Per- and Poly-fluoroalkyl Substances Groundwater Sampling Work Plan

Fox Avenue Building Site
6900 Fox Avenue South
Seattle, Washington

Farallon PN: 3680-002.001

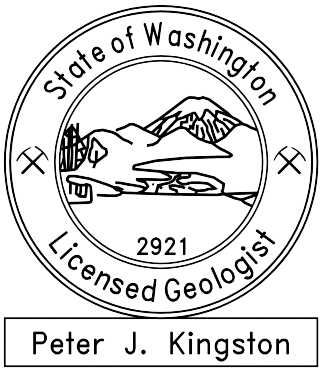
September 2, 2026

Prepared by:

Greg Peters
Associate Scientist

Reviewed by:

Pete Kingston, L.G.
Principal Geologist



For:
Fox Avenue Building LLC
6900 Fox Avenue South
Seattle, Washington 98108

Submitted by:
Farallon Consulting, L.L.C.
1809 7th Avenue, Suite 1111
Seattle, Washington 98101

TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

COC	constituent of concern
CVOCs	chlorinated volatile organic compounds
DOD	U.S. Department of Defense
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
HDPE	high-density polyethylene
MDE	Michigan Department of Environment, Great Lakes, and Energy
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
PCE	tetrachloroethene
PFAS	per- and polyfluoroalkyl substances
QA/QC	quality assurance/quality control
QSM	Quality Systems Manual
SOP	standard operating procedures
Site	Fox Avenue Building site at 6900 Fox Avenue South in Seattle, Washington

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Work Plan on behalf of Fox Avenue Building LLC for the Cascade Columbia Distribution Co. Facility (Cascade Columbia Facility) located at 6900 Fox Avenue South (Figure 1). The Cascade Columbia Facility is part of the Fox Avenue Building Site (Cleanup Site ID 5082) located in Seattle, Washington (Site). The Site also includes the following down-gradient properties impacted by the chlorinated volatile organic compound (CVOC) groundwater plume:

- Dawn Food Products Site at 6901 Fox Avenue South (Cleanup Site ID 16678);
- Whitehead Tyee Site at 730 South Myrtle Street (Cleanup Site ID 12115);
- Seattle Boiler Works at 500 South Myrtle Street;
- Seattle Iron & Metal at 601 South Myrtle Street; and
- Fox Avenue South and South Myrtle Street rights-of-way (ROWs).

The Site is under Agreed Order No. DE 8985 between the Washington State Department of Ecology (Ecology) and Fox Avenue Building LLC (Agreed Order) (Ecology 2013). The Site is shown on Figure 1.

This Work Plan has been prepared to provide a scope of work for the collection of groundwater samples for laboratory analysis of per- and polyfluoroalkyl substances (PFAS) in response to a request from Ecology in the Letter Regarding Direction to Investigate Sources, Nature, and Extent of Per- and Polyfluoroalkyl Substances dated June 22, 2026 (Ecology 2026). Ecology requested that select wells, including upgradient wells, be sampled during the 2027 groundwater monitoring event to assess the presence or absence of PFAS in groundwater.

1.1 PURPOSE

The purpose of the Work Plan is to define the specific requirements for PFAS sample collection and analytical activities to ensure that activities are conducted in accordance with technically acceptable protocols and that the results meet the data quality objectives and that sampling precautions and procedures specific to PFAS are followed. The Work Plan presents the protocols pertaining to sampling equipment and procedures and sample handling and analysis that will be used for PFAS sample collection along with acceptable materials and field equipment. The Work Plan provides a basis for conducting field activities and a mechanism for complying with quality assurance requirements.

1.2 REPORT ORGANIZATION

The Work Plan has been organized into the following sections:

- **Section 2**, **Facility Background**, provides a summary of the historical and current operations at the Cascade Columbia Facility.
- **Section 3**, **Groundwater Sampling,** provides a summary of the proposed groundwater sampling locations.
- **Section 4, Groundwater Sampling Procedures,** outlines the sampling requirements specific to collecting PFAS samples, and provides procedures for groundwater sample collection, handling, and documentation; and handling of waste generated during the sampling process is also discussed.
- **Section 5, Laboratory Analysis,** provides a description of the analytical methods, sample containers and hold time, and laboratory reporting requirements.
- **Section 6, Quality Assurance/Quality Control,** provides details on the field and laboratory quality assurance/quality control (QA/QC) measures to be followed and data validation.
- **Section 7, Schedule,** provides a schedule for the proposed groundwater sampling.
- **Section 8, References,** provides a list of the documents cited in this report.

2.0 FACILITY BACKGROUND

The Cascade Columbia Facility consists of King County Parcel No. 0001800087 totaling 2.53 acres of land. A summary of predominant historical operations is provided below.

