Geosyntec consultants

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21 September 2022

Angel Soto, Director
Health, Environment, Safety & Security (HESS)
Nammo Defense Systems Inc.
4051 North Higley Road
Mesa, Arizona 85215

Subject: Sampling and Analysis Plan for Groundwater Screening for PFAS
Former Thermal Treatment Unit
Nammo Defense Systems, Inc.
Mesa, Arizona

Dear Mr. Soto:

Geosyntec Consultants (Geosyntec) has prepared the following Sampling and Analysis Plan (SAP) for Groundwater Screening for Per- and Polyfluoroalkyl Substances (PFAS) on behalf of Nammo Defense Systems, Inc. (NDS) to address regulatory comments regarding the Current Conditions Report (CCR)[1] and Conceptual Site Model (CSM)[2] for the Former Thermal Treatment Unit (TTU) located at the NDS facility (the Facility) in Mesa, Arizona. This SAP includes the necessary addenda to the Quality Assurance Project Plan (QAPP)[3] previously developed for the Facility for groundwater sampling and analysis and approved by EPA on 10 May 2022.

BACKGROUND

The Former TTU was used for disposal of hazardous waste by open burn from approximately 1966 through 2006. This location, described in contemporary documents as the "Burn Ground," is located on a transitional area between overlying shallow soils

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[1] Geosyntec (2021). Current Conditions Report, Nammo Defense Systems Inc. Facility, Mesa, Arizona. May 2021.
[2] Geosyntec (2021). Conceptual Site Model, Nammo Defense Systems Inc. Facility, Mesa, Arizona. September 2021.
[3] Geosyntec (2022). Quality Assurance Project Plan, Nammo Defense Systems Inc. Facility, Mesa, Arizona. April 2022.

and exposed, fractured bedrock. Open burn pits, and later engineered metal burn pads, were used for the controlled disposal of hazardous wastes primarily consisting of energetic propellent materials. Wastes that were documented to have been burned at the Former TTU include ammonium perchlorate (AP), ammonium nitrate (AN), lead nitrate, lead styphnate, magnesium teflon viton (MTV), sodium azide (SA), and others. Because AP and AN have been estimated to represent at least 75% (minimum estimate[4]) and as much as greater than 95% of the total propellant mass handled at the Facility, these propellants also are understood to comprise the majority of material disposed of at the Former TTU. AP is considered a primary contaminant of concern for the Former TTU.

At the time of the development of this work plan, no guidance exists with respect to screening of potential areas of concern for PFAS as a byproduct of the use of MTV. However, regulatory concern has been expressed that PFAS, as degradation byproducts, may have been released due to the presence of MTV in some product formulations that were disposed of at the Former TTU.

The operation and remedial investigation histories of the Former TTU are presented in detail in the CCR. A detailed description of the geological setting for the Former TTU is presented in the CSM.

DATA QUALITY OBJECTIVES

Project Objectives and Problem Definition

The purpose of this investigation is to screen groundwater in the vicinity of the Former TTU for PFAS that may have originated from past disposal of MTV by open burn. This will be accomplished by collecting groundwater samples from the existing network of groundwater monitoring wells and analyzing the samples for PFAS.

Data Quality Objectives

The contaminants of potential concern (COPCs) are PFAS and will be analyzed by the QAPP specified method 537.1 Modified (M). The list of 40 compounds for Method 537.1M is provided as Attachment 1.

[4] Haley and Aldrich (2016). RCRA Facility Investigation Report, Nammo Talley Thermal Treatment Unit, Mesa Arizona. November 2016.

Regional Screening Levels (RSLs) have been established by the USEPA for five PFAS. A Target Hazard Quotient (THQ) of 0.1 will be applied to the RSLs for this project. The project RSLs for these compounds in tapwater are:

- Perfluorobutanesulfonic acid (PFBS) = 600 nanograms per liter (ng/L)
- Perfluorohexanesulfonic acid (PFHxS) = 39 ng/L
- Perfluorononanoic acid (PFNA) = 5.9 ng/L
- Perfluorooctanesulfonic acid (PFOS) = 4 ng/L
- Perfluorooctanoic acid (PFOA) = 6 ng/L

Because Method 537.1 M is USEPA-validated and approved for drinking water, and is the Department of Defense required method for screening groundwater for PFAS at the time of the issuance of this document, it has been selected in order to meet the most conservative standard. No further action is recommended if the above COPCs are not detected in quantities exceeding the RSLs. If a COPC is detected at a concentration exceeding the associated RSL, then recommendations for further action will be evaluated.

Data Quality Indicators (DQIs) and Measurement Quality Objectives (MQOs)

DQIs and MQOs are specified in Section 3.6 of the QAPP. Data validation will be performed on the laboratory data according to Tier 1A data validation protocols and a Data Quality Evaluation report will be prepared and included with submittal of laboratory analytical results.

SAMPLING RATIONALE

Groundwater will be collected from the existing network of groundwater monitoring wells associated with the Former TTU source area and plume delineation. Like AP, PFAS exhibits solubility in groundwater, and groundwater is the only matrix proposed for sampling. Because AP was disposed of in significantly greater quantities than MTV, is significantly more soluble in water than PFAS, and is not significantly attenuated by biological, chemical, or adsorption processes at this site, AP is expected to act as a conservative tracer for hydraulic transport away from the source area. The list of wells that will be sampled is derived from previously documented detections of perchlorate. A list of monitoring wells for the site is provided in Attachment 2. This list indicates which wells are and are not to be sampled and provides the depth of sample collection and approximate sample depths. A figure providing the location of the monitoring wells is provided in Attachment 3.

REQUEST FOR ANALYSIS

Samples will be submitted for PFAS analysis via Method 537.1 M by a laboratory accredited by the United States Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) (i.e., using a PFAS method that is compliant with Table B-15 of the DoD and Department of Energy (DOE) consolidated Quality Systems Manual (QSM) for Environmental Laboratories) as well as by the Arizona Department of Health Services Environmental Laboratory Licensure Program. The laboratory accreditation certificates are included in Attachment 4.

FIELD METHODS AND PROCEDURES

Groundwater collection for PFAS analysis is a highly technical task due to the very low limits of quantitation (parts per trillion). A significant risk of contamination and data quality erosion is present because of the prevalence of PFAS in consumer goods such as waterproofed clothing, and approved materials (e.g., high-density polyethylene, but not low-density polyethylene) must be used for sampling equipment. Groundwater sampling will be conducted using PFAS-compatible HydraSleeve no-purge samplers in accordance with the following SOPs:

- SOP 008 – Sampling and Analysis of PFAS (Revised March 2022)
- SOP 010 – Groundwater Sampling of Monitoring Wells and Analysis of Per- and Polyfluoroalkyl Substances (Revised August 2020)
- SOP 013 – Sampling Groundwater with a HydraSleeve (2019)

These SOPs are provided in Attachment 5. HydraSleeves are to be removed and not replaced during routine groundwater monitoring in September 2022. It is anticipated that at least four weeks will elapse between the removal of existing HydraSleeves and the installation of PFAS-approved HydraSleeves for the purpose of the present work. After emplacement at the depths indicated in Attachment 2, at least 24 hours of equilibration time will be provided before collection of HydraSleeve samples. This is a typical factor associated with the logistics of sampler deployment and collection; no minimum equilibration time is specified in SOP 013.

As indicated in the QAPP, for each groundwater sample submitted for PFAS analysis, two 250 milliliter (mL) high density polyethylene (HDPE) bottles will be collected and stored on ice at a temperature ≤ 6 degrees Celsius (°C), but not frozen. Groundwater samples do not require Trizma preservative.

Sampling will not be conducted during wet weather.

DISPOSAL OF RESIDUAL MATERIALS

Excess groundwater collected from HydraSleeve samplers for sample container filling will be emptied into a dedicated and labeled 5-gallon pail(s) for investigation-derived waste (IDW). Excess sample water and water used for decontamination of non-dedicated equipment will be collected in pail(s) as necessary and will be sampled at the conclusion of the project. If more than 20 gallons of IDW water accumulates, the IDW water may be transferred to a labeled 55-gallon drum at the discretion of the field staff. The samples will be analyzed for the Resource Conservation and Recovery Act (RCRA) lists of metals, volatile organic compounds (VOCs), polyaromatic hydrocarbons, and the Method 537.1M list of PFAS. Laboratory reports will be used for waste profiling. It is anticipated that the IDW water will be accepted as non-hazardous waste by a permitted disposal facility.

Other IDW, such as used personal protective equipment (PPE), will be disposed of as regular municipal/commercial waste at the Facility.

SAMPLE DOCUMENTATION, PACKAGING, AND SHIPMENT

Field Forms

Field visits and sample collection activities will be documented using specific field forms and procedures outlined in the QAPP. The following field forms will be used for this project and are included in Attachment 6.

- Daily PFAS Sampling Checklist
- Daily Field Note Form
- Daily Tailgate Safety Meeting Form
- Groundwater Sampling Form

Corrections will be made through single-line strikeout with initial and date. No fields or lines will be skipped; unused lines will be crossed out. Forms will be signed and dated by the person making and recording the measurements.

Sample Labeling, Packaging, and Chain-of-Custody

Each sample container will be affixed with a self-sticking, waterproof adhesive label. Each label will be completed with a PFAS-free waterproof ink pen with the following information:

- Identification (ID) in the following format: [Sample Location ID]-[YYYYMMDD]-[Optional Duplicate Indicator]. Sample Location ID will be the well designation with two-digit numbering (e.g., TTU-01), FB for field blank, TB for trip blank, or EB for equipment blank. The optional duplicate indicator will be "DUP."
- Laboratory customer name (NDS or Geosyntec depending on contracting choice);
- Project title (TTU PFAS)
- Analysis request (EPA 537.1M)
- Date (day/month/year) and time (24-hour clock) collected
- Initials of the sample collector; and
- Preservative (e.g., None, HNO3, etc.)

Samples will be packed on wet ice for shipping in waterproof ice chests or coolers in accordance with the SOPs for PFAS sampling. The ice chests will be submitted to the Eurofins facility in Phoenix to be forwarded for analysis within the Eurofins network.

The field Chain-of Custody form will be supplied by the laboratory and the minimum information below will be specified:

- Project title;
- Client name and address;
- Signatures of all carriers from the sampling team to receiver at the laboratory;
- The sample ID, date and time of collection, matrix (GW), and requested analysis;
- The project manager's name and contact information (email and telephone);
- The total number of sample containers; and
- Remarks as necessary in the appropriate field.

FIELD QUALITY CONTROL SAMPLES

In accordance with the QAPP, in addition to the primary project samples, the following types of QC samples will be collected in the field. Field contamination will be assessed through the collection of field blanks collected at a frequency of one per day or one per

20 field samples, whichever is more frequent. Field blanks will be collected using laboratory-provided PFAS-free water, which the laboratory has verified to be PFAS-free to the method detection limits (MDLs). Equipment blanks are required only where non-dedicated sampling equipment is used; since HydraSleeve no-purge samplers are disposable, single-time use sampling equipment, equipment blanks are not required. Sampling precision will be evaluated through the collection and analysis of field duplicate samples at a rate of one field duplicate per 10 primary samples. Matrix spike (MS) and MS duplicate (MSD) pairs will be collected at a frequency of one pair for every 20 primary samples to determine potential matrix interferences that may be present. Samples will be shipped on ice and will be maintained at a temperature between 0 and 6 degrees Celsius. Sample temperature will be checked through the use of laboratory-provided temperature blanks (one per ice chest).

FIELD VARIANCES

Field variances will be communicated to the project manager in a timely manner for verbal approval and will be documented in field notes.

FIELD HEALTH AND SAFETY PROCEDURES

Field work will be conducted in accordance with the 2020 Health and Safety Plan[5] for remedial investigation and remediation work at the NDS Facility.

REPORTING

A brief letter report will be prepared and addressed to EPA summarizing field activities and providing tabulated results of all laboratory reports. Copies of completed field forms and laboratory reports will be provided as attachments. Tier 1A Data Validation will be performed on laboratory analytical reports in accordance with the requirements of the QAPP, and data validation memoranda will be included as attachments to the report. Standard electronic data deliverable (EDD) files will be submitted to EPA and the Arizona Department of Environmental Quality.

[5] Geosyntec (2020). Health and Safety Plan, Nammo Defense Systems Inc. January 2020.

CLOSING

Please contact the undersigned by telephone or email at 602-513-5829 or iroll@geosyntec.com if you have any questions.

Sincerely,

Isaac Roll, PhD, PE (AZ #63308)
Project Engineer

Fabrizio Mascioni, RG (AZ #65652)
Principal

Attachments:
1. Names, Abbreviations, and CAS Registry Numbers for Target PFAS
2. TTU Monitoring Well Network
3. PFAS Sampling Locations Plan
4. Laboratory Accreditation Certificates
5. Standard Operating Procedures
6. Field Forms

ATTACHMENT 1:
Method 537.1M Analyte List

Names, Abbreviations, and CAS Registry Numbers for Target PFAS by Method 537.1M

Target Analyte Name	Abbreviation	CAS Number
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentansulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluorododecanesulfonic acid	PFDoS	79780-39-5
1H,1H, 2H, 2H-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1H,1H, 2H, 2H-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1H,1H, 2H, 2H-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2H,2H,3H,3H-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4

ATTACHMENT 2:
Table of Sampling Locations

TABLE 2: TTU MONITORING WELL NETWORK
FORMER THERMAL TREATMENT UNIT
NAMMO DEFENSE SYSTEMS INC.
SEPTEMBER 2022

Geosyntec consultants

	Northing (intl ft)	Easting (intl ft)	Top of Casing Elevation (ft asml)	Screened Interval (ft btoc)	PFAS Sampling Selection	Proposed Sampling Depth (ft btoc)
Location						
TTU-1	909420.734	761281.203	1312.73	30 - 70 ft	No - extraction well	NA
TTU-2	909087.852	761148.265	1314.44	49.4 - 179.6	No - extraction well	NA
TTU-3	**909303.363**	**760888.204**	**1308.03**	**78.1 - 138.1**	**Yes**	**108**
TTU-4	**909673.680**	**761041.975**	**1305.12**	**39.5 - 99.5**	**Yes**	**57**
TTU-5	**908747.636**	**761102.227**	**1314.93**	**59.5 - 164.5**	**Yes**	**110**
TTU-6	**909260.820**	**760560.096**	**1300.84**	**110 - 175**	**Yes**	**143**
TTU-7	**909287.611**	**760527.269**	**1301.84**	**282 - 410**	**Yes**	**345**
TTU-8	**909699.266**	**760514.908**	**1310.23**	**135 - 185**	**Yes**	**164**
TTU-9A	**909974.490**	**761710.151**	**1318.04**	**24 - 99**	**Yes**	**61**
TTU-10	**908960.114**	**760297.013**	**1302.42**	**115 - 180**	**Yes**	**157**
TTU-11	909029.758	761706.470	1339.20	24.1 - 89.1	No - injection well	NA
TTU-12	**909105.990**	**761103.280**	**1312.21**	**30 - 180**	**Yes**	**82**
TTU-13	**909405.920**	**761232.180**	**1310.79**	**30 - 180**	**Yes**	**51**
TTU-14	**909224.260**	**761181.230**	**1316.80**	**45 - 100**	**Yes**	**64**
TTU-15	**909185.100**	**762065.910**	**1350.85**	**10 - 100**	**Yes**	**75**
TTU-16	**909124.980**	**761848.851**	**1338.55**	**20 - 95.6**	**Yes**	**80**
TTU-17	**909370.903**	**762179.168**	**1347.49**	**20 - 101**	**Yes**	**80**
TTU-18	908215.829	761130.011	1320.25	21 - 140	No - historically dry	NA
TTU-19	909030.750	761687.700	1336.81	25 - 95	No - injection well	NA
TTU-20	909022.530	761681.990	1336.90	25 - 95	No - bio pilot test well	NA
TTU-EX-1	**909350.574**	**761597.823**	**1321.69**	**19 - 110.7**	**Yes**	**69**
TTU-EX-2	**909268.187**	**761493.214**	**1316.40**	**20 - 110**	**Yes**	**74**
TTU-EX-3	**909134.941**	**761465.507**	**1316.85**	**20 - 101.45**	**Yes**	**76**
TTU-EX-4	**909051.298**	**761442.876**	**1319.96**	**20 - 110.7**	**Yes**	**77**
TTU-EX-5	**908971.770**	**761423.325**	**1319.50**	**20 - 110.8**	**Yes**	**80**

Notes:

intl ft = international foot

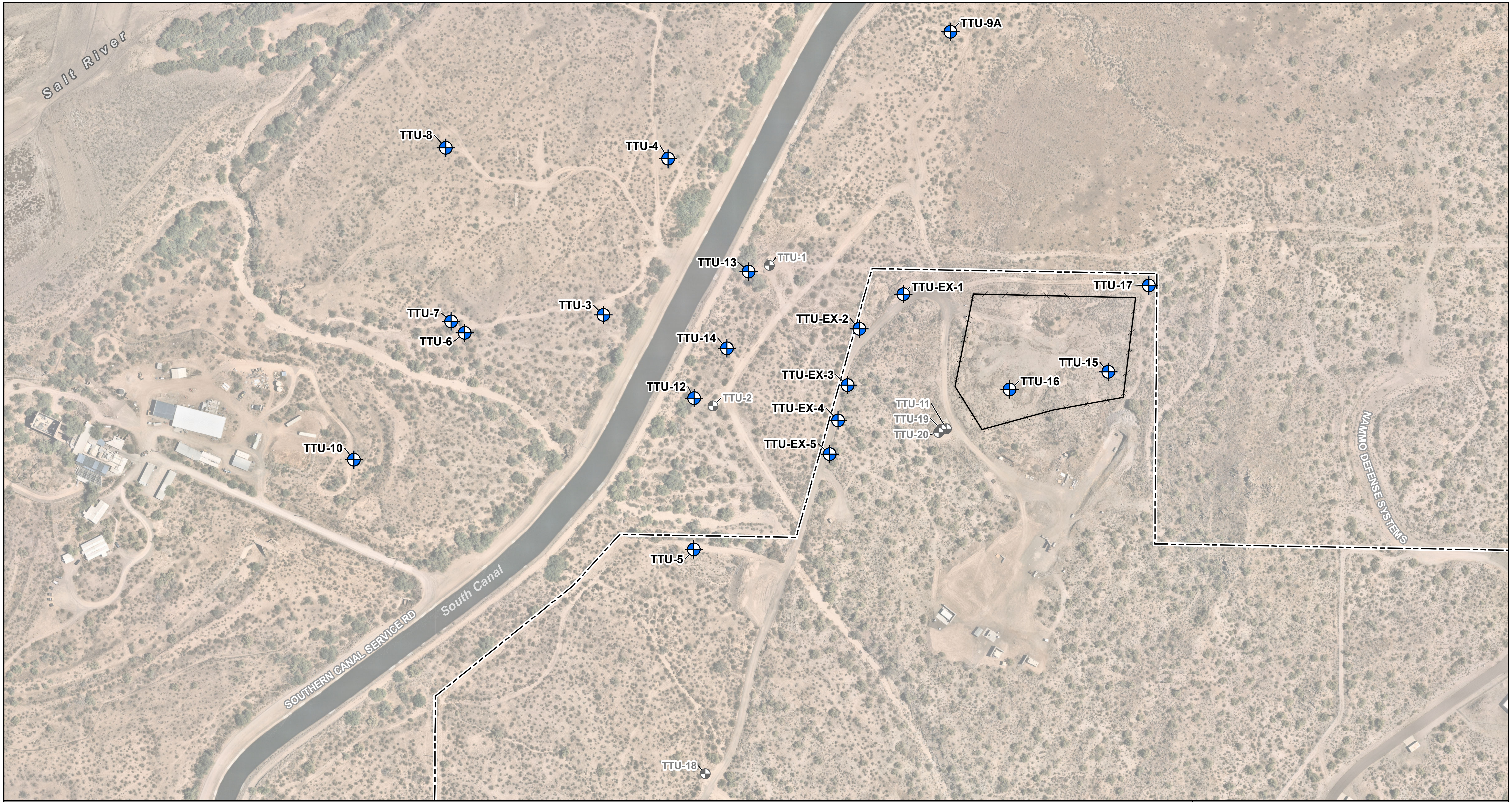
ft amsl = feet above mean sea level

ft btoc = feet below top of casing

NA = Not Applicable

Wells to be sampled for per- and poly-fluoroalkyl substances are indicated in **boldface**.

ATTACHMENT 3:
Sampling Locations Plan



GROUNDWATER MONITORING WELL PROPOSED FOR PFAS SAMPLING

GROUNDWATER MONITORING WELL NOT PROPOSED FOR PFAS SAMPLING

FENCE LINE (TTU)

NDS LEASED PROPERTY BOUNDARY WITH SALT RIVER PIMA-MARICOPA INDIAN COMMUNITY

NDS: Nammo Defense Systems
PFAS: per-and polyfluoroalkyl substances

N

0 110 220 440
Feet

IMAGERY SOURCE: Nearmap, 5/25/2022

PFAS Sampling Locations Plan

Nammo Defense Systems
Former Thermal Treatment Unit (TTU)
Mesa, Arizona

Geosyntec consultants

Figure 1

Phoenix | September 2022

\\SanDiego-01\Data\GIS_SanDiego01\SP0101_Nammo\MXD\TTU\TTU_PFAS\2022_Q3\NDS_PFAS_Fig1_MW.mxd 9/20/2022 SWolfskill

ATTACHMENT 4:
Laboratory Accreditation Certificates

ARIZONA DEPARTMENT OF HEALTH SERVICES

ENVIRONMENTAL LABORATORY LICENSE

Issued to:

Laboratory Director: **Chris Williams**

Owner/Representative: **Mr. Chris Williams**

Eurofins Sacramento

AZ0708

is in compliance with Environmental Laboratory's applicable standards for the State of Arizona and maintains on file a List of Parameters for which the laboratory is certified to perform analysis.

