4-Nitrophenol	EPA 8270D_(2/07)	
Acenaphthene	EPA 8270D_(2/07)	
Acenaphthylene	EPA 8270D_(2/07)	
Acetophenone	EPA 8270D_(2/07)	
Aniline	EPA 8270D_(2/07)	
Anthracene	EPA 8270D_(2/07)	
Atrazine	EPA 8270D_(2/07)	
Benzidine	EPA 8270D_(2/07)	
Benzo(a)anthracene	EPA 8270D_(2/07)	
Benzo(a)pyrene	EPA 8270D_(2/07)	

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Benzo(g,h,i)perylene	EPA 8270D_(2/07)	
Benzo(k)fluoranthene	EPA 8270D_(2/07)	
Benzo[b]fluoranthene	EPA 8270D_(2/07)	
Benzoic acid	EPA 8270D_(2/07)	
Benzyl alcohol	EPA 8270D_(2/07)	
Biphenyl	EPA 8270D_(2/07)	
bis(2-Chloroethoxy)methane	EPA 8270D_(2/07)	
bis(2-Chloroethyl) ether	EPA 8270D_(2/07)	
bis(2-Chloroisopropyl) ether	EPA 8270D_(2/07)	
Butyl benzyl phthalate	EPA 8270D_(2/07)	
Carbazole	EPA 8270D_(2/07)	
Chrysene	EPA 8270D_(2/07)	
Di(2-ethylhexyl)phthalate	EPA 8270D_(2/07)	
Dibenzofuran	EPA 8270D_(2/07)	
Diethyl phthalate	EPA 8270D_(2/07)	
Dimethyl phthalate	EPA 8270D_(2/07)	
Di-n-butyl phthalate	EPA 8270D_(2/07)	
Di-n-octyl phthalate	EPA 8270D_(2/07)	
Fluoranthene	EPA 8270D_(2/07)	
Fluorene	EPA 8270D_(2/07)	
Hexachlorobutadiene	EPA 8270D_(2/07)	
Hexachlorocyclopentadiene	EPA 8270D_(2/07)	
Hexachloroethane	EPA 8270D_(2/07)	
Indeno(1,2,3-cd) pyrene	EPA 8270D_(2/07)	
Isophorone	EPA 8270D_(2/07)	
m+p Cresol	EPA 8270D_(2/07)	
Naphthalene	EPA 8270D_(2/07)	
Nitrobenzene	EPA 8270D_(2/07)	
N-Nitrosodimethylamine	EPA 8270D_(2/07)	
N-Nitroso-di-n-propylamine	EPA 8270D_(2/07)	
N-Nitrosodiphenylamine	EPA 8270D_(2/07)	

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

Matrix/Analyte	Method	Notes
Solid and Chemical Materials		
Ignitability	EPA 1020A_1_1992	
Corrosivity	EPA 1110A-02	
Particle Size Distribution	PSEP 1986 Wet Sieve	

Accredited Parameter Note Detail

(1) Accreditation does not apply to compliance testing due to the sample holding time requirment for pH. (2) Accrediltation 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).(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.

07/24/2019

Authentication Signature
Rebecca Wood, Lab Accreditation Unit Supervisor

Date