- **Seattle Chain and Manufacturing Company and Successor Companies.** Operated coke- and oil-fired furnaces and warehouses between 1918 until the 1960s.
- **Great Western International Chemical Company.** Operated a chemical and petroleum repackaging and distribution facility at the site from the 1950s until the early 2000s. Great Western International Chemical Company received bulk chemical products and repackaged, transferred, and distributed both liquid and dry chemical products, including solvents (e.g., mineral spirits, toluene, PCE, etc.), acids, pentachlorophenol, and lube oil. The chemical products were stored in multiple aboveground storage tanks and underground storage tanks (USTs).
- **Cascade Columbia (current owner/operator).** Since the early 2000s, Cascade Columbia has stored, packaged, and distributed mainly liquid and solid bulk chemicals for the aerospace, electronics, food manufacturing, personal care, water treatment, and metal plating industries. Product is received either by rail tanker via a rail spur on the south side of the facility or truck via a main loading dock on the northeast portion of the warehouse and a smaller loading dock along Fox Avenue. Product is offloaded and stored in aboveground storage tanks or in a variety of sacks, bags, drums, and containers. Currently there are no active USTs at the facility and Cascade Columbia does not distribute or repackage chlorinated solvents.

3.0 GROUNDWATER SAMPLING

The proposed groundwater sample locations were selected based on the location of historical operations and the groundwater flow direction at the Site.

The groundwater flow direction has consistently been to the southwest toward the Duwamish River. Monitoring wells upgradient and downgradient of current and historical operations on the Cascade Columbia Facility were selected for inclusion in the PFAS sampling for spatial coverage across the facility. The proposed sampling locations and rationale are summarized in Table 1 and shown on Figure 2.

The initial PFAS analytical results will be provided to Ecology to evaluate whether additional PFAS evaluation is warranted.

4.0 GROUNDWATER SAMPLING PROCEDURES

The following sections describe the procedures to be followed for collection of the PFAS groundwater samples. Farallon Standard Operating Procedures (SOPs) for fieldwork, including detailed step-by-step protocols, are provided in Attachment A.

4.1 PFAS SAMPLING REQUIREMENTS

A variety of equipment, products, and materials used in the field during groundwater sampling have the potential to contain PFAS. Table 2 lists clothing and personal care products, food and drinks, and field equipment and materials that are prohibited and those that are allowed to avoid sample cross-contamination and false positive results and are in accordance with Ecology' Guidance for Investigating and Remediating PFAS Contamination in Washington State (Ecology 2023), Michigan Department of Environment, Great Lakes, and Energy (MDE) General PFAS Sampling Guidance (MDE 2024), and ITRC (2026). The PFAS sampling requirements described in Table 2 will be followed to avoid sample contamination in the field. The requirements will be discussed with field personnel, and a daily checklist will be completed prior to commencement of sampling activities (Attachment B).

Field personnel will wear disposable nitrile gloves during sample collection and handling, and a new pair of disposable nitrile gloves will be used prior to conducting the following activities:

- Collecting samples;
- Changing sampling locations;
- Handling sample bottles, ice, or PFAS-free water;
- Handling QA/QC samples, including field blanks and equipment blanks; and
- Handling sampling equipment.

Field personnel will wash hands thoroughly and don a new pair of nitrile gloves after the following activities:

- Contact with material potentially containing PFAS; and
- Entry into the designated PFAS sampling area.

4.2 GROUNDWATER MONITORING

Groundwater monitoring activities will include collection of depth to groundwater measurements and samples for laboratory analysis at the monitoring wells presented in Table 1 and on Figure 2. Groundwater purging and sampling will be performed using a PFAS-free peristaltic pump and dedicated silicone, vinyl, or high-density polyethylene (HDPE) tubing. Sample tubing will not be decontaminated or reused from one location to another. Procedures for measuring the depth to groundwater and low-flow groundwater sampling are provided in SOPs GW-03 and GW-04 (Attachment A).

If tubing suspected of containing PFAS is present in the well, at least 3 well volumes will be purged from the well before beginning low-flow sampling. Samples received by the laboratory that are turbid or contain sediment may be centrifuged prior to supernatant extraction and sample processing for samples with greater than 1 percent solids per the U.S. Department of Defense (DOD) Quality System Manual (QSM) Version 5.4, Table B-15 (DOD 2021). The need to centrifuge a sample will be determined based on laboratory recommendation, in lieu of sample dilution, which would raise reporting limits.

4.3 SAMPLE DESIGNATION

Water-resistant inks may be potential sources of PFAS (Table 2). Sample labels will be pre-printed or completed in the field using ballpoint pens. Fine or Ultra-Fine point Sharpie markers may be used in the staging area with the sample container closed (Ecology 2023; MDE 2024). The groundwater samples collected from monitoring wells will be assigned a unique sample identifier that will include the well identification (e.g., MW-9) and the sample date (e.g., 070126). The sample label will also include:

- Sampling date and time (24-hour format);
- Method of sample preservation, if any; and
- QA/QC sample type, if applicable.