PERIOD OF LICENSURE FROM: 08/12/2022 TO: 08/11/2023

GREAT SEAL OF THE STATE OF ARIZONA DITAT DEUS 1912

Steven D. Baker, Chief
Office of Laboratory Licensure & Certification
Bureau of State Laboratory Services

Arizona Department Of Health Services

Office of Laboratory Licensure and Certification

250 N.17th Avenue, Phoenix, Arizona 85007-3246

SDW

Parameter	EPA Method	Certified On
DETERMINATION OF PER - AND PFAS (ESPE / LCMS)	EPA 533	2/16/2021 2:20:00 PM
DETERMINATION OF SELECTED PERFLUORINATED ALKYL ACIDS (LC/MS/MS)	EPA 537	3/21/2016 10:48:01 AM
DIOXIN	EPA 1613 REV B (10/94)	6/28/2007 12:00:00 AM
DIOXINS AND FURANS - ADDITIONAL	EPA 1613B REV B(10/94)	6/28/2007 12:00:00 AM

Total Count: 4

SW

Parameter	EPA Method	Certified On
PCDDS AND PCDFS BY HRGC/HRMS	EPA 8290A	6/28/2007 12:00:00 AM
PERCHLORATE	EPA 6850	7/9/2008 12:00:00 AM
SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION	EPA 3510C	6/28/2007 12:00:00 AM
ULTRASONIC EXTRACTION	EPA 3550C	6/28/2007 12:00:00 AM

Total Count: 4

WW

Parameter	EPA Method	Certified On
DIOXINS AND FURANS	EPA 1613	7/26/2022 4:07:28 PM
TETRA- THROUGH OCTA-CHLORINATED DIOXINS AND FURANS	EPA 1613 REV B (10/94)	6/28/2007 12:00:00 AM

Total Count: 2

Instrument

Instrument	Instrument Code	Quantity	Certified On
GAS CHROMATOGRAPH/MASS SPECTROMETER-HI RESOLUTION	GC/MS-HR	2	5/4/2010 12:00:00 AM
HIGH PERFORMANCE LIQUID CHROMATOGRAPH/MASS SPEC	HPLC/MS	1	8/11/2009 12:00:00 AM
INDUCTIVELY COUPLED PLASMA/MASS SPECTROMETER	ICP/MS	1	5/14/2020 11:36:59 AM
ION CHROMATOGRAPH	IC	1	5/14/2020 11:36:59 AM
HIGH PERFORMANCE LIQUID CHROMATOGRAPH/MASS SPEC	HPLC/MS	2	5/14/2020 11:36:59 AM

Instrument

Instrument	Instrument Code	Quantity	Certified On
ION CHROMATOGRAPH	IC	1	5/14/2020 11:36:59 AM

Total Count: 6

Software

Software Code	Certified On
AGILENT MASS HUNTER - HPLC/MS	4/20/2011 12:00:00 AM
OPUS - GC/MS	4/21/2011 12:00:00 AM
OTHER - HI-RES GC/MS	4/21/2011 12:00:00 AM
MASSLYNX 4.1 - HPLC/MS	5/17/2011 12:00:00 AM
PEAKNET (DIONEX) - IC	6/18/2020 2:35:54 PM
METROHM - IC	6/18/2020 2:35:54 PM
ABSCIEX MULTIQUANT - HPLC/MS	6/18/2020 2:35:54 PM

Total Count: 7

CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Eurofins Sacramento

880 Riverside Parkway
West Sacramento, CA 95605

Fulfills the requirements of

ISO/IEC 17025:2017

and

U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories (DoD QSM V5.4)

In the field of

TESTING

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 20 January 2024
Certificate Number: L2468

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AND

U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories (DoD QSM V5.4)

Eurofins Sacramento

880 Riverside Parkway
West Sacramento, CA 95605
Ms. Lisa Stafford
916-373-5600

TESTING

Valid to: **January 20, 2024** Certificate Number: **L2468**

Environmental

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP-AES	EPA 6010B/6010C	Aluminum
ICP-AES	EPA 6010B/6010C	Antimony
ICP-AES	EPA 6010B/6010C	Arsenic
ICP-AES	EPA 6010B/6010C	Barium
ICP-AES	EPA 6010B/6010C	Beryllium
ICP-AES	EPA 6010B/6010C	Boron
ICP-AES	EPA 6010B/6010C	Cadmium
ICP-AES	EPA 6010B/6010C	Calcium
ICP-AES	EPA 6010B/6010C	Chromium (Total)
ICP-AES	EPA 6010B/6010C	Cobalt
ICP-AES	EPA 6010B/6010C	Copper
ICP-AES	EPA 6010B/6010C	Iron
ICP-AES	EPA 6010B/6010C	Lead
ICP-AES	EPA 6010B/6010C	Magnesium
ICP-AES	EPA 6010B/6010C	Manganese
ICP-AES	EPA 6010B/6010C	Molybdenum

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP-AES	EPA 6010B/6010C	Nickel
ICP-AES	EPA 6010B/6010C	Potassium
ICP-AES	EPA 6010B/6010C	Selenium
ICP-AES	EPA 6010B/6010C	Silica
ICP-AES	EPA 6010B/6010C	Silicon
ICP-AES	EPA 6010B/6010C	Silver
ICP-AES	EPA 6010B/6010C	Sodium
ICP-AES	EPA 6010B/6010C	Thallium
ICP-AES	EPA 6010B/6010C	Tin
ICP-AES	EPA 6010B/6010C	Titanium
ICP-AES	EPA 6010B/6010C	Vanadium
ICP-AES	EPA 6010B/6010C	Zinc
ICP-MS	EPA 6020/6020A	Aluminum
ICP-MS	EPA 6020/6020A	Antimony
ICP-MS	EPA 6020/6020A	Arsenic
ICP-MS	EPA 6020/6020A	Barium
ICP-MS	EPA 6020/6020A	Beryllium
ICP-MS	EPA 6020/6020A	Cadmium
ICP-MS	EPA 6020/6020A	Calcium
ICP-MS	EPA 6020/6020A	Chromium (Total)
ICP-MS	EPA 6020/6020A	Cobalt
ICP-MS	EPA 6020/6020A	Copper
ICP-MS	EPA 6020/6020A	Iron
ICP-MS	EPA 6020/6020A	Lead
ICP-MS	EPA 6020/6020A	Magnesium
ICP-MS	EPA 6020/6020A	Manganese
ICP-MS	EPA 6020/6020A	Molybdenum
ICP-MS	EPA 6020/6020A	Nickel
ICP-MS	EPA 6020/6020A	Phosphorus
ICP-MS	EPA 6020/6020A	Potassium
ICP-MS	EPA 6020/6020A	Selenium
ICP-MS	EPA 6020/6020A	Silver
ICP-MS	EPA 6020/6020A	Sodium
ICP-MS	EPA 6020/6020A	Strontium
ICP-MS	EPA 6020/6020A	Thallium

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP-MS	EPA 6020/6020A	Tin
ICP-MS	EPA 6020/6020A	Titanium
ICP-MS	EPA 6020/6020A	Uranium
ICP-MS	EPA 6020/6020A	Vanadium
ICP-MS	EPA 6020/6020A	Zinc
CVAAS	EPA 7470A	Mercury
Colorimetric	EPA 353.2	Nitrate
Colorimetric	EPA 353.2	Nitrate-nitrite
Colorimetric	EPA 353.2	Nitrite
Colorimetric	EPA 410.4	Chemical Oxygen Demand (COD)
LC/MS/MS	EPA 6850	Perchlorate
Colorimetric	EPA 7196A	Chromium (Hexavalent)
Probe	EPA 9040B/9040C	pH
Ion Chromatography	EPA 9056A/300.0	Bromide
Ion Chromatography	EPA 9056A/300.0	Chloride
Ion Chromatography	EPA 9056A/300.0	Fluoride
Ion Chromatography	EPA 9056A/300.0	Nitrate
Ion Chromatography	EPA 9056A/300.0	Nitrite
Ion Chromatography	EPA 9056A/300.0	Orthophosphate
Ion Chromatography	EPA 9056A/300.0	Sulfate
Titration	SM 2320B	Alkalinity
Gravimetric	SM 2540B	Solids, Total
Gravimetric	SM 2540C	Solids, Total Dissolved
Gravimetric	SM 2540D	Solids, Total Suspended
Colorimetric/Hydrolysis	EPA 353.2 Modified WS-WC-0050	Nitrocellulose
GC/MS	EPA 8260B/8260C	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B/8260C	1,1,1-Trichloroethane
GC/MS	EPA 8260B/8260C	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B/8260C	1,1,2-Trichloroethane
GC/MS	EPA 8260B/8260C	1,1,2-Trichloro-1,2,2-trifluoroethane
GC/MS	EPA 8260B/8260C	1,1-Dichloroethane
GC/MS	EPA 8260B/8260C	1,1-Dichloroethene
GC/MS	EPA 8260B/8260C	1,1-Dichloropropene
GC/MS	EPA 8260B/8260C	1,2,3-Trichlorobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B/8260C	1,2,3-Trichloropropane
GC/MS	EPA 8260B/8260C	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B/8260C	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B/8260C	1,2-Dibromo-3-chloropropane
GC/MS	EPA 8260B/8260C	1,2-Dibromoethane
GC/MS	EPA 8260B/8260C	1,2-Dichlorobenzene
GC/MS	EPA 8260B/8260C	1,2-Dichloroethane
GC/MS	EPA 8260B/8260C	1,2-Dichloropropane
GC/MS	EPA 8260B/8260C	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B/8260C	1,3-Dichlorobenzene
GC/MS	EPA 8260B/8260C	1,3-Dichloropropane
GC/MS	EPA 8260B/8260C	1,4-Dichlorobenzene
GC/MS	EPA 8260B/8260C	1-Chlorohexane
GC/MS	EPA 8260B/8260C	2,2-Dichloropropane
GC/MS	EPA 8260B/8260C	2-Butanone (MEK)
GC/MS	EPA 8260B/8260C	2-Chlorotoluene
GC/MS	EPA 8260B/8260C	2-Hexanone (MBK)
GC/MS	EPA 8260B/8260C	2-Methyl-2-propanol (tert- Butyl Alcohol, TBA)
GC/MS	EPA 8260B/8260C	4-Chlorotoluene
GC/MS	EPA 8260B/8260C	4-Isopropyltoluene
GC/MS	EPA 8260B/8260C	4-Methyl-2-pentanone (MIBK)
GC/MS	EPA 8260B/8260C	Acetone
GC/MS	EPA 8260B/8260C	Allyl Chloride
GC/MS	EPA 8260B/8260C	Benzene
GC/MS	EPA 8260B/8260C	Bromobenzene
GC/MS	EPA 8260B/8260C	Bromochloromethane
GC/MS	EPA 8260B/8260C	Bromodichloromethane
GC/MS	EPA 8260B/8260C	Bromoform
GC/MS	EPA 8260B/8260C	Bromomethane
GC/MS	EPA 8260B/8260C	Carbon Disulfide
GC/MS	EPA 8260B/8260C	Carbon Tetrachloride
GC/MS	EPA 8260B/8260C	Chlorobenzene
GC/MS	EPA 8260B/8260C	Chloroethane
GC/MS	EPA 8260B/8260C	Chloroform
GC/MS	EPA 8260B/8260C	Chloromethane

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B/8260C	cis-1,2-Dichloroethene
GC/MS	EPA 8260B/8260C	cis-1,3-Dichloropropene
GC/MS	EPA 8260B/8260C	Cyclohexane
GC/MS	EPA 8260B/8260C	Dibromochloromethane
GC/MS	EPA 8260B/8260C	Dibromomethane
GC/MS	EPA 8260B/8260C	Dichlorodifluoromethane
GC/MS	EPA 8260B/8260C	Diisopropyl Ether (DIPE)
GC/MS	EPA 8260B/8260C	Ethylbenzene
GC/MS	EPA 8260B/8260C	Ethylmethacrylate
GC/MS	EPA 8260B/8260C	Ethyl tert-butyl Ether (ETBE)
GC/MS	EPA 8260B/8260C	Hexachlorobutadiene
GC/MS	EPA 8260B/8260C	Hexane
GC/MS	EPA 8260B/8260C	Iodomethane
GC/MS	EPA 8260B/8260C	Isobutanol (2-Methyl-1-propanol)
GC/MS	EPA 8260B/8260C	Isopropylbenzene
GC/MS	EPA 8260B/8260C	m & p Xylene
GC/MS	EPA 8260B/8260C	Methyl tert-butyl Ether (MTBE)
GC/MS	EPA 8260B/8260C	Methylene Chloride
GC/MS	EPA 8260B/8260C	Naphthalene
GC/MS	EPA 8260B/8260C	n-Butylbenzene
GC/MS	EPA 8260B/8260C	n-Propylbenzene
GC/MS	EPA 8260B/8260C	o-Xylene
GC/MS	EPA 8260B/8260C	sec-Butylbenzene
GC/MS	EPA 8260B/8260C	Styrene
GC/MS	EPA 8260B/8260C	t-Amyl methyl Ether (TAME)
GC/MS	EPA 8260B/8260C	t-1,4-Dichloro-2-Butene
GC/MS	EPA 8260B/8260C	tert-Butylbenzene
GC/MS	EPA 8260B/8260C	Tetrachloroethene
GC/MS	EPA 8260B/8260C	Toluene
GC/MS	EPA 8260B/8260C	trans-1,2-Dichloroethene
GC/MS	EPA 8260B/8260C	trans-1,3-Dichloropropene
GC/MS	EPA 8260B/8260C	Trichloroethene
GC/MS	EPA 8260B/8260C	Trichlorofluoromethane
GC/MS	EPA 8260B/8260C	Vinyl Acetate
GC/MS	EPA 8260B/8260C	Vinyl Chloride

Non-Potable Water

Technology	Method	Analyte
GC/MS	EPA 8260B/8260C	Xylenes, Total
GC/MS	EPA 8260B/AK101MS	Gasoline (GRO)
GC/MS	EPA 8270C/8270D	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C/8270D	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C/8270D	1,2-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1,2-Diphenylhydrazine (as Azobenzene)
GC/MS	EPA 8270C/8270D	1,3-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1,3-Dinitrobenzene
GC/MS	EPA 8270C/8270D	1,4-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1-Methylnaphthalene
GC/MS	EPA 8270C/8270D	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C/8270D	2,4,5-Trichlorophenol
GC/MS	EPA 8270C/8270D	2,4,6-Trichlorophenol
GC/MS	EPA 8270C/8270D	2,4-Dichlorophenol
GC/MS	EPA 8270C/8270D	2,4-Dimethylphenol
GC/MS	EPA 8270C/8270D	2,4-Dinitrophenol
GC/MS	EPA 8270C/8270D	2,4-Dinitrotoluene
GC/MS	EPA 8270C/8270D	2,6-Dichlorophenol
GC/MS	EPA 8270C/8270D	2,6-Dinitrotoluene
GC/MS	EPA 8270C/8270D	2-Chloronaphthalene
GC/MS	EPA 8270C/8270D	2-Chlorophenol
GC/MS	EPA 8270C/8270D	2-Methylnaphthalene
GC/MS	EPA 8270C/8270D	2-Methylphenol
GC/MS	EPA 8270C/8270D	2-Nitroaniline
GC/MS	EPA 8270C/8270D	2-Nitrophenol
GC/MS	EPA 8270C/8270D	3&4-Methylphenol
GC/MS	EPA 8270C/8270D	3,3'-Dichlorobenzidine
GC/MS	EPA 8270C/8270D	3-Nitroaniline
GC/MS	EPA 8270C/8270D	4,6-Dinitro-2-methylphenol
GC/MS	EPA 8270C/8270D	4-Bromophenyl phenyl ether
GC/MS	EPA 8270C/8270D	4-Chloro-3-methylphenol
GC/MS	EPA 8270C/8270D	4-Chloroaniline
GC/MS	EPA 8270C/8270D	4-Chlorophenyl phenyl ether
GC/MS	EPA 8270C/8270D	4-Nitroaniline
GC/MS	EPA 8270C/8270D	4-Nitrophenol

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C/8270D	Acenaphthene
GC/MS	EPA 8270C/8270D	Acenaphthylene
GC/MS	EPA 8270C/8270D	Aniline
GC/MS	EPA 8270C/8270D	Anthracene
GC/MS	EPA 8270C/8270D	Benzo(a)anthracene
GC/MS	EPA 8270C/8270D	Benzo(a)pyrene
GC/MS	EPA 8270C/8270D	Benzo(b)fluoranthene
GC/MS	EPA 8270C/8270D	Benzo(g,h,i)perylene
GC/MS	EPA 8270C/8270D	Benzo(k)fluoranthene
GC/MS	EPA 8270C/8270D	Benzoic Acid
GC/MS	EPA 8270C/8270D	Benzyl Alcohol
GC/MS	EPA 8270C/8270D	Benzyl butyl Phthalate
GC/MS	EPA 8270C/8270D	Biphenyl
GC/MS	EPA 8270C/8270D	Bis(2-chloroethoxy) Methane
GC/MS	EPA 8270C/8270D	Bis(2-chloroethyl) Ether
GC/MS	EPA 8270C/8270D	Bis(2-chloroisopropyl) Ether
GC/MS	EPA 8270C/8270D	Carbazole
GC/MS	EPA 8270C/8270D	Chrysene
GC/MS	EPA 8270C/8270D	Bis (2-ethylhexyl) Phthalate
GC/MS	EPA 8270C/8270D	Dibenz(a,h)anthracene
GC/MS	EPA 8270C/8270D	Dibenzofuran
GC/MS	EPA 8270C/8270D	Diethyl Phthalate
GC/MS	EPA 8270C/8270D	Dimethyl Phthalate
GC/MS	EPA 8270C/8270D	Di-n-butyl Phthalate
GC/MS	EPA 8270C/8270D	Di-n-octyl Phthalate
GC/MS	EPA 8270C/8270D	Fluoranthene
GC/MS	EPA 8270C/8270D	Fluorene
GC/MS	EPA 8270C/8270D	Hexachlorobenzene
GC/MS	EPA 8270C/8270D	Hexachlorobutadiene
GC/MS	EPA 8270C/8270D	Hexachlorocyclopentadiene
GC/MS	EPA 8270C/8270D	Hexachloroethane
GC/MS	EPA 8270C/8270D	Indeno(1,2,3-c,d) Pyrene
GC/MS	EPA 8270C/8270D	Isophorone
GC/MS	EPA 8270C/8270D	Naphthalene
GC/MS	EPA 8270C/8270D	Nitrobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C/8270D	n-Nitrosodimethylamine
GC/MS	EPA 8270C/8270D	n-Nitrosodi-n-propylamine
GC/MS	EPA 8270C/8270D	n-Nitrosodiphenylamine
GC/MS	EPA 8270C/8270D	Pentachlorophenol
GC/MS	EPA 8270C/8270D	Phenanthrene
GC/MS	EPA 8270C/8270D	Phenol
GC/MS	EPA 8270C/8270D	Pyrene
GC/MS	EPA 8270C/8270D	Pyridine
GC/MS SIM	EPA 8260C-SIM	1,1,2-Trichloroethane
GC/MS SIM	EPA 8260C-SIM	1,1,2,2-Tetrachloroethane
GC/MS SIM	EPA 8260C-SIM	1,2,3-Trichloropropane
GC/MS SIM	EPA 8260C-SIM	1,2-Dibromoethane
GC/MS SIM	EPA 8260C-SIM	1,2-Dichloroethane
GC/MS SIM	EPA 8260C-SIM	1,3-Butadiene
GC/MS SIM	EPA 8260C-SIM	1,4-Dichlorobenzene
GC/MS SIM	EPA 8260C-SIM	Benzene
GC/MS SIM	EPA 8260C-SIM	Bromodichloromethane
GC/MS SIM	EPA 8260C-SIM	Bromoform
GC/MS SIM	EPA 8260C-SIM	Bromomethane
GC/MS SIM	EPA 8260C-SIM	Chloroform
GC/MS SIM	EPA 8260C-SIM	Dibromochloromethane
GC/MS SIM	EPA 8260C-SIM	Hexachlorobutadiene
GC/MS SIM	EPA 8260C-SIM	Naphthalene
GC/MS SIM	EPA 8260C-SIM	Tetrachloroethene
GC/MS SIM	EPA 8260C-SIM	Trichloroethene
GC/MS SIM	EPA 8260C-SIM	Vinyl Chloride
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	1-Methylnaphthalene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	2-Methylnaphthalene
GC/MS SIM	EPA 8270D-SIM	3,3'-Dichlorobenzidine
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Acenaphthene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Acenaphthylene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Anthracene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(a)anthracene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(a)pyrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(b)fluoranthene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(g,h,i)perylene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(k)fluoranthene
GC/MS SIM	EPA 8270D-SIM	Bis(2-chloroethyl) Ether
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Chrysene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Dibenz(a,h)anthracene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Fluoranthene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Fluorene
GC/MS SIM	EPA 8270D-SIM	Hexachlorobenzene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Indeno(1,2,3-c,d) Pyrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Naphthalene
GC/MS SIM	EPA 8270D-SIM	n-Nitrosodimethylamine
GC/MS SIM	EPA 8270D-SIM	n-Nitrosodi-n-propylamine
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Phenanthrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Pyrene
GC/MS SIM	EPA 8270C-SIM Modified WS-MS-0011	1,4-Dioxane
GC-IT/MS	EPA 521 Modified WS-MS-0012	N-Nitrosodimethyl amine (NDMA)
GC-FID	EPA 8015B/8015C/8015D AK102	Diesel Range Organics (DRO)
GC-FID	AK103	Residual Range Organics
GC-FID	EPA 8015B/8015C/8015D	Motor Oil Range Organics (MRO)
GC-ECD	EPA 8081A/8081B	Aldrin

Non-Potable Water		
Technology	**Method**	**Analyte**
GC-ECD	EPA 8081A/8081B	a-BHC
GC-ECD	EPA 8081A/8081B	b-BHC
GC-ECD	EPA 8081A/8081B	d-BHC
GC-ECD	EPA 8081A/8081B	g-BHC (Lindane)
GC-ECD	EPA 8081A/8081B	a-Chlordane
GC-ECD	EPA 8081A/8081B	g-Chlordane
GC-ECD	EPA 8081A/8081B	4,4'-DDD
GC-ECD	EPA 8081A/8081B	4,4'-DDE
GC-ECD	EPA 8081A/8081B	4,4'-DDT
GC-ECD	EPA 8081A/8081B	Dieldrin
GC-ECD	EPA 8081A/8081B	Endosulfan I
GC-ECD	EPA 8081A/8081B	Endosulfan II
GC-ECD	EPA 8081A/8081B	Endosulfan sulfate
GC-ECD	EPA 8081A/8081B	Endrin
GC-ECD	EPA 8081A/8081B	Endrin Aldehyde
GC-ECD	EPA 8081A/8081B	Endrin Ketone
GC-ECD	EPA 8081A/8081B	Heptachlor
GC-ECD	EPA 8081A/8081B	Heptachlor Epoxide
GC-ECD	EPA 8081A/8081B	Methoxychlor
GC-ECD	EPA 8081A/8081B	Toxaphene
GC-ECD	EPA 8081A/8081B	Chlordane (technical)
GC-ECD	EPA 8082/8082A	PCB-1016
GC-ECD	EPA 8082/8082A	PCB-1221
GC-ECD	EPA 8082/8082A	PCB-1232
GC-ECD	EPA 8082/8082A	PCB-1242
GC-ECD	EPA 8082/8082A	PCB-1248
GC-ECD	EPA 8082/8082A	PCB-1254
GC-ECD	EPA 8082/8082A	PCB-1260
GC-ECD	EPA 8082/8082A	PCB-1262
GC-ECD	EPA 8082/8082A	PCB-1268
GC/MS	EPA 8280A/8280B	2,3,7,8-TeCDD
GC/MS	EPA 8280A/8280B	1,2,3,7,8-PeCDD
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8-HxCDD
GC/MS	EPA 8280A/8280B	1,2,3,6,7,8-HxCDD
GC/MS	EPA 8280A/8280B	1,2,3,7,8,9-HxCDD

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8280A/8280B	1,2,3,4,6,7,8-HpCDD
GC/MS	EPA 8280A/8280B	OCDD
GC/MS	EPA 8280A/8280B	2,3,7,8-TeCDF
GC/MS	EPA 8280A/8280B	1,2,3,7,8-PeCDF
GC/MS	EPA 8280A/8280B	2,3,4,7,8-PeCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,6,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,7,8,9-HxCDF
GC/MS	EPA 8280A/8280B	2,3,4,6,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,6,7,8-HpCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8,9-HpCDF
GC/MS	EPA 8280A/8280B	OCDF
GC/MS	EPA 8280A/8280B	Total TCDD
GC/MS	EPA 8280A/8280B	Total PeCDD
GC/MS	EPA 8280A/8280B	Total HxCDD
GC/MS	EPA 8280A/8280B	Total HeptaCDD
GC/MS	EPA 8280A/8280B	Total TCDF
GC/MS	EPA 8280A/8280B	Total PeCDF
GC/MS	EPA 8280A/8280B	Total HxCDF
GC/MS	EPA 8280A/8280B	Total HpCDF
GC/HRMS	EPA 8290/8290A/1613B	2,3,7,8-TeCDD
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,7,8-PeCDD
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,4,7,8-HxCDD
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,6,7,8-HxCDD
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,7,8,9-HxCDD
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,4,6,7,8-HpCDD
GC/HRMS	EPA 8290/8290A/1613B	OCDD
GC/HRMS	EPA 8290/8290A/1613B	2,3,7,8-TeCDF
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,7,8-PeCDF
GC/HRMS	EPA 8290/8290A/1613B	2,3,4,7,8-PeCDF
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,4,7,8-HxCDF
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,6,7,8-HxCDF
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,7,8,9-HxCDF
GC/HRMS	EPA 8290/8290A/1613B	2,3,4,6,7,8-HxCDF
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,4,6,7,8-HpCDF

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 8290/8290A/1613B	1,2,3,4,7,8,9-HpCDF
GC/HRMS	EPA 8290/8290A/1613B	OCDF
GC/HRMS	EPA 8290/8290A/1613B	Total TCDD
GC/HRMS	EPA 8290/8290A/1613B	Total PeCDD
GC/HRMS	EPA 8290/8290A/1613B	Total HxCDD
GC/HRMS	EPA 8290/8290A/1613B	Total HpCDD
GC/HRMS	EPA 8290/8290A/1613B	Total TCDF
GC/HRMS	EPA 8290/8290A/1613B	Total PeCDF
GC/HRMS	EPA 8290/8290A/1613B	Total HxCDF
GC/HRMS	EPA 8290/8290A/1613B	Total HpCDF
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctanoic acid (PFOA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutyric acid (PFBA)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentanoic acid (PFPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononanoic acid (PFNA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecanoic acid (PFDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutane Sulfonic Acid (PFBS)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	10:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorododecane sulfonic acid) (10:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexadecanoic acid (PFHxDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanesulfonic acid (PFDoS
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctadecanoic acid (PFODA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-ethylcyclohexanesulfonic acid (PFecHS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-1-propanesulfonic acid (PFPrS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4,4,5,5,6,6,6-Heptafluorohexanoic acid (3:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorohexylethanoic acid (6:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorooctylethanoic acid (8:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorodecylethanoic acid (10:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropropionic acid (PPF Acid, PFPrA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-methoxybutanoic acid (PFMBA)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Difluoro(perfluoromethoxy)acetic acid (PFMOAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-isopropoxybutanoic acid (PFECA G, PFPE-1)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7,9-butaoxadecanoic acid (PFO4DA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7-trioxaoctanoic acid (PFO3OA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5-dioxahexanoic acid (PFO2HXA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-{[perfluoro-3-(perfluoroethoxy)-2-propanyl]oxy}ethanesulfonic acid (Hydro-PS Acid)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid (PFO5DoA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-(perfluoromethoxy)propanoic acid (PMPA)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoic acid (PEPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid (R-EVE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	1,1,2,2-Tetrafluoro-2-(1,2,2,2-tetrafluoroethoxy)ethane-1-sulfonic acid (NVHOS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2,2,3,3-Tetrafluoro-3-{[1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl]oxy}propanoic acid (Hydro-EVE Acid)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy]ethanesulfonic acid (R-PSDCA)
LC/MS/MS	Draft EPA Method 1633	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	Draft EPA Method 1633	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	Draft EPA Method 1633	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	Draft EPA Method 1633	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctanoic acid (PFOA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutyric acid (PFBA)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentanoic acid (PFPA)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	Draft EPA Method 1633	Perfluorononanoic acid (PFNA)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecanoic acid (PFDA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroundecanoic acid (PFUDA)

Non-Potable Water		
Technology	**Method**	**Analyte**
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	Draft EPA Method 1633	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	Draft EPA Method 1633	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	Draft EPA Method 1633	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	Draft EPA Method 1633	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	Draft EPA Method 1633	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanesulfonic acid (PFDoS
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	Draft EPA Method 1633	4,4,5,5,6,6,6-Heptafluorohexanoic acid (3:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-4-methoxybutanoic acid (PFMBA)
LC/MS/MS	Draft EPA Method 1633	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 1
GC/HRMS	EPA 1668A/1668C	PCB 2
GC/HRMS	EPA 1668A/1668C	PCB 3
GC/HRMS	EPA 1668A/1668C	PCB 4
GC/HRMS	EPA 1668A/1668C	PCB 5
GC/HRMS	EPA 1668A/1668C	PCB 6
GC/HRMS	EPA 1668A/1668C	PCB 7
GC/HRMS	EPA 1668A/1668C	PCB 8
GC/HRMS	EPA 1668A/1668C	PCB 9
GC/HRMS	EPA 1668A/1668C	PCB 10
GC/HRMS	EPA 1668A/1668C	PCB 11
GC/HRMS	EPA 1668A/1668C	PCB 12
GC/HRMS	EPA 1668A/1668C	PCB 13
GC/HRMS	EPA 1668A/1668C	PCB 14
GC/HRMS	EPA 1668A/1668C	PCB 15
GC/HRMS	EPA 1668A/1668C	PCB 16
GC/HRMS	EPA 1668A/1668C	PCB 17
GC/HRMS	EPA 1668A/1668C	PCB 18
GC/HRMS	EPA 1668A/1668C	PCB 19
GC/HRMS	EPA 1668A/1668C	PCB 20
GC/HRMS	EPA 1668A/1668C	PCB 21
GC/HRMS	EPA 1668A/1668C	PCB 22
GC/HRMS	EPA 1668A/1668C	PCB 23
GC/HRMS	EPA 1668A/1668C	PCB 24
GC/HRMS	EPA 1668A/1668C	PCB 25
GC/HRMS	EPA 1668A/1668C	PCB 26
GC/HRMS	EPA 1668A/1668C	PCB 27
GC/HRMS	EPA 1668A/1668C	PCB 28
GC/HRMS	EPA 1668A/1668C	PCB 29
GC/HRMS	EPA 1668A/1668C	PCB 30
GC/HRMS	EPA 1668A/1668C	PCB 32
GC/HRMS	EPA 1668A/1668C	PCB 31
GC/HRMS	EPA 1668A/1668C	PCB 33
GC/HRMS	EPA 1668A/1668C	PCB 34
GC/HRMS	EPA 1668A/1668C	PCB 35

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 36
GC/HRMS	EPA 1668A/1668C	PCB 37
GC/HRMS	EPA 1668A/1668C	PCB 38
GC/HRMS	EPA 1668A/1668C	PCB 39
GC/HRMS	EPA 1668A/1668C	PCB 40
GC/HRMS	EPA 1668A/1668C	PCB 41
GC/HRMS	EPA 1668A/1668C	PCB 42
GC/HRMS	EPA 1668A/1668C	PCB 43
GC/HRMS	EPA 1668A/1668C	PCB 44
GC/HRMS	EPA 1668A/1668C	PCB 45
GC/HRMS	EPA 1668A/1668C	PCB 46
GC/HRMS	EPA 1668A/1668C	PCB 47
GC/HRMS	EPA 1668A/1668C	PCB 48
GC/HRMS	EPA 1668A/1668C	PCB 49
GC/HRMS	EPA 1668A/1668C	PCB 50
GC/HRMS	EPA 1668A/1668C	PCB 51
GC/HRMS	EPA 1668A/1668C	PCB 52
GC/HRMS	EPA 1668A/1668C	PCB 53
GC/HRMS	EPA 1668A/1668C	PCB 54
GC/HRMS	EPA 1668A/1668C	PCB 55
GC/HRMS	EPA 1668A/1668C	PCB 56
GC/HRMS	EPA 1668A/1668C	PCB 57
GC/HRMS	EPA 1668A/1668C	PCB 58
GC/HRMS	EPA 1668A/1668C	PCB 59
GC/HRMS	EPA 1668A/1668C	PCB 60
GC/HRMS	EPA 1668A/1668C	PCB 61
GC/HRMS	EPA 1668A/1668C	PCB 62
GC/HRMS	EPA 1668A/1668C	PCB 63
GC/HRMS	EPA 1668A/1668C	PCB 64
GC/HRMS	EPA 1668A/1668C	PCB 65
GC/HRMS	EPA 1668A/1668C	PCB 66
GC/HRMS	EPA 1668A/1668C	PCB 67
GC/HRMS	EPA 1668A/1668C	PCB 68
GC/HRMS	EPA 1668A/1668C	PCB 69
GC/HRMS	EPA 1668A/1668C	PCB 70

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 71
GC/HRMS	EPA 1668A/1668C	PCB 72
GC/HRMS	EPA 1668A/1668C	PCB 73
GC/HRMS	EPA 1668A/1668C	PCB 74
GC/HRMS	EPA 1668A/1668C	PCB 75
GC/HRMS	EPA 1668A/1668C	PCB 76
GC/HRMS	EPA 1668A/1668C	PCB 77
GC/HRMS	EPA 1668A/1668C	PCB 78
GC/HRMS	EPA 1668A/1668C	PCB 79
GC/HRMS	EPA 1668A/1668C	PCB 80
GC/HRMS	EPA 1668A/1668C	PCB 81
GC/HRMS	EPA 1668A/1668C	PCB 82
GC/HRMS	EPA 1668A/1668C	PCB 83
GC/HRMS	EPA 1668A/1668C	PCB 84
GC/HRMS	EPA 1668A/1668C	PCB 85
GC/HRMS	EPA 1668A/1668C	PCB 86
GC/HRMS	EPA 1668A/1668C	PCB 87
GC/HRMS	EPA 1668A/1668C	PCB 88
GC/HRMS	EPA 1668A/1668C	PCB 89
GC/HRMS	EPA 1668A/1668C	PCB 90
GC/HRMS	EPA 1668A/1668C	PCB 91
GC/HRMS	EPA 1668A/1668C	PCB 92
GC/HRMS	EPA 1668A/1668C	PCB 93
GC/HRMS	EPA 1668A/1668C	PCB 94
GC/HRMS	EPA 1668A/1668C	PCB 95
GC/HRMS	EPA 1668A/1668C	PCB 96
GC/HRMS	EPA 1668A/1668C	PCB 97
GC/HRMS	EPA 1668A/1668C	PCB 98
GC/HRMS	EPA 1668A/1668C	PCB 99
GC/HRMS	EPA 1668A/1668C	PCB 100
GC/HRMS	EPA 1668A/1668C	PCB 101
GC/HRMS	EPA 1668A/1668C	PCB 102
GC/HRMS	EPA 1668A/1668C	PCB 103
GC/HRMS	EPA 1668A/1668C	PCB 104
GC/HRMS	EPA 1668A/1668C	PCB 105

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 106
GC/HRMS	EPA 1668A/1668C	PCB 107
GC/HRMS	EPA 1668A/1668C	PCB 108
GC/HRMS	EPA 1668A/1668C	PCB 109
GC/HRMS	EPA 1668A/1668C	PCB 110
GC/HRMS	EPA 1668A/1668C	PCB 111
GC/HRMS	EPA 1668A/1668C	PCB 112
GC/HRMS	EPA 1668A/1668C	PCB 113
GC/HRMS	EPA 1668A/1668C	PCB 114
GC/HRMS	EPA 1668A/1668C	PCB 115
GC/HRMS	EPA 1668A/1668C	PCB 116
GC/HRMS	EPA 1668A/1668C	PCB 117
GC/HRMS	EPA 1668A/1668C	PCB 118
GC/HRMS	EPA 1668A/1668C	PCB 119
GC/HRMS	EPA 1668A/1668C	PCB 120
GC/HRMS	EPA 1668A/1668C	PCB 121
GC/HRMS	EPA 1668A/1668C	PCB 122
GC/HRMS	EPA 1668A/1668C	PCB 123
GC/HRMS	EPA 1668A/1668C	PCB 124
GC/HRMS	EPA 1668A/1668C	PCB 125
GC/HRMS	EPA 1668A/1668C	PCB 126
GC/HRMS	EPA 1668A/1668C	PCB 127
GC/HRMS	EPA 1668A/1668C	PCB 128
GC/HRMS	EPA 1668A/1668C	PCB 129
GC/HRMS	EPA 1668A/1668C	PCB 130
GC/HRMS	EPA 1668A/1668C	PCB 131
GC/HRMS	EPA 1668A/1668C	PCB 132
GC/HRMS	EPA 1668A/1668C	PCB 133
GC/HRMS	EPA 1668A/1668C	PCB 134
GC/HRMS	EPA 1668A/1668C	PCB 135
GC/HRMS	EPA 1668A/1668C	PCB 136
GC/HRMS	EPA 1668A/1668C	PCB 137
GC/HRMS	EPA 1668A/1668C	PCB 138
GC/HRMS	EPA 1668A/1668C	PCB 139
GC/HRMS	EPA 1668A/1668C	PCB 140

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Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 141
GC/HRMS	EPA 1668A/1668C	PCB 142
GC/HRMS	EPA 1668A/1668C	PCB 143
GC/HRMS	EPA 1668A/1668C	PCB 144
GC/HRMS	EPA 1668A/1668C	PCB 145
GC/HRMS	EPA 1668A/1668C	PCB 146
GC/HRMS	EPA 1668A/1668C	PCB 147
GC/HRMS	EPA 1668A/1668C	PCB 148
GC/HRMS	EPA 1668A/1668C	PCB 149
GC/HRMS	EPA 1668A/1668C	PCB 150
GC/HRMS	EPA 1668A/1668C	PCB 151
GC/HRMS	EPA 1668A/1668C	PCB 152
GC/HRMS	EPA 1668A/1668C	PCB 153
GC/HRMS	EPA 1668A/1668C	PCB 154
GC/HRMS	EPA 1668A/1668C	PCB 155
GC/HRMS	EPA 1668A/1668C	PCB 156
GC/HRMS	EPA 1668A/1668C	PCB 157
GC/HRMS	EPA 1668A/1668C	PCB 158
GC/HRMS	EPA 1668A/1668C	PCB 159
GC/HRMS	EPA 1668A/1668C	PCB 160
GC/HRMS	EPA 1668A/1668C	PCB 161
GC/HRMS	EPA 1668A/1668C	PCB 162
GC/HRMS	EPA 1668A/1668C	PCB 163
GC/HRMS	EPA 1668A/1668C	PCB 164
GC/HRMS	EPA 1668A/1668C	PCB 165
GC/HRMS	EPA 1668A/1668C	PCB 166
GC/HRMS	EPA 1668A/1668C	PCB 167
GC/HRMS	EPA 1668A/1668C	PCB 168
GC/HRMS	EPA 1668A/1668C	PCB 169
GC/HRMS	EPA 1668A/1668C	PCB 170
GC/HRMS	EPA 1668A/1668C	PCB 171
GC/HRMS	EPA 1668A/1668C	PCB 172
GC/HRMS	EPA 1668A/1668C	PCB 173
GC/HRMS	EPA 1668A/1668C	PCB 174
GC/HRMS	EPA 1668A/1668C	PCB 175

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 176
GC/HRMS	EPA 1668A/1668C	PCB 177
GC/HRMS	EPA 1668A/1668C	PCB 178
GC/HRMS	EPA 1668A/1668C	PCB 179
GC/HRMS	EPA 1668A/1668C	PCB 180
GC/HRMS	EPA 1668A/1668C	PCB 181
GC/HRMS	EPA 1668A/1668C	PCB 182
GC/HRMS	EPA 1668A/1668C	PCB 183
GC/HRMS	EPA 1668A/1668C	PCB 184
GC/HRMS	EPA 1668A/1668C	PCB 185
GC/HRMS	EPA 1668A/1668C	PCB 186
GC/HRMS	EPA 1668A/1668C	PCB 187
GC/HRMS	EPA 1668A/1668C	PCB 188
GC/HRMS	EPA 1668A/1668C	PCB 189
GC/HRMS	EPA 1668A/1668C	PCB 190
GC/HRMS	EPA 1668A/1668C	PCB 191
GC/HRMS	EPA 1668A/1668C	PCB 192
GC/HRMS	EPA 1668A/1668C	PCB 193
GC/HRMS	EPA 1668A/1668C	PCB 194
GC/HRMS	EPA 1668A/1668C	PCB 195
GC/HRMS	EPA 1668A/1668C	PCB 196
GC/HRMS	EPA 1668A/1668C	PCB 197
GC/HRMS	EPA 1668A/1668C	PCB 198
GC/HRMS	EPA 1668A/1668C	PCB 199
GC/HRMS	EPA 1668A/1668C	PCB 200
GC/HRMS	EPA 1668A/1668C	PCB 201
GC/HRMS	EPA 1668A/1668C	PCB 202
GC/HRMS	EPA 1668A/1668C	PCB 203
GC/HRMS	EPA 1668A/1668C	PCB 204
GC/HRMS	EPA 1668A/1668C	PCB 205
GC/HRMS	EPA 1668A/1668C	PCB 206
GC/HRMS	EPA 1668A/1668C	PCB 207
GC/HRMS	EPA 1668A/1668C	PCB 208
GC/HRMS	EPA 1668A/1668C	PCB 209

Non-Potable Water		
Technology	**Method**	**Analyte**
Preparation	**Method**	**Type**
Acid Digestion (Aqueous)	EPA 3005A/3010A	Inorganics
Separatory Funnel Liquid-Liquid Extraction	EPA 3510C	Semivolatile and Non-Volatile Organics
Solid Phase Extraction	EPA 3535A	Semivolatile and Non-Volatile Organics
Purge and Trap	EPA 5030B/5030C	Volatile Organic Compounds
Florisil Cleanup	EPA 3620B/3620C	Cleanup of pesticide residues and other chlorinated hydrocarbons
Sulfur Cleanup	EPA 3660A	Sulfur Cleanup
Sulfuric Acid Cleanup	EPA 3665A	Sulfuric Acid Cleanup for PCBs
Silica Gel Cleanup	EPA 3630C	Column Cleanup

Drinking Water		
Technology	**Method**	**Analyte**
LC/MS/MS	EPA 537	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	EPA 537	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	EPA 537	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	EPA 537	Perfluorononanoic acid (PFNA)
LC/MS/MS	EPA 537	Perfluorooctanoic acid (PFOA)
LC/MS/MS	EPA 537	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	EPA 537	Perfluorodecanoic acid (PFDA)
LC/MS/MS	EPA 537	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	EPA 537	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	EPA 537	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	EPA 537	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	EPA 537	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	EPA 537	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	EPA 537	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	EPA 537.1	Perfluorodecanoic acid (PFDA)
LC/MS/MS	EPA 537.1	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	EPA 537.1	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	EPA 537.1	Perfluorotetradecanoic acid (PDTeA)

Drinking Water		
Technology	**Method**	**Analyte**
LC/MS/MS	EPA 537.1	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	EPA 537.1	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	EPA 537.1	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	EPA 537.1	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	EPA 537.1	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	EPA 537.1	Perfluorooctanoic acid (PFOA)
LC/MS/MS	EPA 537.1	Perfluorononanoic acid (PFNA)
LC/MS/MS	EPA 537.1	Perfluorobutanesulfonic acid (PFBS)
LC/MS/MS	EPA 537.1	Perfluorohexanesulfonic acid (PFHxS)
LC/MS/MS	EPA 537.1	Perfluorooctanesulfonic acid (PFOS)
LC/MS/MS	EPA 537.1	Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)
LC/MS/MS	EPA 537.1	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	EPA 537.1	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	EPA 537.1	4,8-Dioxa-3H-perfluoronanoic Acid (ADONA)
LC/MS/MS	EPA 533	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	EPA 533	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	EPA 533	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	EPA 533	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	EPA 533	4,8-Dioxa-3H-perfluorononanoic acid (DONA)
LC/MS/MS	EPA 533	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	EPA 533	Perfluoro-2-propoxypropionic acid (HFPO-DA)
LC/MS/MS	EPA 533	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	EPA 533	Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)