4.4 SAMPLE HANDLING AND PACKAGING

After sample collection and labeling, sample bottles will be double bagged in re-sealable plastic bags and placed in a chilled cooler prior to 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:

- Use a hard-sided insulated cooler suitable for shipment.
- Secure and tape the drain plug with duct tape from the inside and outside, if present.
- Fill the cooler at least one-third full with double-bagged wet ice and tape the ends of the bags with duct tape to prevent leaking. Do not use chemical blue ice.
- Ensure that the caps on all sample containers are tight.
- Ensure that the sample labels are intact, filled out, legible, and that the sample identifier exactly matches the Chain of Custody form.
- Double bag each sample container in a re-sealable plastic bag and place the sample in the cooler with the cap upright.
- One copy of the Chain of Custody form will be detached and retained by the Farallon Field Staff.
- Remaining paperwork will be sealed in a resealable plastic bag and taped to the inside of the cooler lid.
- Fill excess space within the cooler with bubble wrap.
- The cooler will be sealed with a chain-of-custody seal.
- The cooler will be taped shut using strapping tape and sealed with duct tape to prevent leaks.
- 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.

Shipped coolers will be scheduled for priority overnight service to maintain temperature requirements. Saturday deliveries will be coordinated with the laboratory.

4.5 SAMPLE DOCUMENTATION

Sample containers will be identified with a durable label, and the sample identifier (Section 4.3) will be recorded in the Field Report forms. Other sample documentation to be maintained by field personnel includes Purging and Sampling forms, Chain of Custody forms

and seals, sample labels, and shipment bills. Examples of these forms are provided in Attachment B.

At the time of sampling, the appropriate sample containers will be selected, and the sample number for each sample will be recorded on the Field Report form. A chain-of-custody seal will be used to seal the cooler shut before shipping. The chain of-custody seal is used to show that no tampering occurred between the time the cooler was relinquished by field personnel and the time it arrived at the laboratory. The chain of custody seal will be attached so that it must be broken in order to open the shipping container. Information recorded on the seals will be checked against sample summary log entries, and the samples will be recounted before leaving the Site to verify that no samples were misplaced. Entries for all samples will be made on the Chain of Custody form prior to the transfer of the samples off the Site.

Each Chain of Custody form will contain the medium, date, time sampled, sample identification and number, project name, project number, sampler's initials, and analyte preservative(s) if any.

4.6 DECONTAMINATION

Decontamination will occur prior to leaving the sampling area or at a central decontamination location after each sampling location (as needed) and at the end of each workday. Alconox, Liquinox, Luminox, or Citranox detergents are acceptable for decontamination purposes when sampling for PFAS (Table 2). Decon 90^{T} should not be used. Non-disposable sampling equipment will be decontaminated in accordance with the procedures outlined in Farallon SOP EQ-01 between uses at each sampling location (Attachment C) and as follows:

- Remove debris if present (e.g., soil) from sampling equipment with a brush and/or rag.
- Wash equipment thoroughly and vigorously with PFAS-free or potable water containing detergent (Alconox, Liquinox, and Luminox) using a bristle brush or similar.
- Rinse equipment thoroughly with PFAS-free or potable water (1st rinse).
- Rinse equipment thoroughly with PFAS-free water (2nd rinse).
- Complete a free-standing (i.e., non-bucket) rinse with PFAS-free water (3rd rinse). This free-standing rinse can be conducted with a spray bottle made from HDPE or by pumping/pouring PFAS-free water over the equipment.

- Dry equipment with a paper towel or let air dry in a location away from dust or fugitive contaminants.

PFAS-free water will be provided by the analytical laboratory used for decontamination. Eurofins Environment Testing Northern California, LLC of West Sacramento, California (Eurofins), the laboratory selected for conducting the PFAS sample analysis. Eurofins conducts quarterly analysis of their PFAS-free water and was last conducted in June 2026. A copy of the laboratory analytical report will be provided in the report documenting the PFAS sampling.

4.7 WASTEWATER

Wastewater will be generated during monitoring well purging and equipment decontamination. Wastewater will be temporarily stored in 55-gallon drums or similar U.S. Department of Transportation–approved containers at a designated location at the Site.

Wastewater drums will be labeled with content, date, and origin and/or generating activity. Wastewater drums will be tracked using a Waste Inventory Tracking Sheet (Attachment B). Analytical results will be used to generate a profile for disposal. Once the profiles have been approved for a licensed permanent disposal facility, the drums will be removed by a contractor.