Drinking Water		
Technology	**Method**	**Analyte**
LC/MS/MS	EPA 533	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	EPA 533	Perfluoro-4-methoxybutanoic acid (PFMBA)
LC/MS/MS	EPA 533	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	EPA 533	Perfluorobutanoic acid (PFBA)
LC/MS/MS	EPA 533	Perfluorodecanoic acid (PFDA)
LC/MS/MS	EPA 533	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	EPA 533	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	EPA 533	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	EPA 533	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	EPA 533	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	EPA 533	Perfluorononanoic acid (PFNA)
LC/MS/MS	EPA 533	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	EPA 533	Perfluorooctanoic acid (PFOA)
LC/MS/MS	EPA 533	Perfluoropentane Sulfonic acid (PFPeS)
LC/MS/MS	EPA 533	Perfluoropentanoic acid (PFPeA)
LC/MS/MS	EPA 533	Perfluoroundecanoic acid (PFUDA)
Preparation	**Method**	**Type**
Solid Phase Extraction	EPA 537/537.1/533	Perfluoro compounds in Drinking Water

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICP-AES	EPA 6010B/6010C	Aluminum
ICP-AES	EPA 6010B/6010C	Antimony
ICP-AES	EPA 6010B/6010C	Arsenic
ICP-AES	EPA 6010B/6010C	Barium
ICP-AES	EPA 6010B/6010C	Beryllium
ICP-AES	EPA 6010B/6010C	Boron
ICP-AES	EPA 6010B/6010C	Cadmium
ICP-AES	EPA 6010B/6010C	Calcium
ICP-AES	EPA 6010B/6010C	Chromium (Total)
ICP-AES	EPA 6010B/6010C	Cobalt
ICP-AES	EPA 6010B/6010C	Copper

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICP-AES	EPA 6010B/6010C	Iron
ICP-AES	EPA 6010B/6010C	Lead
ICP-AES	EPA 6010B/6010C	Magnesium
ICP-AES	EPA 6010B/6010C	Manganese
ICP-AES	EPA 6010B/6010C	Molybdenum
ICP-AES	EPA 6010B/6010C	Nickel
ICP-AES	EPA 6010B/6010C	Potassium
ICP-AES	EPA 6010B/6010C	Selenium
ICP-AES	EPA 6010B/6010C	Silver
ICP-AES	EPA 6010B/6010C	Sodium
ICP-AES	EPA 6010B/6010C	Thallium
ICP-AES	EPA 6010B/6010C	Tin
ICP-AES	EPA 6010B/6010C	Titanium
ICP-AES	EPA 6010B/6010C	Vanadium
ICP-AES	EPA 6010B/6010C	Zinc
ICP-MS	EPA 6020/6020A	Aluminum
ICP-MS	EPA 6020/6020A	Antimony
ICP-MS	EPA 6020/6020A	Arsenic
ICP-MS	EPA 6020/6020A	Barium
ICP-MS	EPA 6020/6020A	Beryllium
ICP-MS	EPA 6020/6020A	Cadmium
ICP-MS	EPA 6020/6020A	Calcium
ICP-MS	EPA 6020/6020A	Chromium (Total)
ICP-MS	EPA 6020/6020A	Cobalt
ICP-MS	EPA 6020/6020A	Copper
ICP-MS	EPA 6020/6020A	Iron
ICP-MS	EPA 6020/6020A	Lead
ICP-MS	EPA 6020/6020A	Magnesium
ICP-MS	EPA 6020/6020A	Manganese
ICP-MS	EPA 6020/6020A	Molybdenum
ICP-MS	EPA 6020/6020A	Nickel
ICP-MS	EPA 6020/6020A	Phosphorus
ICP-MS	EPA 6020/6020A	Potassium
ICP-MS	EPA 6020/6020A	Selenium
ICP-MS	EPA 6020/6020A	Silver

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICP-MS	EPA 6020/6020A	Sodium
ICP-MS	EPA 6020/6020A	Strontium
ICP-MS	EPA 6020/6020A	Thallium
ICP-MS	EPA 6020/6020A	Tin
ICP-MS	EPA 6020/6020A	Titanium
ICP-MS	EPA 6020/6020A	Uranium
ICP-MS	EPA 6020/6020A	Vanadium
ICP-MS	EPA 6020/6020A	Zinc
CVAAS	EPA 7470A/7471A/7471B	Mercury
Colorimetric/Hydrolysis	EPA 353.2 Modified WS-WC-0050	Nitrocellulose
LC/MS/MS	EPA 6850	Perchlorate
Probe	EPA 9045C/9045D	pH
Ion Chromatography	EPA 9056A/300.0	Bromide
Ion Chromatography	EPA 9056A/300.0	Chloride
Ion Chromatography	EPA 9056A/300.0	Fluoride
Ion Chromatography	EPA 9056A/300.0	Sulfate
Ion Chromatography	EPA 9056A/300.0	Nitrate
Ion Chromatography	EPA 9056A/300.0	Nitrite
Gravimetric	ASTM D2216	%Moisture
GC/MS	EPA 8260B/8260C	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B/8260C	1,1,1-Trichloroethane
GC/MS	EPA 8260B/8260C	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B/8260C	1,1,2-Trichloroethane
GC/MS	EPA 8260B/8260C	1,1,2-Trichloro-1,2,2-trifluoroethane
GC/MS	EPA 8260B/8260C	1,1-Dichloroethane
GC/MS	EPA 8260B/8260C	1,1-Dichloroethene
GC/MS	EPA 8260B/8260C	1,1-Dichloropropene
GC/MS	EPA 8260B/8260C	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B/8260C	1,2,3-Trichloropropane
GC/MS	EPA 8260B/8260C	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B/8260C	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B/8260C	1,2-Dibromo-3-chloropropane
GC/MS	EPA 8260B/8260C	1,2-Dibromoethane
GC/MS	EPA 8260B/8260C	1,2-Dichlorobenzene

Solid and Chemical Materials

Technology	Method	Analyte
GC/MS	EPA 8260B/8260C	1,2-Dichloroethane
GC/MS	EPA 8260B/8260C	1,2-Dichloropropane
GC/MS	EPA 8260B/8260C	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B/8260C	1,3-Dichlorobenzene
GC/MS	EPA 8260B/8260C	1,3-Dichloropropane
GC/MS	EPA 8260B/8260C	1,4-Dichlorobenzene
GC/MS	EPA 8260B/8260C	1-Chlorohexane
GC/MS	EPA 8260B/8260C	2,2-Dichloropropane
GC/MS	EPA 8260B/8260C	2-Butanone (MEK)
GC/MS	EPA 8260B/8260C	2-Chlorotoluene
GC/MS	EPA 8260B/8260C	2-Hexanone (MBK)
GC/MS	EPA 8260B/8260C	2-Methyl-2-propanol (tert- Butyl Alcohol, TBA)
GC/MS	EPA 8260B/8260C	4-Chlorotoluene
GC/MS	EPA 8260B/8260C	4-Isopropyltoluene
GC/MS	EPA 8260B/8260C	4-Methyl-2-pentanone (MIBK)
GC/MS	EPA 8260B/8260C	Acetone
GC/MS	EPA 8260B/8260C	Allyl Chloride
GC/MS	EPA 8260B/8260C	Benzene
GC/MS	EPA 8260B/8260C	Bromobenzene
GC/MS	EPA 8260B/8260C	Bromochloromethane
GC/MS	EPA 8260B/8260C	Bromodichloromethane
GC/MS	EPA 8260B/8260C	Bromoform
GC/MS	EPA 8260B/8260C	Bromomethane
GC/MS	EPA 8260B/8260C	Carbon Disulfide
GC/MS	EPA 8260B/8260C	Carbon Tetrachloride
GC/MS	EPA 8260B/8260C	Chlorobenzene
GC/MS	EPA 8260B/8260C	Chloroethane
GC/MS	EPA 8260B/8260C	Chloroform
GC/MS	EPA 8260B/8260C	Chloromethane
GC/MS	EPA 8260B/8260C	cis-1,2-Dichloroethene
GC/MS	EPA 8260B/8260C	cis-1,3-Dichloropropene
GC/MS	EPA 8260B/8260C	Cyclohexane
GC/MS	EPA 8260B/8260C	Dibromochloromethane
GC/MS	EPA 8260B/8260C	Dibromomethane
GC/MS	EPA 8260B/8260C	Dichlorodifluoromethane

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B/8260C	Diisopropyl Ether (DIPE)
GC/MS	EPA 8260B/8260C	Ethylbenzene
GC/MS	EPA 8260B/8260C	Ethylmethacrylate
GC/MS	EPA 8260B/8260C	Ethyl tert-butyl Ether (ETBE)
GC/MS	EPA 8260B/8260C	Hexachlorobutadiene
GC/MS	EPA 8260B/8260C	Hexane
GC/MS	EPA 8260B/8260C	Iodomethane
GC/MS	EPA 8260B/8260C	Isobutanol (2-Methyl-1-propanol)
GC/MS	EPA 8260B/8260C	Isopropylbenzene
GC/MS	EPA 8260B/8260C	m & p Xylene
GC/MS	EPA 8260B/8260C	Methyl tert-butyl Ether (MTBE)
GC/MS	EPA 8260B/8260C	Methylene Chloride
GC/MS	EPA 8260B/8260C	Naphthalene
GC/MS	EPA 8260B/8260C	n-Butylbenzene
GC/MS	EPA 8260B/8260C	n-Propylbenzene
GC/MS	EPA 8260B/8260C	o-Xylene
GC/MS	EPA 8260B/8260C	sec-Butylbenzene
GC/MS	EPA 8260B/8260C	Styrene
GC/MS	EPA 8260B/8260C	t-Amyl methyl Ether (TAME)
GC/MS	EPA 8260B/8260C	t-1,4-Dichloro-2-Butene
GC/MS	EPA 8260B/8260C	tert-Butylbenzene
GC/MS	EPA 8260B/8260C	Tetrachloroethene
GC/MS	EPA 8260B/8260C	Toluene
GC/MS	EPA 8260B/8260C	trans-1,2-Dichloroethene
GC/MS	EPA 8260B/8260C	trans-1,3-Dichloropropene
GC/MS	EPA 8260B/8260C	Trichloroethene
GC/MS	EPA 8260B/8260C	Trichlorofluoromethane
GC/MS	EPA 8260B/8260C	Vinyl Acetate
GC/MS	EPA 8260B/8260C	Vinyl Chloride
GC/MS	EPA 8260B/8260C	Xylenes, Total
GC/MS	EPA 8260B/AK101MS	Gasoline Range Organics (GRO)
GC/MS	EPA 8270C/8270D	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C/8270D	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C/8270D	1,2-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1,2-Diphenylhydrazine (as Azobenzene)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C/8270D	1,3-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1,3-Dinitrobenzene
GC/MS	EPA 8270C/8270D	1,4-Dichlorobenzene
GC/MS	EPA 8270C/8270D	1-Methylnaphthalene
GC/MS	EPA 8270C/8270D	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C/8270D	2,4,5-Trichlorophenol
GC/MS	EPA 8270C/8270D	2,4,6-Trichlorophenol
GC/MS	EPA 8270C/8270D	2,4-Dichlorophenol
GC/MS	EPA 8270C/8270D	2,4-Dimethylphenol
GC/MS	EPA 8270C/8270D	2,4-Dinitrophenol
GC/MS	EPA 8270C/8270D	2,4-Dinitrotoluene
GC/MS	EPA 8270C/8270D	2,6-Dichlorophenol
GC/MS	EPA 8270C/8270D	2,6-Dinitrotoluene
GC/MS	EPA 8270C/8270D	2-Chloronaphthalene
GC/MS	EPA 8270C/8270D	2-Chlorophenol
GC/MS	EPA 8270C/8270D	2-Methylnaphthalene
GC/MS	EPA 8270C/8270D	2-Methylphenol
GC/MS	EPA 8270C/8270D	2-Nitroaniline
GC/MS	EPA 8270C/8270D	2-Nitrophenol
GC/MS	EPA 8270C/8270D	3&4-Methylphenol
GC/MS	EPA 8270C/8270D	3,3'-Dichlorobenzidine
GC/MS	EPA 8270C/8270D	3-Nitroaniline
GC/MS	EPA 8270C/8270D	4,6-Dinitro-2-methylphenol
GC/MS	EPA 8270C/8270D	4-Bromophenyl phenyl ether
GC/MS	EPA 8270C/8270D	4-Chloro-3-methylphenol
GC/MS	EPA 8270C/8270D	4-Chloroaniline
GC/MS	EPA 8270C/8270D	4-Chlorophenyl phenyl ether
GC/MS	EPA 8270C/8270D	4-Nitroaniline
GC/MS	EPA 8270C/8270D	4-Nitrophenol
GC/MS	EPA 8270C/8270D	Acenaphthene
GC/MS	EPA 8270C/8270D	Acenaphthylene
GC/MS	EPA 8270C/8270D	Aniline
GC/MS	EPA 8270C/8270D	Anthracene
GC/MS	EPA 8270C/8270D	Benzo(a)anthracene
GC/MS	EPA 8270C/8270D	Benzo(a)pyrene

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C/8270D	Benzo(b)fluoranthene
GC/MS	EPA 8270C/8270D	Benzo(g,h,i)perylene
GC/MS	EPA 8270C/8270D	Benzo(k)fluoranthene
GC/MS	EPA 8270C/8270D	Benzoic Acid
GC/MS	EPA 8270C/8270D	Benzyl Alcohol
GC/MS	EPA 8270C/8270D	Benzyl butyl Phthalate
GC/MS	EPA 8270C/8270D	Biphenyl
GC/MS	EPA 8270C/8270D	Bis(2-chloroethoxy) Methane
GC/MS	EPA 8270C/8270D	Bis(2-chloroethyl) Ether
GC/MS	EPA 8270C/8270D	Bis(2-chloroisopropyl) Ether
GC/MS	EPA 8270C/8270D	Carbazole
GC/MS	EPA 8270C/8270D	Chrysene
GC/MS	EPA 8270C/8270D	Bis (2-ethylhexyl) Phthalate
GC/MS	EPA 8270C/8270D	Dibenz(a,h)anthracene
GC/MS	EPA 8270C/8270D	Dibenzofuran
GC/MS	EPA 8270C/8270D	Diethyl Phthalate
GC/MS	EPA 8270C/8270D	Dimethyl Phthalate
GC/MS	EPA 8270C/8270D	Di-n-butyl Phthalate
GC/MS	EPA 8270C/8270D	Di-n-octyl Phthalate
GC/MS	EPA 8270C/8270D	Fluoranthene
GC/MS	EPA 8270C/8270D	Fluorene
GC/MS	EPA 8270C/8270D	Hexachlorobenzene
GC/MS	EPA 8270C/8270D	Hexachlorobutadiene
GC/MS	EPA 8270C/8270D	Hexachlorocyclopentadiene
GC/MS	EPA 8270C/8270D	Hexachloroethane
GC/MS	EPA 8270C/8270D	Indeno(1,2,3-c,d) Pyrene
GC/MS	EPA 8270C/8270D	Isophorone
GC/MS	EPA 8270C/8270D	Naphthalene
GC/MS	EPA 8270C/8270D	Nitrobenzene
GC/MS	EPA 8270C/8270D	n-Nitrosodimethylamine
GC/MS	EPA 8270C/8270D	n-Nitrosodi-n-propylamine
GC/MS	EPA 8270C/8270D	n-Nitrosodiphenylamine
GC/MS	EPA 8270C/8270D	Pentachlorophenol
GC/MS	EPA 8270C/8270D	Phenanthrene
GC/MS	EPA 8270C/8270D	Phenol

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C/8270D	Pyrene
GC/MS	EPA 8270C/8270D	Pyridine
GC/MS SIM	EPA 8260C-SIM	1,1,2-Trichloroethane
GC/MS SIM	EPA 8260C-SIM	1,1,2,2-Tetrachloroethane
GC/MS SIM	EPA 8260C-SIM	1,2,3-Trichloropropane
GC/MS SIM	EPA 8260C-SIM	1,2-Dibromoethane
GC/MS SIM	EPA 8260C-SIM	1,2-Dichloroethane
GC/MS SIM	EPA 8260C-SIM	1,3-Butadiene
GC/MS SIM	EPA 8260C-SIM	1,4-Dichlorobenzene
GC/MS SIM	EPA 8260C-SIM	Benzene
GC/MS SIM	EPA 8260C-SIM	Bromodichloromethane
GC/MS SIM	EPA 8260C-SIM	Bromoform
GC/MS SIM	EPA 8260C-SIM	Bromomethane
GC/MS SIM	EPA 8260C-SIM	Chloroform
GC/MS SIM	EPA 8260C-SIM	Dibromochloromethane
GC/MS SIM	EPA 8260C-SIM	Dibromomethane
GC/MS SIM	EPA 8260C-SIM	Hexachlorobutadiene
GC/MS SIM	EPA 8260C-SIM	Naphthalene
GC/MS SIM	EPA 8260C-SIM	Tetrachloroethene
GC/MS SIM	EPA 8260C-SIM	Trichloroethene
GC/MS SIM	EPA 8260C-SIM	Vinyl Chloride
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	1-Methylnaphthalene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	2-Methylnaphthalene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Acenaphthene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Acenaphthylene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Anthracene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(a)anthracene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(a)pyrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(b)fluoranthene

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(g,h,i)perylene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Benzo(k)fluoranthene
GC/MS SIM	EPA 8270D-SIM	Bis(2-chloroethyl) Ether
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Chrysene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Dibenz(a,h)anthracene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Fluoranthene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Fluorene
GC/MS SIM	EPA 8270D-SIM	Hexachlorobenzene
GC/MS SIM	EPA 8270D-SIM	Hexachlorocyclopentadiene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Indeno(1,2,3-c,d) Pyrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Naphthalene
GC/MS SIM	EPA 8270D-SIM	n-Nitrosodi-n-propylamine
GC/MS SIM	EPA 8270D-SIM	Pentachlorophenol
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Phenanthrene
GC/MS SIM	EPA 8270C-SIM EPA 8270D-SIM	Pyrene
GC-FID	EPA 8015B/8015C/8015D AK102	Diesel Range Organics (DRO)
GC-FID	AK103	Residual Range Organics
GC-FID	EPA 8015B/8015C/8015D	Motor Oil Range Organics (MRO)
GC-ECD	EPA 8081A/8081B	Aldrin
GC-ECD	EPA 8081A/8081B	a-BHC
GC-ECD	EPA 8081A/8081B	b-BHC
GC-ECD	EPA 8081A/8081B	d-BHC
GC-ECD	EPA 8081A/8081B	g-BHC (Lindane)
GC-ECD	EPA 8081A/8081B	a-Chlordane
GC-ECD	EPA 8081A/8081B	g-Chlordane
GC-ECD	EPA 8081A/8081B	4,4'-DDD
GC-ECD	EPA 8081A/8081B	4,4'-DDE

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC-ECD	EPA 8081A/8081B	4,4'-DDT
GC-ECD	EPA 8081A/8081B	Dieldrin
GC-ECD	EPA 8081A/8081B	Endosulfan I
GC-ECD	EPA 8081A/8081B	Endosulfan II
GC-ECD	EPA 8081A/8081B	Endosulfan sulfate
GC-ECD	EPA 8081A/8081B	Endrin
GC-ECD	EPA 8081A/8081B	Endrin Aldehyde
GC-ECD	EPA 8081A/8081B	Endrin Ketone
GC-ECD	EPA 8081A/8081B	Heptachlor
GC-ECD	EPA 8081A/8081B	Heptachlor Epoxide
GC-ECD	EPA 8081A/8081B	Methoxychlor
GC-ECD	EPA 8081A/8081B	Toxaphene
GC-ECD	EPA 8081A/8081B	Chlordane (technical)
GC-ECD	EPA 8082/8082A	PCB-1016
GC-ECD	EPA 8082/8082A	PCB-1221
GC-ECD	EPA 8082/8082A	PCB-1232
GC-ECD	EPA 8082/8082A	PCB-1242
GC-ECD	EPA 8082/8082A	PCB-1248
GC-ECD	EPA 8082/8082A	PCB-1254
GC-ECD	EPA 8082/8082A	PCB-1260
GC-ECD	EPA 8082/8082A	PCB-1262
GC-ECD	EPA 8082/8082A	PCB-1268
GC/MS	EPA 8280A/8280B	2,3,7,8-TeCDD
GC/MS	EPA 8280A/8280B	1,2,3,7,8-PeCDD
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8-HxCDD
GC/MS	EPA 8280A/8280B	1,2,3,6,7,8-HxCDD
GC/MS	EPA 8280A/8280B	1,2,3,7,8,9-HxCDD
GC/MS	EPA 8280A/8280B	1,2,3,4,6,7,8-HpCDD
GC/MS	EPA 8280A/8280B	OCDD
GC/MS	EPA 8280A/8280B	2,3,7,8-TeCDF
GC/MS	EPA 8280A/8280B	1,2,3,7,8-PeCDF
GC/MS	EPA 8280A/8280B	2,3,4,7,8-PeCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,6,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,7,8,9-HxCDF

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8280A/8280B	2,3,4,6,7,8-HxCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,6,7,8-HpCDF
GC/MS	EPA 8280A/8280B	1,2,3,4,7,8,9-HpCDF
GC/MS	EPA 8280A/8280B	OCDF
GC/MS	EPA 8280A/8280B	Total TCDD
GC/MS	EPA 8280A/8280B	Total PeCDD
GC/MS	EPA 8280A/8280B	Total HxCDD
GC/MS	EPA 8280A/8280B	Total HeptaCDD
GC/MS	EPA 8280A/8280B	Total TCDF
GC/MS	EPA 8280A/8280B	Total PeCDF
GC/MS	EPA 8280A/8280B	Total HxCDF
GC/MS	EPA 8280A/8280B	Total HpCDF
GC/HRMS	EPA 8290/ 8290A/1613B	2,3,7,8-TeCDD
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,7,8-PeCDD
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,4,7,8-HxCDD
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,6,7,8-HxCDD
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,7,8,9-HxCDD
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,4,6,7,8-HpCDD
GC/HRMS	EPA 8290/ 8290A/1613B	OCDD
GC/HRMS	EPA 8290/ 8290A/1613B	2,3,7,8-TeCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,7,8-PeCDF
GC/HRMS	EPA 8290/ 8290A/1613B	2,3,4,7,8-PeCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,4,7,8-HxCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,6,7,8-HxCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,7,8,9-HxCDF
GC/HRMS	EPA 8290/ 8290A/1613B	2,3,4,6,7,8-HxCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,4,6,7,8-HpCDF
GC/HRMS	EPA 8290/ 8290A/1613B	1,2,3,4,7,8,9-HpCDF
GC/HRMS	EPA 8290/ 8290A/1613B	OCDF
GC/HRMS	EPA 8290/ 8290A/1613B	Total TCDD
GC/HRMS	EPA 8290/ 8290A/1613B	Total PeCDD
GC/HRMS	EPA 8290/ 8290A/1613B	Total HxCDD
GC/HRMS	EPA 8290/ 8290A/1613B	Total HpCDD
GC/HRMS	EPA 8290/ 8290A/1613B	Total TCDF
GC/HRMS	EPA 8290/ 8290A/1613B	Total PeCDF

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 8290/ 8290A/1613B	Total HxCDF
GC/HRMS	EPA 8290/ 8290A/1613B	Total HpCDF
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methyl perfluorooctanesulfon amidoacetic acide (MeFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctanoic acid (PFOA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutyric acid (PFBA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentanoic acid (PFPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexanoic acid (PFHxA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononanoic acid (PFNA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecanoic acid (PFDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexane Sulfonic Acid (PFHxS)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	10:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorododecane sulfonic acid) (10:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexadecanoic acid (PFHxDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanesulfonic acid (PFDoS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctadecanoic acid (PFODA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-ethylcyclohexanesulfonic acid (PFecHS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-1-propanesulfonic acid (PFPrS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4,4,5,5,6,6,6-Heptafluorohexanoic acid (3:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorohexylethanoic acid (6:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorooctylethanoic acid (8:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2-Perfluorodecylethanoic acid (10:2 FTCA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropropionic acid (PPF Acid, PFPrA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-methoxybutanoic acid (PFMBA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Difluoro(perfluoromethoxy)acetic acid (PFMOAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-4-isopropoxybutanoic acid (PFECA G, PFPE-1)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7,9-butaoxadecanoic acid (PFO4DA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7-trioxaoctanoic acid (PFO3OA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5-dioxahexanoic acid (PFO2HXA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-{[perfluoro-3-(perfluoroethoxy)-2-propanyl]oxy}ethanesulfonic acid (Hydro-PS Acid)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-3,5,7,9,11-pentaoxadodecanoic acid (PFO5DoA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-(perfluoromethoxy)propanoic acid (PMPA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2,3,3,3-Tetrafluoro-2-(pentafluoroethoxy)propanoic acid (PEPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid (R-EVE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	,1,2,2-Tetrafluoro-2-(1,2,2,2-tetrafluoroethoxy)ethane-1-sulfonic acid (NVHOS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	2,2,3,3-Tetrafluoro-3-{[1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl]oxy}propanoic acid (Hydro-EVE Acid)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy]ethanesulfonic acid (R-PSDCA)
LC/MS/MS	Draft EPA Method 1633	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	Draft EPA Method 1633	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	Draft EPA Method 1633	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	Draft EPA Method 1633	N-Methyl perfluorooctanesulfon amidoacetic acide (MeFOSAA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctanoic acid (PFOA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutyric acid (PFBA)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentanoic acid (PFPA)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptanoic acid (PFHpA)
LC/MS/MS	Draft EPA Method 1633	Perfluorononanoic acid (PFNA)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecanoic acid (PFDA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroundecanoic acid (PFUDA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	Draft EPA Method 1633	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	Draft EPA Method 1633	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	Draft EPA Method 1633	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	Draft EPA Method 1633	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	Draft EPA Method 1633	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanesulfonic acid (PFDoS)
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	Draft EPA Method 1633	4,4,5,5,6,6,6-Heptafluorohexanoic acid (3:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-4-methoxybutanoic acid (PFMBA)
LC/MS/MS	Draft EPA Method 1633	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 1
GC/HRMS	EPA 1668A/1668C	PCB 2
GC/HRMS	EPA 1668A/1668C	PCB 3
GC/HRMS	EPA 1668A/1668C	PCB 4
GC/HRMS	EPA 1668A/1668C	PCB 5
GC/HRMS	EPA 1668A/1668C	PCB 6
GC/HRMS	EPA 1668A/1668C	PCB 7
GC/HRMS	EPA 1668A/1668C	PCB 8
GC/HRMS	EPA 1668A/1668C	PCB 9
GC/HRMS	EPA 1668A/1668C	PCB 10
GC/HRMS	EPA 1668A/1668C	PCB 11
GC/HRMS	EPA 1668A/1668C	PCB 12
GC/HRMS	EPA 1668A/1668C	PCB 13
GC/HRMS	EPA 1668A/1668C	PCB 14
GC/HRMS	EPA 1668A/1668C	PCB 15
GC/HRMS	EPA 1668A/1668C	PCB 16
GC/HRMS	EPA 1668A/1668C	PCB 17
GC/HRMS	EPA 1668A/1668C	PCB 18
GC/HRMS	EPA 1668A/1668C	PCB 19
GC/HRMS	EPA 1668A/1668C	PCB 20
GC/HRMS	EPA 1668A/1668C	PCB 21
GC/HRMS	EPA 1668A/1668C	PCB 22
GC/HRMS	EPA 1668A/1668C	PCB 23
GC/HRMS	EPA 1668A/1668C	PCB 24
GC/HRMS	EPA 1668A/1668C	PCB 25
GC/HRMS	EPA 1668A/1668C	PCB 26
GC/HRMS	EPA 1668A/1668C	PCB 27
GC/HRMS	EPA 1668A/1668C	PCB 28
GC/HRMS	EPA 1668A/1668C	PCB 29
GC/HRMS	EPA 1668A/1668C	PCB 30
GC/HRMS	EPA 1668A/1668C	PCB 32
GC/HRMS	EPA 1668A/1668C	PCB 31
GC/HRMS	EPA 1668A/1668C	PCB 33
GC/HRMS	EPA 1668A/1668C	PCB 34
GC/HRMS	EPA 1668A/1668C	PCB 35

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 36
GC/HRMS	EPA 1668A/1668C	PCB 37
GC/HRMS	EPA 1668A/1668C	PCB 38
GC/HRMS	EPA 1668A/1668C	PCB 39
GC/HRMS	EPA 1668A/1668C	PCB 40
GC/HRMS	EPA 1668A/1668C	PCB 41
GC/HRMS	EPA 1668A/1668C	PCB 42
GC/HRMS	EPA 1668A/1668C	PCB 43
GC/HRMS	EPA 1668A/1668C	PCB 44
GC/HRMS	EPA 1668A/1668C	PCB 45
GC/HRMS	EPA 1668A/1668C	PCB 46
GC/HRMS	EPA 1668A/1668C	PCB 47
GC/HRMS	EPA 1668A/1668C	PCB 48
GC/HRMS	EPA 1668A/1668C	PCB 49
GC/HRMS	EPA 1668A/1668C	PCB 50
GC/HRMS	EPA 1668A/1668C	PCB 51
GC/HRMS	EPA 1668A/1668C	PCB 52
GC/HRMS	EPA 1668A/1668C	PCB 53
GC/HRMS	EPA 1668A/1668C	PCB 54
GC/HRMS	EPA 1668A/1668C	PCB 55
GC/HRMS	EPA 1668A/1668C	PCB 56
GC/HRMS	EPA 1668A/1668C	PCB 57
GC/HRMS	EPA 1668A/1668C	PCB 58
GC/HRMS	EPA 1668A/1668C	PCB 59
GC/HRMS	EPA 1668A/1668C	PCB 60
GC/HRMS	EPA 1668A/1668C	PCB 61
GC/HRMS	EPA 1668A/1668C	PCB 62
GC/HRMS	EPA 1668A/1668C	PCB 63
GC/HRMS	EPA 1668A/1668C	PCB 64
GC/HRMS	EPA 1668A/1668C	PCB 65
GC/HRMS	EPA 1668A/1668C	PCB 66
GC/HRMS	EPA 1668A/1668C	PCB 67
GC/HRMS	EPA 1668A/1668C	PCB 68
GC/HRMS	EPA 1668A/1668C	PCB 69
GC/HRMS	EPA 1668A/1668C	PCB 70

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 71
GC/HRMS	EPA 1668A/1668C	PCB 72
GC/HRMS	EPA 1668A/1668C	PCB 73
GC/HRMS	EPA 1668A/1668C	PCB 74
GC/HRMS	EPA 1668A/1668C	PCB 75
GC/HRMS	EPA 1668A/1668C	PCB 76
GC/HRMS	EPA 1668A/1668C	PCB 77
GC/HRMS	EPA 1668A/1668C	PCB 78
GC/HRMS	EPA 1668A/1668C	PCB 79
GC/HRMS	EPA 1668A/1668C	PCB 80
GC/HRMS	EPA 1668A/1668C	PCB 81
GC/HRMS	EPA 1668A/1668C	PCB 82
GC/HRMS	EPA 1668A/1668C	PCB 83
GC/HRMS	EPA 1668A/1668C	PCB 84
GC/HRMS	EPA 1668A/1668C	PCB 85
GC/HRMS	EPA 1668A/1668C	PCB 86
GC/HRMS	EPA 1668A/1668C	PCB 87
GC/HRMS	EPA 1668A/1668C	PCB 88
GC/HRMS	EPA 1668A/1668C	PCB 89
GC/HRMS	EPA 1668A/1668C	PCB 90
GC/HRMS	EPA 1668A/1668C	PCB 91
GC/HRMS	EPA 1668A/1668C	PCB 92
GC/HRMS	EPA 1668A/1668C	PCB 93
GC/HRMS	EPA 1668A/1668C	PCB 94
GC/HRMS	EPA 1668A/1668C	PCB 95
GC/HRMS	EPA 1668A/1668C	PCB 96
GC/HRMS	EPA 1668A/1668C	PCB 97
GC/HRMS	EPA 1668A/1668C	PCB 98
GC/HRMS	EPA 1668A/1668C	PCB 99
GC/HRMS	EPA 1668A/1668C	PCB 100
GC/HRMS	EPA 1668A/1668C	PCB 101
GC/HRMS	EPA 1668A/1668C	PCB 102
GC/HRMS	EPA 1668A/1668C	PCB 103
GC/HRMS	EPA 1668A/1668C	PCB 104
GC/HRMS	EPA 1668A/1668C	PCB 105

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 106
GC/HRMS	EPA 1668A/1668C	PCB 107
GC/HRMS	EPA 1668A/1668C	PCB 108
GC/HRMS	EPA 1668A/1668C	PCB 109
GC/HRMS	EPA 1668A/1668C	PCB 110
GC/HRMS	EPA 1668A/1668C	PCB 111
GC/HRMS	EPA 1668A/1668C	PCB 112
GC/HRMS	EPA 1668A/1668C	PCB 113
GC/HRMS	EPA 1668A/1668C	PCB 114
GC/HRMS	EPA 1668A/1668C	PCB 115
GC/HRMS	EPA 1668A/1668C	PCB 116
GC/HRMS	EPA 1668A/1668C	PCB 117
GC/HRMS	EPA 1668A/1668C	PCB 118
GC/HRMS	EPA 1668A/1668C	PCB 119
GC/HRMS	EPA 1668A/1668C	PCB 120
GC/HRMS	EPA 1668A/1668C	PCB 121
GC/HRMS	EPA 1668A/1668C	PCB 122
GC/HRMS	EPA 1668A/1668C	PCB 123
GC/HRMS	EPA 1668A/1668C	PCB 124
GC/HRMS	EPA 1668A/1668C	PCB 125
GC/HRMS	EPA 1668A/1668C	PCB 126
GC/HRMS	EPA 1668A/1668C	PCB 127
GC/HRMS	EPA 1668A/1668C	PCB 128
GC/HRMS	EPA 1668A/1668C	PCB 129
GC/HRMS	EPA 1668A/1668C	PCB 130
GC/HRMS	EPA 1668A/1668C	PCB 131
GC/HRMS	EPA 1668A/1668C	PCB 132
GC/HRMS	EPA 1668A/1668C	PCB 133
GC/HRMS	EPA 1668A/1668C	PCB 134
GC/HRMS	EPA 1668A/1668C	PCB 135
GC/HRMS	EPA 1668A/1668C	PCB 136
GC/HRMS	EPA 1668A/1668C	PCB 137
GC/HRMS	EPA 1668A/1668C	PCB 138
GC/HRMS	EPA 1668A/1668C	PCB 139
GC/HRMS	EPA 1668A/1668C	PCB 140

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 141
GC/HRMS	EPA 1668A/1668C	PCB 142
GC/HRMS	EPA 1668A/1668C	PCB 143
GC/HRMS	EPA 1668A/1668C	PCB 144
GC/HRMS	EPA 1668A/1668C	PCB 145
GC/HRMS	EPA 1668A/1668C	PCB 146
GC/HRMS	EPA 1668A/1668C	PCB 147
GC/HRMS	EPA 1668A/1668C	PCB 148
GC/HRMS	EPA 1668A/1668C	PCB 149
GC/HRMS	EPA 1668A/1668C	PCB 150
GC/HRMS	EPA 1668A/1668C	PCB 151
GC/HRMS	EPA 1668A/1668C	PCB 152
GC/HRMS	EPA 1668A/1668C	PCB 153
GC/HRMS	EPA 1668A/1668C	PCB 154
GC/HRMS	EPA 1668A/1668C	PCB 155
GC/HRMS	EPA 1668A/1668C	PCB 156
GC/HRMS	EPA 1668A/1668C	PCB 157
GC/HRMS	EPA 1668A/1668C	PCB 158
GC/HRMS	EPA 1668A/1668C	PCB 159
GC/HRMS	EPA 1668A/1668C	PCB 160
GC/HRMS	EPA 1668A/1668C	PCB 161
GC/HRMS	EPA 1668A/1668C	PCB 162
GC/HRMS	EPA 1668A/1668C	PCB 163
GC/HRMS	EPA 1668A/1668C	PCB 164
GC/HRMS	EPA 1668A/1668C	PCB 165
GC/HRMS	EPA 1668A/1668C	PCB 166
GC/HRMS	EPA 1668A/1668C	PCB 167
GC/HRMS	EPA 1668A/1668C	PCB 168
GC/HRMS	EPA 1668A/1668C	PCB 169
GC/HRMS	EPA 1668A/1668C	PCB 170
GC/HRMS	EPA 1668A/1668C	PCB 171
GC/HRMS	EPA 1668A/1668C	PCB 172
GC/HRMS	EPA 1668A/1668C	PCB 173
GC/HRMS	EPA 1668A/1668C	PCB 174
GC/HRMS	EPA 1668A/1668C	PCB 175

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/HRMS	EPA 1668A/1668C	PCB 176
GC/HRMS	EPA 1668A/1668C	PCB 177
GC/HRMS	EPA 1668A/1668C	PCB 178
GC/HRMS	EPA 1668A/1668C	PCB 179
GC/HRMS	EPA 1668A/1668C	PCB 180
GC/HRMS	EPA 1668A/1668C	PCB 181
GC/HRMS	EPA 1668A/1668C	PCB 182
GC/HRMS	EPA 1668A/1668C	PCB 183
GC/HRMS	EPA 1668A/1668C	PCB 184
GC/HRMS	EPA 1668A/1668C	PCB 185
GC/HRMS	EPA 1668A/1668C	PCB 186
GC/HRMS	EPA 1668A/1668C	PCB 187
GC/HRMS	EPA 1668A/1668C	PCB 188
GC/HRMS	EPA 1668A/1668C	PCB 189
GC/HRMS	EPA 1668A/1668C	PCB 190
GC/HRMS	EPA 1668A/1668C	PCB 191
GC/HRMS	EPA 1668A/1668C	PCB 192
GC/HRMS	EPA 1668A/1668C	PCB 193
GC/HRMS	EPA 1668A/1668C	PCB 194
GC/HRMS	EPA 1668A/1668C	PCB 195
GC/HRMS	EPA 1668A/1668C	PCB 196
GC/HRMS	EPA 1668A/1668C	PCB 197
GC/HRMS	EPA 1668A/1668C	PCB 198
GC/HRMS	EPA 1668A/1668C	PCB 199
GC/HRMS	EPA 1668A/1668C	PCB 200
GC/HRMS	EPA 1668A/1668C	PCB 201
GC/HRMS	EPA 1668A/1668C	PCB 202
GC/HRMS	EPA 1668A/1668C	PCB 203
GC/HRMS	EPA 1668A/1668C	PCB 204
GC/HRMS	EPA 1668A/1668C	PCB 205
GC/HRMS	EPA 1668A/1668C	PCB 206
GC/HRMS	EPA 1668A/1668C	PCB 207
GC/HRMS	EPA 1668A/1668C	PCB 208
GC/HRMS	EPA 1668A/1668C	PCB 209

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
Preparation	**Method**	**Type**
Acid Digestion (Aqueous)	EPA 3005A/3010A	Inorganics
Acid Digestion (Solid)	EPA 3050B	Inorganics
Separatory Funnel Liquid-Liquid Extraction	EPA 3510C	Semivolatile and Non-Volatile Organics
Ultrasonic Extraction	EPA 3550B/3550C	Semivolatile and Non-Volatile Organics
Solvent Dilution	EPA 3580A	Semivolatile and Non-Volatile Organics
Purge and Trap	EPA 5030B	Volatile Organic Compounds
Purge and Trap	EPA 5035/5035A	Volatile Organic Compounds
Microwave Extraction	EPA 3546	Semivolatile and Non-Volatile Organics
Florisil Cleanup	EPA 3620B/3620C	Cleanup of pesticide residues and other chlorinated hydrocarbons
Sulfur Cleanup	EPA 3660A	Sulfur Cleanup
Sulfuric Acid Cleanup	EPA 3665A	Sulfuric Acid Cleanup for PCBs
Silica Gel Cleanup	EPA 3630C	Column Cleanup
TCLP Extraction	EPA 1311	Toxicity Characteristic Leaching Procedure
SPLP Extraction	EPA 1312	Synthetic Precipitation Leaching Procedure
STLC Extraction	CA-WET	California Waste Extraction Test

Air and Emissions		
Technology	**Method**	**Analyte**
ICP-MS	EPA 6020/6020A	Aluminum
ICP-MS	EPA 6020/6020A	Antimony
ICP-MS	EPA 6020/6020A	Arsenic
ICP-MS	EPA 6020/6020A	Barium
ICP-MS	EPA 6020/6020A	Beryllium
ICP-MS	EPA 6020/6020A	Cadmium
ICP-MS	EPA 6020/6020A	Calcium
ICP-MS	EPA 6020/6020A	Chromium (Total)
ICP-MS	EPA 6020/6020A	Cobalt
ICP-MS	EPA 6020/6020A	Copper
ICP-MS	EPA 6020/6020A	Iron
ICP-MS	EPA 6020/6020A	Lead
ICP-MS	EPA 6020/6020A	Magnesium
ICP-MS	EPA 6020/6020A	Manganese

Air and Emissions		
Technology	**Method**	**Analyte**
ICP-MS	EPA 6020/6020A	Molybdenum
ICP-MS	EPA 6020/6020A	Nickel
ICP-MS	EPA 6020/6020A	Potassium
ICP-MS	EPA 6020/6020A	Selenium
ICP-MS	EPA 6020/6020A	Silver
ICP-MS	EPA 6020/6020A	Sodium
ICP-MS	EPA 6020/6020A	Thallium
ICP-MS	EPA 6020/6020A	Vanadium
ICP-MS	EPA 6020/6020A	Zinc
Gravimetric	40CFR Part 50 App B	TSP (Total Suspended Particulate)
Gravimetric	40CFR Part 50 App J	PM10
GC/MS	EPA TO-13A	1,2,4-Trichlorobenzene
GC/MS	EPA TO-13A	1,2-Dichlorobenzene
GC/MS	EPA TO-13A	1,3-Dichlorobenzene
GC/MS	EPA TO-13A	1,4-Dichlorobenzene
GC/MS	EPA TO-13A	2,4,5-Trichlorophenol
GC/MS	EPA TO-13A	2,4,6-Trichlorophenol
GC/MS	EPA TO-13A	2,4-Dichlorophenol
GC/MS	EPA TO-13A	2,4-Dimethylphenol
GC/MS	EPA TO-13A	2,4-Dinitrophenol
GC/MS	EPA TO-13A	2,4-Dinitrotoluene
GC/MS	EPA TO-13A	2,6-Dinitrotoluene
GC/MS	EPA TO-13A	2-Chloronaphthalene
GC/MS	EPA TO-13A	2-Chlorophenol
GC/MS	EPA TO-13A	2-Methylnaphthalene
GC/MS	EPA TO-13A	2-Methylphenol
GC/MS	EPA TO-13A	2-Nitroaniline
GC/MS	EPA TO-13A	2-Nitrophenol
GC/MS	EPA TO-13A	3&4-Methylphenol
GC/MS	EPA TO-13A	3,3'-Dichlorobenzidine
GC/MS	EPA TO-13A	3-Nitroaniline
GC/MS	EPA TO-13A	4,6-Dinitro-2-methylphenol
GC/MS	EPA TO-13A	4-Bromophenyl phenyl ether
GC/MS	EPA TO-13A	4-Chloro-3-methylphenol
GC/MS	EPA TO-13A	4-Chloroaniline

Air and Emissions

Technology	Method	Analyte
GC/MS	EPA TO-13A	4-Chlorophenyl phenyl ether
GC/MS	EPA TO-13A	4-Nitroaniline
GC/MS	EPA TO-13A	4-Nitrophenol
GC/MS	EPA TO-13A	Acenaphthene
GC/MS	EPA TO-13A	Acenaphthylene
GC/MS	EPA TO-13A	Aniline
GC/MS	EPA TO-13A	Anthracene
GC/MS	EPA TO-13A	Benzo(a)anthracene
GC/MS	EPA TO-13A	Benzo(a)pyrene
GC/MS	EPA TO-13A	Benzo(b)fluoranthene
GC/MS	EPA TO-13A	Benzo(g,h,i)perylene
GC/MS	EPA TO-13A	Benzo(k)fluoranthene
GC/MS	EPA TO-13A	Benzoic Acid
GC/MS	EPA TO-13A	Benzyl Alcohol
GC/MS	EPA TO-13A	Benzyl butyl Phthalate
GC/MS	EPA TO-13A	Biphenyl
GC/MS	EPA TO-13A	Bis(2-chloroethoxy) Methane
GC/MS	EPA TO-13A	Bis(2-chloroethyl) Ether
GC/MS	EPA TO-13A	Bis(2-chloroisopropyl) Ether
GC/MS	EPA TO-13A	Carbazole
GC/MS	EPA TO-13A	Chrysene
GC/MS	EPA TO-13A	Bis (2-ethylhexyl) Phthalate
GC/MS	EPA TO-13A	Dibenz(a,h)anthracene
GC/MS	EPA TO-13A	Dibenzofuran
GC/MS	EPA TO-13A	Diethyl Phthalate
GC/MS	EPA TO-13A	Dimethyl Phthalate
GC/MS	EPA TO-13A	Di-n-butyl Phthalate
GC/MS	EPA TO-13A	Di-n-octyl Phthalate
GC/MS	EPA TO-13A	Fluoranthene
GC/MS	EPA TO-13A	Fluorene
GC/MS	EPA TO-13A	Hexachlorobenzene
GC/MS	EPA TO-13A	Hexachlorobutadiene
GC/MS	EPA TO-13A	Hexachlorocyclopentadiene
GC/MS	EPA TO-13A	Hexachloroethane
GC/MS	EPA TO-13A	Indeno(1,2,3-c,d) Pyrene