4.8 DISPOSABLES

Disposable personal protective clothing (e.g., Tyvek suits, rubber gloves, boot covers) and disposable sampling devices (e.g., tubing and bailers) will be placed into plastic garbage bags, and disposed of as nonhazardous waste.

5.0 LABORATORY ANALYSIS

Farallon has selected Eurofins as the preferred analytical laboratory to conduct the sample analysis. This section provides information on Eurofins's PFAS analytical method, accreditations, reporting limits, sample containers, preservatives, holding times, storage conditions, and other information to supplement site-specific work plans.

5.1 LABORATORY ANALYTICAL METHOD AND ACCREDITATIONS

Eurofins has been selected as the preferred analytical laboratory to conduct the PFAS analysis. Eurofins is accredited by DOD Laboratory Accreditation Program using a PFAS method that is consistent with Table B-15 of the DOD QSM, Version 5.4 (DOD 2021) and is an Ecology-accredited laboratory.

5.2 PARAMETERS AND REPORTING LIMITS

Samples will be submitted for laboratory analysis of the 40 PFAS compounds as requested by Ecology (2026) and summarized in Table 3 by U.S. Environmental Protection Agency Method 1633. Eurofins typical PFAS reporting limits and method detection limits are also provided in Table 3.

5.3 SAMPLE CONTAINERS, PRESERVATION, HOLDING TIMES, AND STORAGE

Two 250-milliliter HDPE bottles will be used to collect each sample. No preservative will be added to each sample bottle, since the groundwater that will be sampled is not chlorinated. The laboratory is required to ensure that the sample bottles provided to clients are verified as clean (i.e., meet the acceptance criteria required for blank analysis). Samples are to be stored at less than 6 degrees Celsius with a holding time of 14 days prior to extracting the samples and an additional 28 days prior to sample analysis. These sample guidelines are appropriate for groundwater samples.

The laboratory will provide deionized water that has been tested and confirmed to be PFAS-free for use as field blanks, equipment blanks, and decontamination.

5.4 SAMPLE TURNAROUND TIME AND REPORT FORMAT

Eurofins will provide analytical results within approximately 15 business days of sample receipt and will provide an electronic data deliverable.

6.0 QUALITY ASSURANCE/QUALITY CONTROL AND DATA VALIDATION

The following section describes the QA/QC field sampling and data validation measured to be followed.

6.1 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Field 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.

Equipment rinsate blanks will be collected by rinsing non-dedicated sampling equipment with laboratory-supplied certified PFAS-free water following decontamination, and collecting the rinsate for analysis to evaluate the efficacy of the decontamination procedures.

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

6.1.1 Field Duplicate Samples

Field duplicate samples will be collected in the same manner and at the same location as the original sample. Field duplicate samples will be collected at a rate of one field duplicate per 10 samples collected.

6.1.2 Equipment Rinsate Blanks

Equipment rinsate blanks are used to assess the effectiveness of decontamination process. Equipment blanks will be collected by pouring PFAS-free water over or through decontaminated field sampling equipment and collecting the rinsate in a sample container. One equipment blank will be collected prior to the start of sample collection and one equipment blank will be collected at the end of each day that PFAS samples are collected.

6.1.3 Field Blanks

Field blanks are used to assess potential cross-contamination as a result of environmental conditions during sample collection and handling. Field blanks will be collected by filling a sample container with PFAS-free water in the field in the same manner as groundwater samples. One field blank will be collected for each day of sampling.

6.1.4 Trip Blanks

Trip blanks will be used to assess if contamination is introduced during sample shipment. Trip blanks will be provided by Eurofins. One trip blank will accompany each cooler of samples.

6.2 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Laboratory QA/QC samples will be analyzed to documentation of laboratory QA/QC practices and for data validation. Laboratory QA/QC samples may include laboratory control samples/laboratory control sample duplicates, laboratory duplicates, matrix spike/matrix spike duplicates samples, surrogates, internal standards, method blanks, and instrument blanks. Laboratory control samples/laboratory control sample duplicates or matrix spike/matrix spike duplicates samples are analyzed to measure analytical accuracy, precision, and bias. If QA/QC results are outside the laboratory-specified acceptance criteria range, corrective action will be taken based on procedures in the DOD QSM, version 5.4 (DOD 2021) and the laboratory QA program. Laboratory flags are used to indicate sample results associated with QC sample results that are outside of the laboratory-specified acceptance criteria. Level II laboratory reports will include sample and QA/QC sample results.

6.3 DATA REVIEW, VERIFICATION AND VALIDATION

Hand-entered data from field forms (e.g., groundwater elevation data) will be peer reviewed to minimize data entry errors. Field notes, photographs, and other records of field activity will be saved in the project file.