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	EPA TO-13A	Isophorone
GC/MS	EPA TO-13A	Naphthalene
GC/MS	EPA TO-13A	Nitrobenzene
GC/MS	EPA TO-13A	n-Nitrosodimethylamine
GC/MS	EPA TO-13A	n-Nitrosodi-n-propylamine
GC/MS	EPA TO-13A	n-Nitrosodiphenylamine
GC/MS	EPA TO-13A	Pentachlorophenol
GC/MS	EPA TO-13A	Phenanthrene
GC/MS	EPA TO-13A	Phenol
GC/MS	EPA TO-13A	Pyrene
GC/MS SIM	EPA TO-13A SIM	1-Methylnaphthalene
GC/MS SIM	EPA TO-13A SIM	2-Methylnaphthalene
GC/MS SIM	EPA TO-13A SIM	Acenaphthene
GC/MS SIM	EPA TO-13A SIM	Acenaphthylene
GC/MS SIM	EPA TO-13A SIM	Anthracene
GC/MS SIM	EPA TO-13A SIM	Benzo(a)anthracene
GC/MS SIM	EPA TO-13A SIM	Benzo(a)pyrene
GC/MS SIM	EPA TO-13A SIM	Benzo(b)fluoranthene
GC/MS SIM	EPA TO-13A SIM	Benzo(g,h,i)perylene
GC/MS SIM	EPA TO-13A SIM	Benzo(k)fluoranthene
GC/MS SIM	EPA TO-13A SIM	Chrysene
GC/MS SIM	EPA TO-13A SIM	Fluoranthene
GC/MS SIM	EPA TO-13A SIM	Fluorene
GC/MS SIM	EPA TO-13A SIM	Indeno(1,2,3-c,d) Pyrene
GC/MS SIM	EPA TO-13A SIM	Naphthalene
GC/MS SIM	EPA TO-13A SIM	Phenanthrene
GC/MS SIM	EPA TO-13A SIM	Pyrene
GC-ECD	EPA TO-4A/TO-10A	PCB-1016
GC-ECD	EPA TO-4A/TO-10A	PCB-1221
GC-ECD	EPA TO-4A/TO-10A	PCB-1232
GC-ECD	EPA TO-4A/TO-10A	PCB-1242
GC-ECD	EPA TO-4A/TO-10A	PCB-1248
GC-ECD	EPA TO-4A/TO-10A	PCB-1254
GC-ECD	EPA TO-4A/TO-10A	PCB-1260
GC-ECD	EPA TO-4A/TO-10A	PCB-1262

Air and Emissions		
Technology	**Method**	**Analyte**
GC-ECD	EPA TO-4A/TO-10A	PCB-1268
Preparation	**Method**	**Type**
Acid Digestion (Filters, Solid)	EPA 3050B	Inorganics
Soxhlet extraction of PUF	TO-4A/TO-10A	PCBs in Air
Soxhlet extraction of PUF/XAD	TO-13	Semivolatiles in Air
Florisil Cleanup	EPA 3620B/3620C	Cleanup of pesticide residues and other chlorinated hydrocarbons
Sulfur Cleanup	EPA 3660A	Sulfur Cleanup
Sulfuric Acid Cleanup	EPA 3665A	Sulfuric Acid Cleanup for PCBs

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctanoic acid (PFOA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutyric acid (PFBA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentanoic acid (PFPA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptanoic acid (PFHpA)

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononanoic acid (PFNA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecanoic acid (PFDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	10:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorododecane sulfonic acid) (10:2 FTS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorohexadecanoic acid (PFHxDA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorododecanesulfonic acid (PFDoS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorooctadecanoic acid (PFODA)

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	Draft EPA Method 1633	6:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorooctane sulfonic acid) (6:2 FTS)
LC/MS/MS	Draft EPA Method 1633	8:2 Fluorotelomer sulfonic acid (1H,1H,2H,2H-perfluorodecane sulfonic acid) (8:2 FTS)
LC/MS/MS	Draft EPA Method 1633	N-Ethyl perfluorooctanesulfon amidoacetic acid (EtFOSAA)
LC/MS/MS	Draft EPA Method 1633	N-Methyl perfluorooctanesulfon amidoacetic acid (MeFOSAA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctanoic acid (PFOA)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonic Acid (PFOS)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutyric acid (PFBA)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentanoic acid (PFPA)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexanoic acid (PFHxA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptanoic acid (PFHpA)

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	Draft EPA Method 1633	Perfluorononanoic acid (PFNA)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecanoic acid (PFDA)
LC/MS/MS	Draft EPA Method 1633	Perfluoroundecanoic acid (PFUDA)
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanoic acid (PFDoDA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotridecanoic acid (PFTriA)
LC/MS/MS	Draft EPA Method 1633	Perfluorotetradecanoic acid (PDTeA)
LC/MS/MS	Draft EPA Method 1633	Perfluorobutane Sulfonic Acid (PFBS)
LC/MS/MS	Draft EPA Method 1633	Perfluorohexane Sulfonic Acid (PFHxS)
LC/MS/MS	Draft EPA Method 1633	Perfluorooctane Sulfonamide (FOSA)
LC/MS/MS	Draft EPA Method 1633	4:2 Fluorotelomer sulfonic acid (1H, 1H,2H,2H-perfluorohexane sulfonic acid) (4:2 FTS)
LC/MS/MS	Draft EPA Method 1633	Perfluoropentane Sulfonic acid (PFPS)
LC/MS/MS	Draft EPA Method 1633	Perfluorononane Sulfonic acid (PFNS)
LC/MS/MS	Draft EPA Method 1633	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-2-propoxypropionic acid (GenX Parent Acid) (HFPO-DA)
LC/MS/MS	Draft EPA Method 1633	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)
LC/MS/MS	Draft EPA Method 1633	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11C1-PF3OUdS)
LC/MS/MS	Draft EPA Method 1633	Perfluorododecanesulfonic acid (PFDoS)
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamide (EtFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamide (MeFOSA)
LC/MS/MS	Draft EPA Method 1633	N-Ethylperfluorooctane sulfonamido ethanol (EtFOSE)
LC/MS/MS	Draft EPA Method 1633	N-Methylperfluorooctane sulfonamido ethanol (MeFOSE)
LC/MS/MS	Draft EPA Method 1633	Perfluoroheptane Sulfonic Acid (PFHpS)
LC/MS/MS	Draft EPA Method 1633	Perfluorodecane Sulfonic Acid (PFDS)
LC/MS/MS	Draft EPA Method 1633	4,4,5,5,6,6,6-Heptafluorohexanoic acid (3:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-3-methoxypropanoic acid (PFMPA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro-4-methoxybutanoic acid (PFMBA)

Biological Tissue		
Technology	**Method**	**Analyte**
LC/MS/MS	Draft EPA Method 1633	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)
LC/MS/MS	Draft EPA Method 1633	Perfluoro(2-ethoxyethane) sulfonic acid (PFEESA)
Preparation	**Method**	**Type**
Tissue Extraction for PFAS	PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 WS-LC-0025	Sonication/Solvent Shake with SPE cleanup

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L2468.

R. Douglas Leonard Jr., VP, PILR SBU

ATTACHMENT 5:
Standard Operating Procedures

STANDARD OPERATING PROCEDURE 008

FOR SAMPLING AND ANALYSIS OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Prepared by

Geosyntec consultants

engineers | scientists | innovators

Revised March 2022

1. INTRODUCTION

1.1 Purpose and Scope

This standard operating procedures (SOP) was prepared to guide per- and polyfluoroalkyl substance (PFAS) sampling activities. This SOP describes recommended general procedures to be used by Geosyntec field personnel when collecting samples using various techniques for PFAS analysis. Because PFAS are potentially present in a variety of materials that may come into contact with samples, and because laboratory analytical method detection limits are low (low to sub nanogram per liter concentrations), conservative precautions are recommended to avoid sample cross-contamination and false positive results. The procedures in this SOP are consistent with best practices at the time of authoring.

1.2 Definitions and Acronyms

1.2.1 Definitions

PFAS-free water	Water that has been analyzed by an accredited laboratory (see Section 3.1) and determined to be below the method detection limit (i.e., non-detect) for the suite of PFAS to be analyzed for in environmental samples. Method detection limits (MDLs) used during analysis of PFAS-free water should be at or below the MDLs used for environmental samples.
Potable water	Water that meets state and federal drinking water requirements. Note this water may or may not have detectable PFAS concentrations.

1.2.2 Acronyms

ASTM	American Society for Testing Materials
CoC	chain of custody
DO	dissolved oxygen
DPT	direct push technology
DoD	Department of Defense
DOT	Department of Transportation
ETFE	ethylene tetrafluoroethylene
FEP	fluorinated ethylene propylene
HDPE	high-density polyethylene

IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LDPE	low-density polyethylene
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
ORP	oxidation-reduction potential
PFAS	per- and polyfluoroalkyl substances
PFTE	polytetrafluoroethylene
PPE	personal protective equipment
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
QA	quality assurance
QC	quality control
SOP	standard operating procedure

1.3 Equipment and Products

Sections 1.3.1 and 1.3.2 detail items that are safe to use versus not recommended for use on the job site to protect PFAS samples from potential cross-contamination. Science-based evidence is not currently available to support a determination of the realistic impact of these commonly used field items and materials on PFAS samples. In the absence of scientific-based sampling guidance, field staff, contractors, and analytical laboratories should try to avoid using items that may pose a risk for cross-contamination and false positive results and instead use acceptable alternatives identified in this section. If the field team needs to use products and equipment on site that are not recommended, additional quality assurance/quality control (QA/QC) samples may be collected to evaluate any potential impact on PFAS environmental samples. This information is also provided in an abbreviated format as a checklist for field staff to reference (Attachment A).

1.3.1 Field Equipment

Items that are **safe to use** on site when sampling for PFAS include the following:

- Sampling containers, screw caps and other equipment made from high-density polyethylene (HDPE)[1], polypropylene, silicone, acetate, or stainless steel;
- Sample preservatives (e.g., Trizma®);
- QA/QC samples (e.g., temperature and field blanks);
- Low-density polyethylene (LDPE)[2] materials not in direct contact with the sample (e.g., Ziploc® bags);
- Materials made of HDPE, silicone, acetate, or stainless steel;
- Masonite or aluminum clipboards;
- Sampling forms, loose paper or field notebooks, chain of custody (CoC) record, and sample container labels;
- Ballpoint pens;
- Alconox®, Liquinox® and Luminox® detergents;
- Paper towels;
- Trash bags;
- HDPE sheeting;
- Hard-shell coolers;
- Shipping and handling labels;
- Regular (wet) ice;
- Bubble wrap;
- Duct tape and packing tape;
- Large (e.g., 55-gallon) containers;
- DPT rig, rods, and related tools;
- HDPE or stainless steel bailer and cable;
- Submersible pumps, bladder pumps, peristaltic pumps, and inertia pumps that do not have Teflon components;
- Dedicated Silicon and/or HDPE tubing;

[1] HDPE plastics are commonly identified by a recycling symbol with a number 2 inside it.
[2] LDPE plastics are commonly identified by a recycling symbol with a number 4 inside it.

- Analytical field meter (e.g., temperature, pH, conductivity, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity); and
- Water level probe(s).

Items **to be avoided (i.e. not recommended) for use** during PFAS sampling include the following:

- Glass sample containers, due to PFAS adherence to glass surfaces;
- Water-resistant paper, notebooks, and labels (e.g., certain Rite in the Rain® products), due to use of PFAS in water-resistant inks and coatings;
- Sticky notes (e.g., certain Post-It® products), due to potential use of a paper coating product Zonyl™ or similar fluorotelomer compounds;
- Plastic clipboards, binders, and spiral hardcover notebooks;
- Pens with water-resistant ink;
- Felt pens and markers (e.g., certain Sharpie® products) – some PFAS SOPs (e.g., Michigan) specifically allow Fine or Ultra-Fine Point Sharpies® and TestAmerica Laboratories, Inc. routinely uses Sharpies® in the laboratory following unpublished analytical tests that reportedly showed no impact on PFAS sample results;
- Aluminum foil, as PFAS are sometimes used as a protective layer;
- Decon 90™ liquid detergent, which reportedly contain fluorosurfactants;
- Chemical (e.g., blue) ice packs, unless it is contained in a sealed bag. Blue ice has the potential to be contaminated from previous field sampling events;
- Materials containing polytetrafluoroethylene (PFTE) including Teflon™ and Hostaflon® (e.g., tubing, tape, plumbing paste, O-rings);
- Equipment with Viton™ components (i.e., fluoroelastomers);
- Stain- or water-resistant materials, as these are typically fluoropolymer-based;
- Material containing LDPE, particularly if used in direct contact with the sample (e.g., LDPE tubing, as PFAS can sorb to the porous tubing); and
- Material containing “fluoro” in the name – this includes, but is not limited to, fluorinated ethylene propylene (FEP), ethylene tetrafluoroethylene (ETFE), and polyvinylidene fluoride (PVDF).

1.3.2 Clothing, Personal Protective Equipment (PPE), and Consumer Products

Items that are **safe to use** when sampling for PFAS include the following:

- Boots made of polyurethane, polyvinyl chloride (PVC), rubber, or untreated leather;
- Other field boots covered by PFAS-free (e.g., polypropylene) over-boots;
- Rain gear made of polyurethane, PVC, wax-coated, vinyl, or rubber;
- Clothing made of synthetic (e.g., polyester) or natural (e.g., cotton) fibers;
- Safety glasses;
- Reflective safety vests;
- Hardhats;
- Disposable powder-free nitrile gloves;
- Uncoated HDPE suits (e.g., certain Tyvek® products);
- Sunscreens[3] and insect repellants[4] that have been tested and found to be PFAS-free; and
- Bottled water and hydration drinks.

Items **to be avoided (i.e., not recommended) for use** during PFAS sampling include the following:

- Water- or stain-resistant boots and clothing (e.g., products containing GORE-TEX®);

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[3] Examples of PFAS-free sunscreens include Alba Organics Natural, Aubrey Organics, Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30, Banana Boat for Men Triple Defense Continuous Spray Sunscreen SPF 30, Banana Boat Sport Performance Coolzone 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, Jason Natural Sun Block, Kiss my Face, L'Oréal Silky Sheer Face Lotion 50+, Meijer Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50, Meijer Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70, Neutrogena Beach Defense Water + Sun Barrier Lotion SPF 70, Neutrogena Beach Defense Water + Sun Barrier Spray Broad Spectrum SPF 30, Neutrogena Pure & Free Baby Sunscreen Broad Spectrum SPF 60+, Neutrogena Ultra-Sheer Dry-Touch Sunscreen Broad Spectrum SPF 30, Yes to Cucumbers, and sunscreens for infants. Products with fluorinated compounds in their ingredients (e.g., polyfluoroalkyl phosphate esters) should not be worn during sampling.

[4] Examples of PFAS-free insect repellent include Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, OFF! Deep Woods® spray for clothing and skin, Sawyer® do-it-yourself permethrin treatment for clothing, Insect Shield Insect® pretreated clothing, DEET products, and sunscreen/insect repellent combination product Avon Skin so Soft Bug Guard-SPF 30. Products with fluorinated compounds in their ingredients (e.g., polyfluoroalkyl phosphate esters) should not be worn during sampling.

- Flame resistant clothing (FRC);
- Clothing recently laundered with a fabric softener;
- Coated HDPE suits (e.g., certain Tyvek® products);
- Sunscreen and insect repellants containing fluorinated compounds as ingredients, such as polyfluoroalkyl phosphate esters;
- Latex gloves;
- Cosmetics, moisturizers, hand cream, and other related products;
- Food wrappers and packaging; and
- Food and drinks other than bottled water or hydration drinks.

Field staff should try to find acceptable alternatives to these items that still allow them to complete the field work safely and efficiently. For example, wearing long-sleeved clothing and a hard hat or sun hat may eliminate the need to use sunscreen in some climates. If an item cannot be easily avoided, field staff should note the use of the item on the daily checklist (Attachment A) and consider collecting QA/QC samples to evaluate the potential impact of sample cross-contamination (e.g., field blanks).

2. FIELD PROCEDURES

Field procedures are provided separately in a site-specific work plan. Considerations for field staff who are developing the work plan are described in this section.

2.1 Pre-Mobilization Activities

2.1.1 Health and Safety Plan

Prior to each field event, the site health and safety plan should be reviewed and updated, as necessary. Health and safety plan requirements should be reviewed for consistency with this SOP and modified as appropriate to resolve any differences.

2.1.2 Source of PFAS-Free Water

PFAS-free water may be needed for equipment decontamination during sample collection (i.e., water that has been analyzed by an accredited laboratory and determined to be below the method detection limit [MDL] or reporting limit [RL] for the suite of PFAS to be analyzed for in environmental samples). MDLs or RLs used during analysis of PFAS-free water should be at or below the MDLs or RLs used for environmental samples.

If an on-site water source is available, the project team may consider whether the water source can be tested for PFAS and determined to be PFAS-free ahead of the sampling event. PFAS-free deionized water can also be purchased from the analytical laboratory and shipped with the bottle order.

2.1.3 Laboratory Coordination

Field personnel should communicate with the laboratory that will conduct PFAS analysis regarding the following items:

- Laboratory accreditation for PFAS analysis;
- Appropriate sample containers, labels, and preservatives;
- Turnaround times;
- Sample storage conditions and holding time (see Section 2.2.5); and
- The number and type of QA/QC samples (see Section 2.3).

At the time of this SOP preparation, United States Environmental Protection Agency (USEPA) Draft Method 1633 for analysis of PFAS in aqueous, solid, biosolids, and tissue samples is still in the method development and accreditation process with the contract laboratories. Prior to and until implementation of Draft Method 1633, commercial laboratories typically offer PFAS analysis of non-drinking water samples using a modified version of Method 537.1. The suite of 24 PFAS compounds presented in Table 1 will be analyzed by the selected laboratory.

Table 1: PFAS Analyte List

Chemical	CASRN	Acronym
4:2 Fluorotelomer sulfonic acid	757124-72-4	4:2 FTS
6:2 Fluorotelomer sulfonic acid	27619-97-2	6:2 FTS
8:2 Fluorotelomer sulfonic acid	39108-34-4	8:2 FTS
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	NEtFOSAA
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	NMeFOSAA
Perfluorobutanesulfonic acid	375-73-5	PFBS
Perfluorobutanoic acid	375-22-4	PFBA
Perfluorodecanesulfonic acid	335-77-3	PFDS
Perfluorodecanoic acid	335-76-2	PFDA
Perfluorododecanoic acid	307-55-1	PFDoA
Perfluoroheptanoic acid	375-85-9	PFHpA
Perfluoroheptanesulfonic acid	375-92-8	PFHpS
Perfluorohexanesulfonic acid	355-46-4	PFHxS
Perfluorohexanoic acid	307-24-4	PFHxA
Perfluorononanoic acid	375-95-1	PFNA
Perfluorononanesulfonic acid	68259-12-1	PFNS

Perfluorooctanesulfonamide	754-91-6	PFOSA
Perfluorooctanesulfonic acid	1763-23-1	PFOS
Perfluorooctanoic acid	335-67-1	PFOA
Perfluoropentanoic acid	2706-90-3	PFPeA
Perfluoropentanesulfonic acid	2706-91-4	PFPeS

Project staff may consider the impact of differences in reported PFAS concentrations and the potential value of collecting and sending a split sample to a second commercial laboratory to assess variability in reported PFAS concentrations.

Accreditation: Laboratories conducting PFAS analysis for Department of Defense (DoD) facilities should be accredited by the United States DoD Environmental Laboratory Accreditation Program (i.e. use a PFAS method that is compliant with Table B-15 or Table B-24 of the DoD and Department of Energy consolidated Quality Systems Manual for Environmental Laboratories). States may also require that analytical laboratories are National Environmental Laboratory Accreditation Program accredited for their state and that PFAS analytical methods follow state guidelines.

Turnaround Times: Analytical laboratories may offer a range of turnaround times at varying costs per sample, however, turnaround times for receiving PFAS results typically range from 2 to 3 weeks, with expedited turnaround times of 3 to 5 days. The laboratory's capacity and acceptable project schedule for receiving results may affect the project team's choice of analytical laboratory.

Sample Containers: HDPE containers with screw caps are commonly used for PFAS sample collection. Different laboratories may supply sample containers of varying sizes. Sample container caps are typically unlined.

Preservatives: Field personnel should communicate with the laboratory to determine what, if any, sample preservatives will be used. Trizma is typically added to PFAS drinking water samples analyzed using EPA Method 537.1; no preservatives are used for soil, groundwater, or other media.

2.1.4 Equipment Decontamination

Equipment should be decontaminated on site before work begins. Equipment decontamination should follow the steps outlined in Section 2.4.

2.2 Sampling

2.2.1 Sampling PPE

Gloves: Disposable powder-free nitrile gloves should be worn at all times during sample collection and handling of sampling equipment.

At a minimum, field personnel should put on a new pair of nitrile gloves after the following activities:

- Handling samples, including QA/QC samples and blanks; and
- Handling sampling equipment.