Validation of the laboratory analytical data will be completed to evaluate if sample results, holding times, laboratory blanks, and detection limits are within the laboratory acceptance criteria. Laboratory analytical data will be performed to EPA Stage 2B and in accordance with EPA National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2020), and Ecology (2024) guidance.

Data validation will be performed by Farallon's Data Group. The Data Group are not involved in the planning or collection of the PFAS groundwater data.

7.0 SCHEDULE

The PFAS sampling will occur during the regularly scheduled annual groundwater monitoring event in May 2027. A report summarizing the results will be provided to Ecology 90 days following completion of data validation. The project schedule may be adjusted in consultation with Ecology.

8.0 REFERENCES

Interstate Technology Regulator Council (ITRC). 2026. Technical and Regulatory Guidance, PFAS – Per- and Polyfluoroalkyl Substances, Firefighting Foams. January. <https://pfas-1.itrcweb.org/pdf-full-document/>. (June 1, 2026.)

Michigan Department of Environment, Great Lakes, and Energy (MDE). 2024. *General PFAS Sampling Guidance.* January.

Washington State Department of Ecology (Ecology). 2013. Agreed Order No. DE 8985 entered into with Fox Avenue building LLC. May 8.

_____.2023. *Guidance for Investigating and Remediating PFAS Contamination in Washington State*. Toxics Cleanup Program Publication No. 22-09-058. June.

_____. 2026. Letter Regarding Direction to Investigate Sources, Nature, and Extent of Per-and Polyflouroalkyl Substances (PFAS), Fox Avenue Building, 6900 Fox Avenue South, Seattle Washington. From David Unruh, Ecology. To Robert Code, Fox Avenue Building LLC. June 22.

U.S. Department of Defense (DOD). 2021. Consolidated Quality Systems Manual (QSM) for Environmental Laboratories. Version 5.4.

U.S. Environmental Protection Agency. 2020. EPA National Functional Guidelines for Organic Superfund Methods Data Review. 540-R-20-005. November.

FIGURES

PER-AND POLY-FLOUROALKYL SUBSTANCES
GROUNDWATER SAMPLING WORK PLAN

Fox Avenue Building Site
6900 Fox Avenue South
Seattle, Washington

Farallon PN: 3680-002.001

REFERENCE: 7.5 MINUTE USGS QUADRANGLE SEATTLE SOUTH, WASHINGTON, DATED 2013

0 3,000
SCALE IN FEET

N

FARALLON CONSULTING

Your Challenges. Our Priority. | farallonconsulting.com

Washington
Bellevue | Bellingham | Seattle

Oregon
Portland | Baker City

California
Oakland | Irvine

FIGURE 1

SITE VICINITY MAP
FOX AVENUE BUILDING SITE
6900 FOX AVENUE SOUTH
SEATTLE, WASHINGTON

FARALLON PN: 3680-002

Drawn By: lmurock | Checked By: RH | Date: 7/24/2025 | Disc Reference:

Path: Q:\Projects\3680 Cascade Family LLC\002 Fox Ave\Mapfiles\001\Figure-01_SiteVicinityMap.mxd

LEGEND

- SHALLOW MONITORING WELL (1st WBZ)
- INJECTION WELL
- CONDITIONAL POINT OF COMPLIANCE (CPOC) FOR GROUNDWATER
- RAILROAD
- FORMER SITE FEATURE
- SITE FEATURE
- CLEANUP ACTION AREA (CAA)
- KING COUNTY PARCEL BOUNDARY
- APPROXIMATE GROUNDWATER FLOW DIRECTION

UST = UNDERGROUND STORAGE TANK
WBZ = WATER-BEARING ZONE

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

FARALLON CONSULTING
Your Challenges. Our Priority. | farallonconsulting.com

Washington
Bellevue | Bellingham | Seattle

Oregon
Portland | Baker City

California
Oakland | Irvine

FIGURE 2

SITE PLAN WITH
PROPOSED SAMPLING LOCATIONS
FOX AVENUE BUILDING SITE
6900 FOX AVENUE SOUTH SEATTLE, WASHINGTON

FARALLON PN: 3680-002

Drawn By: ehall | Checked By: GP | Date: 8/21/2026 | Disc Reference: Q:\Projects\3680 Cascade Family LLC\002 Fox Ave\Mapfiles\005_RegulatoryInteractions\3680-002_RegulatoryInteractions.aprx

TABLES

PER-AND POLY-FLOUROALKYL SUBSTANCES
GROUNDWATER SAMPLING WORK PLAN

Fox Avenue Building Site
6900 Fox Avenue South
Seattle, Washington

Farallon PN: 3680-002.001

Table 1
Prohibited and Allowed PFAS Sampling Materials
Fox Avenue Building Site
Seattle, Washington
Farallon PN: 3680-002.001