At a minimum, personnel should (1) thoroughly wash their hands with detergent (preferably Alconox®, Liquinox® or Luminox ®) and PFAS-free water; (2) thoroughly dry their hands with paper towels; and (3) put on a new pair of nitrile gloves after the following activities:

- Contact with a material potentially containing PFAS;
- Change in sampling locations;
- Breaks in work;
- Washroom breaks; and
- Exit and entry into the project site exclusion zone.

2.2.2 Sampling Equipment

Sampling equipment will vary based on the sample media and sample collection method. The field staff should consider preparing an equipment list prior to the sampling event and evaluating whether equipment may contain Teflon™ or other PFAS-containing materials, potential alternatives, and whether equipment will be dedicated, disposable, or require decontamination. For example, pump components, fittings, O-rings, sampling tubing and other sampling materials should not include Teflon™ or other PFAS-containing materials. Dedicated HDPE or silicon tubing could be used for sampling groundwater monitoring wells, or a stainless steel bailer. Analytical field meters to measure these parameters should be free of Teflon™ and other PFAS materials (e.g., tubing, O-rings). Water level meters should be decontaminated prior to and after each sampling location using PFAS-free water, as described in Section 2.4.

2.2.3 Sample Collection and Labeling

Container Rinsing: Sample containers should not to be rinsed prior to sampling.

Sample Collection: The following sample collection procedures should be considered for inclusion in the work plan by the project team:

1. PPE worn within the exclusion area at all times. No eating, drinking, or smoking should occur within the exclusion zone;
2. Procedure for decontamination at each sample location. For example, as drill rods are pulled up, they might be wiped down with a rag rinsed in soapy water (Alconox®, Liquinox® or Luminox® are suitable for PFAS sampling).

Labels: Some water-resistant inks may be potential sources of PFAS. PFAS-free container labels should be filled out using a ballpoint pen that does not have water-resistant ink, if possible. Field staff should try to avoid filling out container labels using felt pens and markers (e.g., certain Sharpie® products).

Chain of Custody: If applicable, the following remarks should be added to the CoC record:

- A request for rapid turnaround time, if applicable; and
- A note regarding the potential concentrations in a highly-contaminated sample in order to assist the analytical laboratory in determining if dilution will be required and reducing the risk of highly concentrated samples from exceeding instrument calibration ranges.

Wet Weather Considerations: Field sampling during wet weather (e.g., rainfall and snowfall) should be conducted wearing appropriate clothing that does not pose a risk for cross-contamination. Field personnel should try to avoid treated water-resistant clothing and boots. Rain gear made of polyurethane, PVC, vinyl, or rubber is an acceptable alternative. Samples and sample containers should not be opened prior to sample collection to avoid collecting precipitation.

2.2.4 Sample Handling, Storage, and Shipment

Handling: Clean nitrile gloves should be worn when handling sample containers. Sample containers should **not** be placed in close proximity to a potential PFAS source.

Storage and Holding Times: Storage conditions and holding times will be determined by the laboratory. Measures should be taken to meet storage and holding time criteria (e.g., expedited shipping).

Shipment: Sample containers should be packed for shipment using the following steps:

1. Seal each sample container in a sample bag to prevent melt water from getting into the sample or degrading the sample label.
2. Place sample containers into the cooler with their caps upright.

3. Fill any excess space within the cooler with bubble wrap (avoid using paper, cardboard, or polystyrene foam).
4. Fill remaining space from the top of the sample containers to the top of the cooler with wet ice that is double-bagged and sealed.
5. Seal the entire cooler with duct tape, particularly the lid, to prevent leaks.

2.3 Sampling QA/QC

2.3.1 Field Duplicates

Field duplicates are samples collected in the same manner and at the same time and location as a primary sample. They should be collected from locations of known or suspected contamination. Field duplicates are used to assess field and analytical precision and sample heterogeneity. Typically, at least one field duplicate is collected for every 10 primary samples. The UFP-QAPP Worksheets 26/17 "Sample Handling, Custody, and Disposal" should be consulted for the approved sample duplicate nomenclature.

2.3.2 Matrix Spike and Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicate (MS/MSD) samples are aliquots of environmental samples that are spiked with a known concentration of PFAS by the laboratory. MS/MSD samples are used to assess interferences caused by the sample matrix. MS/MSD samples may not be needed if the analytical laboratory is using an isotopic dilution method but are technically required to meet Department of Defense (DoD) accreditation requirements. If necessary, MS/MSD samples are to be collected in the same manner and at the same time and location as a primary sample (i.e., additional sample volume). It is preferred that this location have little to no PFAS contamination. Samples should have the same matrix to ensure a valid result; if the samples do not appear visually similar (e.g., discoloration, suspended solids), choose another location for collection of MS/MSD samples. The number of required MS/MSD samples should be determined based on discussions with the laboratory. Typically, at least one MS/MSD sample is collected for every 20 primary samples. MS/MSD samples should be labeled with the same sample name and time as the primary sample and denoted as MS/MSD samples on the CoC and sample label.

2.3.3 Blanks

Blanks should be shipped and handled in the same manner as environmental samples. Field blanks should be labeled as such on sample bottles and on the CoC. The number and type of blanks should be determined by discussions with the laboratory.

Equipment Blanks: Equipment blanks are used to assess sources of field and laboratory contamination. Equipment blanks are prepared by pouring PFAS-free water over or through decontaminated reusable field sampling equipment and collecting the rinsate in a sample container. Typically, at least one equipment blank is collected for every 1 day of sampling. For passive sampling techniques, such as Hydrasleeve samplers, in which samplers are used only once and then discarded, collection of equipment blanks is not necessary.

Field Blanks: Field blanks are used to assess ambient contamination within the field and laboratory. Field blanks should be prepared by filling a sample container with PFAS-free water in the field in the same manner as environmental samples. Field blanks are an effective way of assessing potential cross-contamination as a result of sample handling. Typically, one field blank is collected for every 10 primary samples.

Temperature Blanks: Temperature blanks are used to assess the temperature of samples during shipping. Temperature blanks should be provided by the laboratory and prepared by filling a sample container with PFAS-free water prior to shipment of the sample containers. The blank should be kept in the cooler during sampling and shipment to the laboratory. Once the cooler returns to the laboratory, the temperature of the blank should be measured to ensure that recommended sample storage criteria are met (typically less than 6 degrees Celsius).

2.4 Decontamination

Decontamination should occur prior to leaving the sampling area or at a central decontamination location and at the end of each work day. Additionally, sampling equipment exposed to PFAS-contaminated water should be decontaminated between sample locations.

Alconox®, Liquinox® and Luminox® detergents are acceptable for decontamination purposes from the perspective of PFAS sampling. Use of Decon 90 should be avoided. Decontamination wastes must be properly contained and disposed of in accordance with applicable local, state and federal regulations.

2.4.1 Field Equipment Decontamination

Drilling Equipment: Drillers typically have multiple rods, augers, spoons, and samplers on hand and thoroughly decontaminate them as a group once they have been used. As drill rods are pulled up, they are typically wiped down with a rag rinsed in soapy water. Inner rods are placed into a 5-gallon bucket and rinsed with a rag using soapy water (Alconox®, Liquinox® or Luminox®). Drilling equipment is fully decontaminated using the following procedures:

1. Remove any gross (e.g., soil) contamination from sampling equipment).

2. If heavy petroleum residuals are encountered during sampling, use methanol or another appropriate solvent to remove any residues from sampling equipment;
3. Rinse the exterior of the samplers with PFAS-free or potable water using a pressure washer. If using a constructed decontamination pit, equipment should be laid horizontally and elevated above the pit, typically on sawhorses, to prevent decontamination water from splashing back onto the equipment. Rods, augers, and screens should be rotated midway through the rinse so that the entire exterior of the equipment is sprayed (1st rinse);
4. Clean (using a brush or clean rag) the exterior of the equipment with soapy, PFAS-free or potable water;
5. Clean (using a wire brush) the interior of the equipment with soapy, PFAS-free or potable water;
6. If using DPT samplers, follow the procedures listed below for 2nd and 3rd rinses:
    a. If possible, remove the grout plugs from the samplers prior to the 2nd rinse;
    b. In a 5-gallon bucket, hold the sampler vertically and use a water hose with a nozzle or a pressure washer to spray the interior of each sampler using PFAS-free water (2nd rinse);
    c. Hold the nozzle close to the exterior of the sampler and move the nozzle up and down along the length of the sampler to flush out any residual soils within the screen;
    d. Flip the sampler upside down in the opposite orientation and repeat Steps 6b and 6c so that water is flushed through both ends of the sampler (3rd rinse);
7. For other drilling equipment, rinse the interior and exterior thoroughly with PFAS-free water (2nd rinse);
8. Leave the equipment to air dry in a location away from dust and fugitive contaminants. All equipment should be dry before reuse.

Other Field Equipment: All non-disposable sampling equipment that is in contact with contaminated soil, groundwater, or decontamination water (e.g., 5-gallon bucket, field meters) must be cleaned prior to and between uses at each groundwater sampling location according to the following procedures:

1. Remove any gross (e.g., soil) contamination from sampling equipment.
2. If heavy petroleum residuals are encountered during sampling, use methanol or another appropriate solvent to remove any residues from sampling equipment.

3. Wash water-resistant equipment thoroughly and vigorously with potable water containing detergent (Alconox®, Liquinox® and Luminox ®) using a bristle brush or similar utensil to remove any remaining residual contamination.
4. Rinse equipment thoroughly with potable water (1st rinse).
5. Rinse equipment thoroughly with PFAS-free water (2nd rinse).
6. For field instruments, rinse again with PFAS-free water (3rd rinse).
7. Dry the wet equipment with a paper towel or leave the equipment to air dry in a location away from dust or fugitive contaminants. All equipment should be dry before reuse.

Cleaning and decontamination of the equipment should be accomplished in stages and in such a way that the contamination does not discharge into the environment. Disposable sample tubing is required to minimize the need for decontamination.

2.4.2 Personnel and PPE Decontamination

A decontamination area for personnel and portable equipment may be specified in the health and safety plan. The area may include basins or tubs to capture decontamination wastes, which can be transferred to larger containers as necessary. Decontamination following groundwater sampling should follow these steps:

1. Gross (e.g., soil) (e.g., soil) contamination should be scraped and wiped from boots, safety glasses, hardhats, reflective vests, and other reusable PPE. Once gross contamination has been removed, gloves should be removed by rolling off the hands in such a way to avoid exposing skin to PFAS-contaminated materials;
2. A new pair of gloves should be put on and reusable PPE should be decontaminated using PFAS-free water mixed with detergent (preferably Alconox®, Liquinox® or Luminox®) and brushes, or similar means. After debris is removed, reusable PPE should be rinsed with PFAS-free water; and
3. Hands and any exposed body parts should be washed thoroughly using detergent (preferably Alconox®, Liquinox® or Luminox®) and PFAS-free water. Hands should be dried with paper towels.

2.5 Food and Drink

Food and drink should not be brought within the exclusion zone. Food that is kept in the staging area should preferably be contained in HDPE or stainless-steel containers.

Daily PFAS Sampling Checklist

Date: ___________________ Site Name: _____________________________________

Weather (*temperature/precipitation*): ____

Please check all boxes that apply and describe any exceptions in the notes section below along with QA/QC methods used to assess potential sample cross-contamination as a result.

Field Clothing and PPE:

- ☐ No water- or stain-resistant clothing (e.g., GORE-TEX®)
- ☐ During collection of water and sediment samples, no water- or stain-resistant boots OR water- or stain-resistant boots covered by PFAS-free over-boots
- ☐ Field boots (or over-boots) are made of polyurethane, PVC, rubber, or untreated leather
- ☐ Waders or rain gear are made of polyurethane, PVC, vinyl, wax-coated or rubber
- ☐ Clothing has not been recently laundered with a fabric softener
- ☐ 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

Field Equipment:

- ☐ Sample containers and equipment in direct contact with the sample are made of HDPE, polypropylene, silicone, acetate or stainless steel, not LDPE or glass
- ☐ Sample caps are made of HDPE or polypropylene and are not lined with Teflon™
- ☐ No materials containing Teflon™, Viton™, or fluoropolymers
- ☐ No materials containing LDPE in direct contact with the sample (e.g., LDPE tubing, Ziploc® bags)
- ☐ 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)

Decontamination:

- ☐ Reusable field equipment (e.g., inner drill rods, samplers) decontaminated prior to reuse
- ☐ "PFAS-free" water is on-site for decontamination of field equipment
- ☐ Alconox® or Liquinox® used as decontamination detergent

Food and Drink:

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

Notes:____

____

____

____

____

Field Team Leader Name (Print): ______________________________

Field Team Leader Signature: ___________________________ Date/Time: _________________

STANDARD OPERATING PROCEDURE 010

FOR GROUNDWATER SAMPLING OF MONITORING WELLS AND ANALYSIS OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Prepared by

Geosyntec consultants

engineers | scientists | innovators

Revised August 2020

1. INTRODUCTION

1.1 Purpose and Scope

Standard operating procedures (SOPs) were prepared to guide per- and polyfluoroalkyl substance (PFAS) sampling activities. This SOP describes recommended procedures to be used by Geosyntec field personnel when collecting groundwater samples from monitoring wells. Because PFAS are potentially present in a variety of materials that may come into contact with water samples, and because laboratory analytical method detection limits are low (low to sub nanogram per liter concentrations), conservative precautions are recommended to avoid sample cross-contamination and false positive results. The procedures in this SOP are consistent with best practices at the time of authoring.

1.2 Definitions and Acronyms

1.2.1 Definitions

Bladder pump	A positive displacement pump that is acceptable for collection of all analytes and depths. Can be small enough to sample from wells as small as 3/4-inch in diameter.
Dedicated equipment	Equipment that is installed in or used in just one monitoring well for purging and sampling, and that remains in that well for the duration of the monitoring program. Dedicated equipment does not need to be decontaminated between sampling events.
Hydrasleeve	A no-purge (passive) grab sampling device used to collect groundwater samples directly from the screened interval of a well without having to purge the well prior to sample collection.
Inertia pump	A riser tube fitted with a one-way foot valve. Best used on small diameter wells (2 inches or less). Can be used if the depth to water is less than approximately 25 feet.
Peristaltic pump	A positive displacement pump that can be used to move fluids at a fixed rate. Peristaltic pumps are typically used if the depth to water is less than approximately 25 feet.
PFAS-free water	Water that has been analyzed by an accredited laboratory (see Section 3.1) and determined to be below the method detection limit (i.e., non-detect) for the suite of PFAS to be analyzed for in environmental samples. Method detection limits (MDLs) used during analysis of PFAS-free water should be at or below the MDLs used for environmental samples.

Potable water	Water that meets state and federal drinking water requirements. Note this water may or may not have detectable PFAS concentrations.
Submersible pump	A positive-pressure pump that is acceptable for collection of all analytes. Achievable depths are limited by the power of the pump and length of wiring. Well must be at least 2 inches in diameter.

1.2.2 Acronyms

ASTM	American Society for Testing and Materials
CoC	chain of custody
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
ETFE	ethylene tetrafluoroethylene
FEP	fluorinated ethylene propylene
HDPE	high-density polyethylene
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
LDPE	low-density polyethylene
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
ORP	oxidation-reduction potential
PFAS	per- and polyfluoroalkyl substances
PFTE	polytetrafluoroethylene
PPE	personal protective equipment
PVC	polyvinyl chloride
PVDF	polyvinylidene fluoride
QA	quality assurance
QC	quality control
QSM	quality systems manual

SOP standard operating procedure

USGS United States Geological Survey

1.3 Equipment and Products

Sections 1.3.1 and 1.3.2 detail items that are safe to use versus not recommended for use on the job site to protect PFAS samples from potential cross-contamination. Science-based evidence is not currently available to support a determination of the realistic impact of these commonly used field items and materials on PFAS samples. In the absence of scientific-based sampling guidance, field staff, contractors, and analytical laboratories should try to avoid using items that may pose a risk for cross-contamination and false positive results and instead use acceptable alternatives identified in this section. If the field team needs to use products and equipment on site that are not recommended, additional quality assurance/quality control (QA/QC) samples may be collected to evaluate any potential impact on PFAS environmental samples. This information is also provided in an abbreviated format as a checklist for field staff to reference (Attachment A).

1.3.1 Field Equipment

Items that are **safe to use** on site when sampling for PFAS include the following:

- Sampling containers, screw caps and other equipment made from high-density polyethylene (HDPE)[1], polypropylene, silicone, acetate, or stainless steel;
- Sample preservatives (e.g., Trizma);
- QA/QC samples (e.g., temperature and field blanks);
- Low-density polyethylene (LDPE)[2] materials not in direct contact with the sample (e.g., Ziploc bags);
- Materials made of HDPE, silicone, acetate, or stainless steel;
- Masonite or aluminum clipboards;
- Ballpoint pens;
- Sampling forms, loose paper or field notebooks, chain of custody (CoC) record, and sample container labels;
- Alconox, Liquinox, and Luminox detergents;

[1] HDPE plastics are commonly identified by a recycling symbol with a number 2 inside it.
[2] LDPE plastics are commonly identified by a recycling symbol with a number 4 inside it.

- Paper towels;
- Trash bags;
- HDPE sheeting;
- HDPE Hydrasleeves;
- Hard-shell coolers;
- Shipping and handling labels;
- Regular (wet) ice;
- Bubble wrap;
- Duct tape and packing tape;
- Large (e.g., 55-gallon) containers;
- Submersible pumps, bladder pumps, peristaltic pumps, and inertia pumps that do not have Teflon components;
- Dedicated Silicon and/or HDPE tubing;
- Analytical field meter (e.g., temperature, pH, conductivity, oxidation-reduction potential [ORP], dissolved oxygen [DO], and turbidity); and
- Water level probe(s).

Items **to be avoided (i.e. not recommended) for use** on site include the following:

- Glass sample containers, due to PFAS adherence to glass surfaces;
- Water-resistant paper, notebooks, and labels (e.g., certain Rite in the Rain products), due to use of PFAS in water-resistant inks and coatings;
- Sticky notes (e.g., certain Post-It products), due to potential use of a paper coating product Zonyl or similar fluorotelomer compounds;
- Plastic clipboards, binders, and spiral hardcover notebooks;
- Pens with water-resistant ink;
- Felt pens and markers (e.g., certain Sharpie products) – some PFAS SOPs (e.g., Michigan) specifically allow Fine or Ultra-Fine Point Sharpies and TestAmerica Laboratories, Inc. routinely uses Sharpies in the laboratory following unpublished analytical tests that reportedly showed no impact on PFAS sample results;
- Aluminum foil, as PFAS are sometimes used as a protective layer;

- Decon 90 liquid detergent, which reportedly contain fluorosurfactants;
- Chemical (e.g., blue) ice packs, unless it is contained in a sealed bag. Blue ice has the potential to be contaminated from previous field sampling events;
- Materials containing polytetrafluoroethylene (PFTE) including Teflon and Hostaflon (e.g., tubing, tape, plumbing paste, O-rings);
- Equipment with Viton components (i.e., fluoroelastomers);
- Stain- or water-resistant materials, as these are typically fluoropolymer-based;
- Material containing LDPE, particularly if used in direct contact with the sample (e.g., LDPE tubing, as PFAS can sorb to the porous tubing); and
- Material containing "fluoro" in the name – this includes, but is not limited to, fluorinated ethylene propylene (FEP), ethylene tetrafluoroethylene (ETFE), and polyvinylidene fluoride (PVDF).

1.3.2 Clothing, Personal Protective Equipment (PPE), and Consumer Products

Items that are **safe to use** on site when sampling for PFAS include the following:

- Boots made of polyurethane, polyvinyl chloride (PVC), rubber, or untreated leather;
- Other field boots covered by PFAS-free (e.g., polypropylene) over-boots;
- Rain gear made of neoprene, polyurethane, PVC, wax-coated, vinyl, or rubber;
- Clothing made of synthetic (e.g., polyester) or natural (e.g., cotton) fibers;
- Safety glasses;
- Reflective safety vests;
- Hardhats;
- Disposable powder-free nitrile gloves;
- Uncoated HDPE suits (e.g., certain Tyvek products);
- Bottled water and hydration drinks; and

- Sunscreens[3] and insect repellants[4] that have been tested and found to be PFAS-free.

Items **to be avoided (i.e., not recommended) for use** on site include the following:

- Water- or stain-resistant boots and clothing (e.g., products containing GORE-TEX);
- Clothing recently laundered with a fabric softener;
- Coated HDPE suits (e.g., certain Tyvek products);
- Sunscreen and insect repellants containing fluorinated compounds as ingredients, such as polyfluoroalkyl phosphate esters;
- Latex gloves;
- Cosmetics, moisturizers, hand cream, and other related products;
- Food wrappers and packaging; and
- Food and drinks other than bottled water or hydration drinks.

Field staff should try to find acceptable alternatives to these items that still allow them to complete the field work safely and efficiently. For example, wearing long-sleeved clothing and a hard hat or sun hat may eliminate the need to use sunscreen in some climates. If an item cannot be easily avoided, additional consideration should be given to QA/QC samples to evaluate the potential impact of sample cross-contamination (e.g., field blanks).

[3] Examples of PFAS-free sunscreens include Alba Organics Natural, Aubrey Organics, Banana Boat Sport Performance Sunscreen Lotion Broad Spectrum SPF 30, Banana Boat for Men Triple Defense Continuous Spray Sunscreen SPF 30, Banana Boat Sport Performance Coolzone 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, Jason Natural Sun Block, Kiss my Face, L'Oréal Silky Sheer Face Lotion 50+, Meijer Clear Zinc Sunscreen Lotion Broad Spectrum SPF 15, 30 and 50, Meijer Wet Skin Kids Sunscreen Continuous Spray Broad Spectrum SPF 70, Neutrogena Beach Defense Water + Sun Barrier Lotion SPF 70, Neutrogena Beach Defense Water + Sun Barrier Spray Broad Spectrum SPF 30, Neutrogena Pure & Free Baby Sunscreen Broad Spectrum SPF 60+, Neutrogena Ultra-Sheer Dry-Touch Sunscreen Broad Spectrum SPF 30, Yes to Cucumbers, and sunscreens for infants. Products with fluorinated compounds as ingredients (e.g., polyfluoroalkyl phosphate esters) should not be worn during sampling.

[4] Examples of PFAS-free insect repellent include Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, OFF! Deep Woods spray for clothing and skin, Sawyer do-it-yourself permethrin treatment for clothing, Insect Shield Insect pretreated clothing, DEET products, and sunscreen/insect repellent combination product Avon Skin so Soft Bug Guard-SPF 30. Products with fluorinated compounds in their ingredients (e.g., polyfluoroalkyl phosphate esters) should not be worn during sampling.