Prohibited	Allowed
Clothing and Personal Products	
New unwashed clothing Clothing recently washed with fabric softener	Clothing laundered with most recent washing not using fabric softener or scented detergents
Clothing treated to be water-, stain- or dirt-resistant (including but not limited to Gore-Tex, Scotchguard, RUCO)	Waterproof clothing made of polyurethane, polyvinyl chloride (PVC), wax-coated fabrics, rubber, or neoprene
Clothing chemically treated to provide insect resistance or ultraviolet (UV) protection Coated Tyvek	Plain/non-coated Tyvek
Latex gloves	Powderless nitrile gloves
UV-resistant or insect-resistant clothing Use of cosmetics, moisturizers, hand creams and other products after previous shower (e.g., day of or night before field sampling)	Sunscreen and insect repellants allowed in Ecology's PFAS sampling guidelines[1]
Boots containing Gore-Tex or other fluoropolymers or boots treated with stain or water-resistant compounds	Boots made with polyurethane or PVC OR covered with PFAS-free overboots[2]
Food and Drink	
Packaged food or snack items (e.g., paper plates, foil, bags, and wrappers) in the sampling area or in the staging area while sampling	Food and drink outside of the sampling area, in designated area Hand washing and new gloves upon re-entering the sampling area
Sample Containers/Materials in Direct Contact with Samples	
Glass sample containers, due to PFAS adherence to glass surfaces Teflon liners, caps, or sample container lids Low density polyethylene (LDPE) sample containers or liners, due to sorption of PFAS to LDPE materials	HDPE or polypropylene containers with screw caps that do not contain Teflon or other fluoropolymers

Table 1
Prohibited and Allowed PFAS Sampling Materials
Fox Avenue Building Site
Seattle, Washington
Farallon PN: 3680-002.001

Prohibited	Allowed
Field Equipment/Materials	
Materials or equipment components containing fluoropolymers. Trademark examples include Teflon®, Hostaflon, Kynar, Neoflon, Tefzel, and Viton Fluorinated ethylene propylene (FEP), ethylene tetrafluoroethylene (ETFE), polytetrafluoroethylene (PTFE), polyvinylidene fluoride (PVDF) and polychlorotrifluoroethylene (PCTFE) are other examples	Equipment with these components can be used if the PFAS is internal to the equipment and does not contact the external environment If in doubt about a product, collect and analyze an equipment blank sample LDPE[1] not in direct contact with the sample (e.g., Ziploc bags) Dedicated/decontaminated equipment: Submersible pumps, bladder pumps, peristaltic pumps, and inertia pumps that do not have Teflon components Silicon and/or HDPE tubing HDPE Hydrasleeve samplers, Nylon string, and stainless-steel weights Water quality field meters Water level probes Stainless steel bailers without PTFE components (e.g., PFTE ball valves), bacon bomb samplers Telescoping pole
Waterproof paper, field books, and forms; plastic clipboards, Post-it Notes Regular/thick-size Sharpie® or other felt-tip markers, felt pens and pens with water-resistant ink Binders, or spiral hard cover notebooks Aluminum foil	Ball-point pens Pre-printed labels from the laboratory Fine and Ultra-Fine point Sharpie® markers and Rite-in-the-rain® notebooks in staging area only Standard/loose plain paper and sample container labels Masonite or aluminum clipboards Thin HDPE sheeting, HDPE trash bags Hard sample coolers Bubble wrap Duct tape and packing tape
Decon 90	Alconox®, Liquinox, or Citranox
Chemical (blue) ice packs	Regular (wet) ice that is double-bagged and kept in the staging area and does not contact sample media

NOTES:

PFAS = per- and polyfluoroalkyl substances

[1]Washington Department of Ecology, *Guidance for Investigation and Remediating PFAS Contamination in Washington State* , Toxics Cleanup Program Publication No. 22-09-058 dated June 2003 and Michigan Department of Environment, Great Lakes, and Energy, *General PFAS Sampling Guidance,* dated January 2024, Figure 1, Sunscreen and Insect Repellents.

[2]PFAS-free over-boots may be worn when PFAS-free boots are not available. Over-boots will be put on in the staging area, and hands washed after donning the over-boots before the beginning of sampling activities. Over-boots are to be removed in the staging area after the sampling activities are complete.

Table 2
Proposed PFAS Sampling Locations
Fox Avenue Building Site
Seattle, Washington
Farallon PN: 3680-002.001

Well Identification	Water Bearing Zone	Screened Interval (feet)[1]	Elevation at Top of Well Casing (feet NAVD88)[2]	Measurement Date	Depth to Water (feet)[1]	Groundwater Elevation (feet NAVD88)[2]
B-54	1st	9-14	17.34	5/18/2026	10.14	7.20
MW-18S	1st	10-20	20.75	5/21/2026	13.65	7.10
B-22	1st	6-11	15.88	5/18/2026	8.85	7.03
R1-IW3A	1st	6-16	20.27	5/18/2026	12.97	7.30

NOTES:

[1]In feet below top of well casing.

[2]In feet above mean sea level.

[4]Depth to water last measured in May 2026.

NAVD88 = North American Vertical Datum of 1988

NM = not measured

PFAS = per- and polyfluoroalkyl substances

Table 3
EPA Method 1633 PFAS Constituents, Reporting, and Detection Limits
Fox Avenue Building Site
Seattle, Washington
Farallon PN: 3680-002.001

PFAS Analyte	Abbreviation	CAS No.	Reporting Limit[1] (ng/L)	Method Detection Limit[1] (ng/L)
Perfluorobutanoic acid	PFBA	375-22-4	4.00	1.00
Perfluoropentanoic acid	PFPeA	2706-90-3	2.00	1.00
Perfluorohexanoic acid	PFHxA	307-24-4	2.00	0.500
Perfluoroheptanoic acid	PFHpA	375-85-9	2.00	0.500
Perfluorooctanoic acid	PFOA	335-67-1	2.00	0.500
Perfluorononanoic acid	PFNA	375-95-1	2.00	0.500
Perfluorodecanoic acid	PFDA	335-76-2	2.00	0.500
Perfluoroundecanoic acid	PFUnA	2058-94-8	2.00	0.500
Perfluorododecanoic acid	PFDoA	307-55-1	2.00	0.550
Perfluorotridecanoic acid	PFTrDA	72629-94-8	2.00	0.580
Perfluorotetradecanoic acid	PFTeDA	376-06-7	2.00	0.810
Perfluorobutanesulfonic acid	PFBS	375-73-5	4.00	1.97
Perfluoropentanesulfonic acid	PFPeS	2706-91-4	2.00	0.500
Perfluorohexanesulfonic acid	PFHxS	355-46-4	2.00	0.500
Perfluoroheptanesulfonic acid	PFHpS	375-92-8	2.00	0.500
Perfluorooctanesulfonic acid	PFOS	1763-23-1	2.00	0.500
Perfluorononanesulfonic acid	PFNS	68259-12-1	2.00	0.500
Perfluorodecanesulfonic acid	PFDS	335-77-3	2.00	0.500
Perfluorododecanesulfonic acid	PFDoS	79780-39-5	2.00	0.530
1H,1H,2H,2H-Perfluorohexane sulfonic acid	4:2 FTS	757124-72-4	4.00	1.00
1H,1H,2H,2H-Perfluorooctane sulfonic acid	6:2 FTS	27619-97-2	4.00	1.00
1H,1H,2H,2H-Perfluorodecane sulfonic acid	8:2 FTS	39108-34-4	4.00	1.00
Perfluorooctanesulfonamide	PFOSA	754-91-6	2.00	1.00
N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8	2.00	0.500
N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2	2.00	0.500
N-methylperfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9	2.00	0.500
N-ethylperfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6	2.00	0.500
N-methylperfluorooctane sulfonamidoethanol	NMeFOSE	24448-09-7	10.0	2.50
N-ethylperfluorooctane sulfonamidoethanol	NEtFOSE	1691-99-2	10.0	2.50
Hexafluoropropylene Oxide Dimer Acid	HFPO-DA	13252-13-6	1.50	0.390
4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4	2.00	0.500
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1	2.00	0.500
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5	2.00	0.500
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6	2.00	0.720
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1	2.00	0.580
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9	2.00	0.500
Perfluoro (2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7	2.00	0.500
3-Perfluoropropylpropanoic acid	3:3 FTCA	356-02-5	4.00	1.00
3-Perfluoropentylpropanoic acid	5:3 FTCA	914637-49-3	10.0	2.50
3-Perfluoroheptylpropanoic acid	7:3 FTCA	812-70-4	10.0	2.50

NOTES:

[1]Analyzed by U.S. Environmental Protection Agency (EPA) Method 1633.

CAS = chemical abstract service

ng/L = nanograms per liter

PFAS = per- and polyfluoroalkyl substances

ATTACHMENT A
FARALLON STANDARD OPERATING PROCEDURES

PER-AND POLY-FLOUROALKYL SUBSTANCES
GROUNDWATER SAMPLING WORK PLAN

Fox Avenue Building Site
6900 Fox Avenue South
Seattle, Washington

Farallon PN: 3680-002.001

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 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 (EPA). 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.

ATTACHMENT B
FARALLON FIELD FORMS

PER-AND POLY-FLOUROALKYL SUBSTANCES
GROUNDWATER SAMPLING WORK PLAN

Fox Avenue Building Site
6900 Fox Avenue South
Seattle, Washington

Farallon PN: 3680-002.001

Allowed Insect Repellents

- OFF Deep Woods
- Sawyer Permethrin

Allowed Sunscreens

- Banana Boat Sunscreen for Men Triple Defense Continuous Spray Sunscreen SPF 30 Sport
- Banana Boat Performance Coolzone Broad Spectrum SPF 30
- Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30
- Banana Boat Sport Performance Sunscreen Stick SPF 50
- Coppertone Sunscreen Lotion Ultra Guard Broad Spectrum SPF 50
- Coppertone Sport High-Performance AccuSpray Sunscreen SPF 30
- Coppertone Sunscreen Stick Kids SPF 55
- L'Oréal Silky Sheer Face Lotion 50+
- Meijer Sunscreen Lotion Broad Spectrum SPF 30
- Meijer Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50
- Meijer Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70
- Neutrogena Ultra-Sheer Dry-Touch Sunscreen Broad Spectrum SPF 30
- Neutrogena Beach Defense Water + Sun Barrier Lotion SPF 70 & Spray Broad Spectrum SPF 30
- Neutrogena Pure & Free Baby Sunscreen Broad Spectrum SPF 60+

Reference: Michigan Department of Environment, Great Lakes, and Energy, *General PFAS Sampling Guidance*, dated January 2024, Figure 1, Sunscreen and Insect Repellents.

FARALLON CONSULTING

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

FIELD REPORT

Page ___ of ___

Date: _____ **Project #:** _____ **Task #:**_____

Project: _____ **Site Address:** _____

Client: _____ **Contractor:** _____

Weather: _____ **Temp:** _____

Equipment Used: _____

Project Manager: _____

Prepared By: _____ **Reviewed By:** _____

Comments:

FIELD REPORT (continued)

Project: _____ **Date:** _____ **Project #:** _____ **Task #:**___

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: YSI Pro DSS	PUMP TYPE: Peristaltic	TUBING: 1/4" P.E.

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

PFAS GROUNDWATER SAMPLING DAILY CHECKLIST

Project Name_____

Project Number_____

Date_____

Clothing and PPE

- □ No water- or stain-resistant boots or clothing (e.g., GORE-TEX®)
- □ Boots made of polyurethane, PVC, rubber, or untreated leather
- □ Clothing has not been recently laundered with a fabric softener or scented detergent
- □ No coated HDPE suits (e.g., coated Tyvek® suits)
- □ Field crew has not used cosmetics, moisturizers, or other related products today
- □ Field crew has not used sunscreen or insect repellants today, other than products approved as PFAS-free -see attached list

Wet Weather Clothing

- □ Field staff rain gear is made of polyurethane, PVC, vinyl, wax-coated or rubber

Food and Drinks

- □ No food or drink on-site, except within staging area
- □ Food in staging area is contained in HDPE or stainless-steel containers

Decontamination

- □ Reusable sampling equipment decontaminated before and after each sample location
- □ "PFAS-free" water is on site for decontamination of sample equipment
- □ Alconox®, Liquinox®, Luminox® or Citranox® used as decontamination detergent

Field Equipment

- □ Sample containers are made of HDPE or polypropylene, not LDPE
- □ Sample caps are made of HDPE or polypropylene and are not lined with Teflon™
- □ No materials containing Teflon™ Viton™, or other fluoropolymers
- □ No materials containing LDPE in direct contact with the sample (e.g., LDPE tubing)
- □ Equipment in direct contact with the sample is made from stainless steel, HDPE, acetate, silicon, or polypropylene
- □ No plastic clipboards, binders, or spiral hard cover notebooks
- □ No waterproof field books
- □ No waterproof or felt pens or markers (e.g., certain Sharpie® products)
- □ No chemical (blue) ice, unless it is contained in a sealed bag
- □ No aluminum foil
- □ No sticky notes (e.g., certain Post-It® products)

Printed Name	Signature	Company	Date

WASTE INVENTORY TRACKING SHEET

Project Number: _____ **Page:** _____ **of** _____

Project Name: _____ **Project Manager:** _____

Project Address: _____ **Field Work Description:** _____

Prepared By: _____ **Waste Transporter:** _____

Inventory Date: _____ **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 / Drum Condition

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

FARALLON CONSULTING

Groundwater Level Measurement Summary Form

Date:						**Project Name:**	
Project Number:			**Task:**			**Project Location:**	
Equipment Used:						**Project Manager:**	
Well ID	**Time Opened**	**Time Measured**	**Depth to Water (feet)**	**Total Well Depth (feet)**	**Depth to NAPL (feet)**	**NAPL Thickness (feet)**	**Comments / Well Condition**
					Prepared By:		