2. FIELD PROCEDURES

2.1 Pre-Mobilization Activities

2.1.1 Health and Safety Plan

Prior to each field event, the site health and safety plan should be reviewed and updated, as necessary. Health and safety plan requirements should be reviewed for consistency with this SOP and modified as appropriate to resolve any differences.

2.1.2 Laboratory Coordination

Field personnel should communicate with the laboratory that will conduct PFAS analysis regarding the following items:

- Laboratory accreditation for PFAS analysis (see Section 3.1);
- Appropriate sample containers, labels, and preservatives (see Sections 2.2.3 and 2.2.4);
- Sample storage conditions and holding time (see Section 2.2.5); and
- The number and type of QA/QC samples (see Section 2.3).

Because there is no standard United States Environmental Protection Agency method for analyzing PFAS samples in media other than drinking water, commercial laboratories typically offer analysis using a modified version of Method 537.1. The standard suite of 24 PFAS compounds presented in Table 1 will be analyzed by the selected laboratory. Additional PFAS compounds requested for analysis will be described in the project work plan, if necessary.

Table 1: PFAS Analyte List

Chemical	CASRN	Acronym
4:2 Fluorotelomer sulfonic acid	75124-72-4	4:2 FTS
6:2 Fluorotelomer sulfonic acid	27619-97-2	6:2 FTS
8:2 Fluorotelomer sulfonic acid	39108-34-4	8:2 FTS
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	NEtFOSAA
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	NMeFOSAA
Perfluorobutanesulfonic acid	375-73-5	PFBS
Perfluorobutanoic acid	375-22-4	PFBA
Perfluorodecanesulfonic acid	335-77-3	PFDS
Perfluorodecanoic acid	83-89-6	PFDA
Perfluorododecanoic acid	307-55-1	PFDoA
Perfluoroheptanoic acid	374-85-9	PFHpA
Perfluoroheptanesulfonic acid	375-92-8	PFHpS
Perfluorohexanesulfonic acid	355-46-4	PFHxS
Perfluorohexanoic acid	307-24-4	PFHxA
Perfluorononanoic acid	375-95-1	PFNA

Perfluorononanesulfonic acid	68259-12-1	PFNS
Perfluorooctanesulfonamide	754-91-6	PFOSA
Perfluorooctanesulfonic acid	1763-23-1	PFOS
Perfluorooctanoic acid	335-67-1	PFOA
Perfluoropentanoic acid	2706-90-3	PFPA
Perfluoropentanesulfonic acid	2706-91-4	PFPS

Project staff may consider the impact of differences in reported PFAS concentrations and the potential value of collecting and sending a split sample to a second commercial laboratory to assess variability in reported PFAS concentrations.

The Laboratories conducting PFAS analysis at DoD facilities should be accredited by the United States Department of Defense Environmental Laboratory Accreditation Program (i.e. use a PFAS method that is compliant with Table B-15 of the DoD and Department of Energy consolidated Quality Systems Manual for Environmental Laboratories) are:

- Primary Laboratory – Eurofins Lancaster
- Secondary Laboratory - Eurofins TestAmerica Sacramento, Seattle, and Denver

2.1.3 Equipment Decontamination

Equipment should be decontaminated on site before work begins. Equipment decontamination should follow the steps outlined in Section 2.4.

2.2 Sampling

2.2.1 Pre-Sampling Activities

Prior to the sampling event, field staff can review information from previous groundwater monitoring events to inform their knowledge of well locations, field equipment, and field conditions. Field staff should also identify upgradient wells and downgradient wells relative to potential source area wells. Wells with the lowest anticipated PFAS concentrations should be sampled first.

At the beginning of each sampling day, field staff should prepare for sampling as follows:

1. Inspect field equipment to ensure that it is in good working order; and
2. Calibrate analytical field meter(s) according to the instrument manufacturers' specifications. Record calibration results on the appropriate form(s). Instruments that cannot be calibrated should not be used.

2.2.2 Sampling PPE

Gloves: Disposable powder-free nitrile gloves should be worn at all times during sample collection and handling of sampling equipment.

At a minimum, field personnel should put on a new pair of nitrile gloves after the following activities:

- Handling samples, including QA/QC samples and blanks; and
- Handling sampling equipment.

At a minimum, personnel should (1) thoroughly wash their hands with detergent (preferably Alconox, Liquinox, or Luminox) and PFAS-free water; (2) thoroughly dry their hands with paper towels; and (3) put on a new pair of nitrile gloves after the following activities:

- Contact with a material potentially containing PFAS;
- Change in sampling locations;
- Breaks in work;
- Washroom breaks; and
- Exit and entry into the project site exclusion zone.

2.2.3 Sampling Equipment

Sample Containers: HDPE containers with screw caps are commonly used for sample collection. Different laboratories may supply sample containers of varying sizes. Sample container caps are typically unlined.

Preservatives: Field personnel should communicate with the laboratory to determine what, if any, sample preservatives will be used.

Pumps: A variety of pumps, including submersible pumps, bladder pumps, peristaltic pumps, or inertia pumps, may be used for groundwater sampling. The choice of sampling device should be based on site-specific considerations, including well diameter, depth to groundwater, and purge rates. Regardless of the type of pump, the pump components, fittings, O-rings, sampling tubing, and other sampling equipment should not include Teflon or other PFAS-containing materials.

Dedicated HDPE or silicon tubing is recommended for sampling each groundwater monitoring well.

Hydrasleeves: Hydrasleeve samplers come in both LDPE and HDPE materials. Only HDPE Hydrasleeve samplers should be utilized for sampling activities. Dedicated equipment, such as stainless steel waits and clips, and polyester tether should be thoroughly washed using Alconox, Liquinox, or Luminox) and PFAS-free water solution.

Analytical Field Meter(s): Water quality parameters commonly evaluated during sampling of groundwater monitoring wells include temperature, pH, conductivity, ORP, DO, and turbidity. Salinity and total dissolved solids may also be measured and recorded. Analytical field meters to measure these parameters should be free of Teflon and other PFAS materials (e.g., tubing, O-rings).

Water Level Meter: A water level meter is typically used to monitor drawdown during groundwater purging prior to sampling. Water level meters should be decontaminated prior to and after each sampling location using PFAS-free water, as described in Section 2.4.

2.2.4 Sample Collection and Labeling

Container Rinsing: Sample containers should not to be rinsed prior to sampling.

Water Level Measurement Collection: If known, wells with the lowest PFAS concentrations should be measured first and wells with the highest PFAS concentrations measured. The following sampling method should be used:

1. Use water level meter that can record measurements within 0.01-foot accuracy;
2. Measure the static groundwater level by lowering the meter into the well;
3. Record the static groundwater level on the appropriate field form; and
4. Decontaminate reusable equipment prior to proceeding to the next groundwater monitoring well location, as described in Section 2.4.

Well Purging and Sample Collection: If known, wells with the lowest PFAS concentrations should be sampled first and wells with the highest PFAS concentrations sampled last. Well purging and sample collection should be conducted in accordance with applicable state regulations and sampling requirements. The following sampling method should be used:

5. Measure and record the static groundwater level using a groundwater elevation probe;
6. Place the pump or bottom of the dedicated tubing into the well within the screened interval;
7. Secure the outlet of the tubing from the well to the influent of the analytical field meter;

8. Start the pump;
9. Adjust the purge rate to minimize and stabilize drawdown, as measured by the water level probe;
10. Once drawdown is stable, start recording water quality parameters;
11. Routinely measure and record water level, temperature, pH, conductivity, ORP, DO, and turbidity throughout well purging at approximately 2- to 3-minute intervals. Record the parameters on a Groundwater Sampling Form;
12. Continue to measure and record the groundwater parameters until the parameters stabilize in accordance with FDEP SOPs;
13. Disconnect the tubing from the analytical field meter;
14. Remove the cap from the sample container;
15. Place the sample container under the water stream. Fill the container to the level specified by the laboratory (samples do not need to be collected headspace free) and then turn off the pump;
16. Close the container by screwing on the cap; and
17. Using a paper towel, dry the outside of the sample container if necessary.
18. Decontaminate reusable equipment prior to proceeding to the next groundwater monitoring well location, as described in Section 2.4.

Well Sample Collection Using Hydrasleeve Samplers: If known, wells with the lowest PFAS concentrations should be sampled first and wells with the highest PFAS concentrations sampled last. Well sample collection should be conducted in accordance with the Hydrasleeve SOP. Consult the SOP to determine the appropriate Hydrasleeve size for water collection volume. Multiple in-line Hydrasleeve may have to be installed at sample locations where field duplicates, and/or MS/MSDs are proposed. Immediately following sampling collection based on the Hydrasleeve sampler specific SOP, groundwater quality parameters for temperature, pH, conductivity, ORP, and DO should be recorded from remaining water. Once laboratory samples and water quality parameters have been collected, the used Hydrasleeve sampler may be discarded, and a new Hydrasleeve sampler can be reinstalled in the well using dedicated equipment. During sampling, ensure that all dedicated equipment is properly stored during sample collection and is **not** placed in close proximity to a potential PFAS source.

Labels: Some water-resistant inks may be potential sources of PFAS. PFAS-free container labels should be filled out using a ballpoint pen that does not have water-resistant ink, if possible. Field staff should try to avoid filling out container labels using felt pens and markers (e.g., certain Sharpie® products). Container labels should include the following information:

- A unique sample identifier;
- QA/QC sample type, if applicable;
- Sampling date and time (24-hour format);
- Sampler's name or initials; and
- Method of sample preservation.

Except for temperature blanks, all QC samples should be labeled and included on the CoC record. Duplicate samples should not be indicated as duplicates.

Wet Weather Considerations: Field sampling during wet weather (e.g., rainfall and snowfall) should be conducted wearing appropriate clothing that does not pose a risk for cross-contamination. Field personnel should try to avoid water-resistant clothing and boots. Rain gear made of polyurethane, PVC, vinyl, or rubber is an acceptable alternative. Samples and sample containers should not be opened prior to sample collection to avoid collecting precipitation. Should samples or sample containers become contaminated with precipitation, they should be discarded.

2.2.5 Sample Handling, Storage, and Shipment

Handling: Clean nitrile gloves should be worn when handling sample containers. Precautions should be taken to not drop or otherwise damage sample containers. Sample containers should **not** be placed in close proximity to a potential PFAS source.

Storage and Holding Times: Storage conditions and holding times should be determined by the laboratory. Measures should be taken to meet storage and holding time criteria (e.g., expedited shipping).

Shipment: Sample containers should be packed for shipment using the following steps:

19. Choose a cooler with structural integrity that will withstand shipment.
20. Secure and tape the drain plug with duct tape from the inside and outside.
21. Check that the caps on all sample containers are tight and will not leak.
22. Check that the sample labels are intact, filled out, legible, and that the sample identifier exactly matches the CoC record.
23. Seal each sample container in a sample bag to prevent melt water from getting into the sample or degrading the sample label.
24. Place sample containers into the cooler with their caps upright.

25. Fill any excess space within the cooler with bubble wrap (try to avoid using paper, cardboard, or polystyrene foam).
26. Fill remaining space from the top of the sample containers to the top of the cooler with wet ice that is double-bagged and sealed.
27. Seal the entire cooler with duct tape, particularly the lid, to prevent leaks.

Ship samples as non-hazardous material unless the samples meet the established Department of Transportation (DOT) criteria for a "hazardous material" or the International Air Transport Association (IATA)/International Civil Aviation Organization (ICAO) for air definition of "dangerous goods." If the samples meet criteria for hazardous materials or dangerous goods, then DOT and IATA/ICAO regulations must be followed. Prior to shipping samples, field personnel should complete the appropriate air waybill or manifest. A copy of the air waybill or manifest should be kept for recordkeeping.

2.3 Sampling QA/QC

2.3.1 Field Duplicates

Field duplicates are samples collected in the same manner and at the same time and location as a primary sample. They should be collected from locations of known or suspected contamination. Field duplicates are used to assess field and analytical precision and sample heterogeneity. Typically, at least one field duplicate is collected for every 10 primary samples. The UFP-QAPP Worksheets 26/17 "Sample Handling, Custody, and Disposal" should be consulted for the approved sample duplicate nomenclature.

2.3.2 Matrix Spike and Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicate (MS/MSD) samples are aliquots of environmental samples that are spiked with a known concentration of PFAS by the laboratory. MS/MSD samples are used to assess interferences caused by the sample matrix. MS/MSD samples are not needed if the analytical laboratory is using an isotopic dilution method but are technically required to meet Department of Defense (DoD) accreditation requirements. If necessary, MS/MSD samples are to be collected in the same manner and at the same time and location as a primary sample (i.e., additional sample volume). It is preferred that this location have little to no PFAS contamination. Samples should have the same matrix to ensure a valid result; if the samples do not appear visually similar (e.g., discoloration, suspended solids), choose another location for collection of MS/MSD samples. The number of required MS/MSD samples should be determined based on discussions with the laboratory. Typically, at least one MS/MSD sample is collected for every 20 primary samples. MS/MSD samples should be labeled with the same sample name and time as the primary sample and denoted as MS/MSD samples on the CoC and sample label.

2.3.3 Blanks

Blanks should be shipped and handled in the same manner as environmental samples. Field blanks should be labeled as such on sample bottles and on the CoC. The number and type of blanks should be determined by discussions with the laboratory.

Equipment Blanks: Equipment blanks are used to assess sources of field and laboratory contamination. Equipment blanks are prepared by pouring PFAS-free water over or through decontaminated reusable field sampling equipment and collecting the rinsate in a sample container. Typically, at least one equipment blank is collected for every 1 day of sampling. For passive sampling techniques, such as Hydrasleeve samplers, in which samplers are used only once and then discarded, collection of equipment blanks is not necessary.

Field Blanks: Field blanks are used to assess ambient contamination within the field and laboratory. Field blanks should be prepared by filling a sample container with PFAS-free water in the field in the same manner as environmental samples. Field blanks are an effective way of assessing potential cross-contamination as a result of sample handling. Typically, one field blank is collected for every 10 primary samples.

Temperature Blanks: Temperature blanks are used to assess the temperature of samples during shipping. Temperature blanks should be provided by the laboratory and prepared by filling a sample container with PFAS-free water prior to shipment of the sample containers. The blank should be kept in the cooler during sampling and shipment to the laboratory. Once the cooler returns to the laboratory, the temperature of the blank should be measured to ensure that recommended sample storage criteria are met (typically less than 6 degrees Celsius).

2.4 Decontamination

Decontamination should occur prior to leaving the sampling area or at a central decontamination location and at the end of each work day. Additionally, sampling equipment exposed to PFAS-contaminated water should be decontaminated between sample locations.

Alconox®, Liquinox® and Luminox ® detergents are acceptable for decontamination purposes. Use of Decon 90 should be avoided. Decontamination wastes must be properly contained and disposed of in accordance with applicable local, state and federal regulations.

2.4.1 Field Equipment Decontamination

All non-disposable sampling equipment that is in contact with groundwater (e.g., field probes, pumps) must be cleaned prior to and between uses at each groundwater sampling location according to the following procedures:

28. Remove any gross (e.g., soil) contamination from sampling equipment.
29. If heavy petroleum residuals are encountered during sampling, use methanol or another appropriate solvent to remove any residues from sampling equipment.
30. Wash water-resistant equipment thoroughly and vigorously with potable water containing detergent (Alconox, Liquinox, or Luminox) using a bristle brush or similar utensil to remove any remaining residual contamination.
31. Rinse equipment thoroughly with potable water (1st rinse).
32. Rinse equipment thoroughly with PFAS-free water (2nd rinse).
33. For field instruments, rinse again with PFAS-free water (3rd rinse).
34. Dry the wet equipment with a paper towel or leave the equipment to air dry in a location away from dust or fugitive contaminants. All equipment should be dry before reuse.

Cleaning and decontamination of the equipment should be accomplished in stages and in such a way that the contamination does not discharge into the environment. Dedicated or disposable sampling equipment should be considered to minimize the need for decontamination.

2.4.2 Personnel and PPE Decontamination

A decontamination area for personnel and portable equipment may be specified in the health and safety plan. The area may include basins or tubs to capture decontamination wastes, which can be transferred to larger containers as necessary. Decontamination following groundwater monitoring well sampling should follow these steps:

35. Gross (e.g., soil) contamination should be scraped and wiped from boots, safety glasses, hardhats, reflective vests, and other reusable PPE. Once gross contamination has been removed, gloves should be removed by rolling off the hands in such a way to avoid exposing skin to PFAS-contaminated materials;
36. A new pair of gloves should be put on and reusable PPE should be decontaminated using PFAS-free water mixed with detergent (preferably Alconox, Liquinox, or Luminox) and brushes, or similar means. After debris is removed, reusable PPE should be rinsed with PFAS-free water; and
37. Hands and any exposed body parts should be washed thoroughly using detergent (preferably Alconox, Liquinox, or Luminox) and PFAS-free water. Hands should be dried with paper towels.

2.5 Food and Drink

Food and drink should not be brought within the exclusion zone. Food that is kept in the staging area should preferably be contained in HDPE or stainless-steel containers.

3. LABORATORY PROCEDURES

3.1 Accreditations

Laboratories conducting PFAS analysis for DoD facilities should be accredited by the United States Department of Defense Environmental Laboratory Accreditation Program, that is, use a PFAS method that is compliant with Table B-15 of the DoD and DOE consolidated QSM 5.2 for Environmental Laboratories. States may also require that analytical laboratories are National Environmental Laboratory Accreditation Program accredited for their state and that PFAS analytical methods follow state guidelines.

4. DOCUMENTATION

4.1 Chain of Custody

4.1.1 Field Custody Procedures

A sample is considered to be in custody if the following conditions have been observed:

- It is in possession or view of the person in custody;
- It is locked in a secure area;
- It is placed in an area restricted to authorized personnel; or
- It is placed in a container and secured with an official seal, so that the sample cannot be reached without breaking the seal.

The following practices should be observed by field personnel to ensure sample custody:

- As few persons as possible will handle samples;
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to the laboratory;
- The sample collector will record sample data in the field notebook; and
- Sample labels will be completed for each sample.

4.1.2 Chain of Custody Record

All samples should be accompanied by a CoC record. The CoC record is typically provided by the laboratory. The CoC record should be fully completed in duplicate (e.g., a carbon copy). At the minimum, the following information should be included on a CoC record:

- Project name and number;
- Laboratory name and address;
- Name of person that collected the samples;
- Sample identifier;
- Sample date and time (time in 24-hour format);
- Laboratory analysis requested;
- Preservatives added to each sample;
- Sample matrix (e.g., soil, water);
- Number of containers per sample; and
- Airway bill tracking number.

As applicable, the following remarks should be added to the CoC record:

- Contractor name and address;
- MS/MSD sample volume (if necessary);
- A request for rapid turnaround time; and
- A note regarding the potential concentrations in a highly-contaminated sample.

Indication of a duplicate sample should **not** be included on a CoC record.

4.1.3 Sample Packaging

The CoC record should accompany all sample shipments. One CoC record should be prepared for each cooler and the cooler number recorded on the CoC. The samples in the cooler should be listed on the CoC record. The CoC record should be placed in a sealed plastic bag (e.g., Ziploc) and taped to the inside lid of the cooler. If one sample is contained in two coolers (i.e., one sample has too many containers to fit in one cooler), then the original CoC should be placed in the first cooler and a copy of the CoC record should be placed in the second cooler. The duplicate copy of the CoC record should be retained by the sampler.

Custody seals should be signed and dated at the time of use. Sample shipping containers should be sealed in as many places as necessary to ensure that the container cannot be opened without breaking a custody seal. Tape should be placed over the seals to ensure that seals are not accidentally broken during shipment. If the sampler transports the samples to the laboratory without sample shipment, custody seals are not required.

4.1.4 Transfer of Custody

When transferring the possession of samples from the field sampler to a transporter or to the laboratory, the sampler should sign, date, and note the time as "relinquished by" on the CoC record. The receiver should also sign, date, and note the time as "received by" on the CoC record. The date and time of the receiver and relinquisher should be the same.

When samples are transported by a commercial carrier, the carrier will not sign the CoC record. However, the airway bill tracking number should be recorded on the CoC record. Airway bills should also be retained with the CoC record as documentation of transport. For this reason, the date and time of the receiver and relinquisher will not match when shipping with a commercial carrier.

4.1.5 Laboratory Custody Procedures

A designated sample custodian should accept custody of the shipped samples and verify that the sample identification number matches the CoC record. Pertinent information about shipment, pickup, and courier should be entered in the "Remarks" section. The temperature of the temperature blanks at the time of receiving should be noted on the CoC record.

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Attachment A. Daily PFAS Sampling Checklist

Date: ___________________

Site Name: _____________________________________

Weather (*temperature/precipitation*): ____

Please check all boxes that apply and describe any exceptions in the notes section below along with QA/QC methods used to assess potential sample cross-contamination as a result.

Field Clothing and PPE:

- ☐ No water- or stain-resistant clothing (e.g., GORE-TEX)
- ☐ During collection of water and sediment samples, no water- or stain-resistant boots OR water- or stain-resistant boots covered by PFAS-free over-boots
- ☐ Field boots (or over-boots) are made of polyurethane, PVC, rubber, or untreated leather
- ☐ Waders or rain gear are made of polyurethane, PVC, vinyl, wax-coated or rubber
- ☐ Clothing has not been recently laundered with a fabric softener
- ☐ 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

Field Equipment:

- ☐ Sample containers and equipment in direct contact with the sample are made of HDPE, polypropylene, silicone, acetate or stainless steel, not LDPE or glass
- ☐ Sample caps are made of HDPE or polypropylene and are not lined with Teflon
- ☐ No materials containing Teflon, Viton, or fluoropolymers
- ☐ No materials containing LDPE in direct contact with the sample (e.g., LDPE tubing, Ziploc bags)
- ☐ 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)

Decontamination:

- ☐ Reusable field equipment decontaminated prior to reuse
- ☐ "PFAS-free" water is on-site for decontamination of field equipment
- ☐ Alconox, Liquinox, or Luminox used as decontamination detergent

Food and Drink:

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

Notes:

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Field Team Leader Name (Print): ___________________________

Field Team Leader Signature: ______________________________

Date/Time: ____________________________

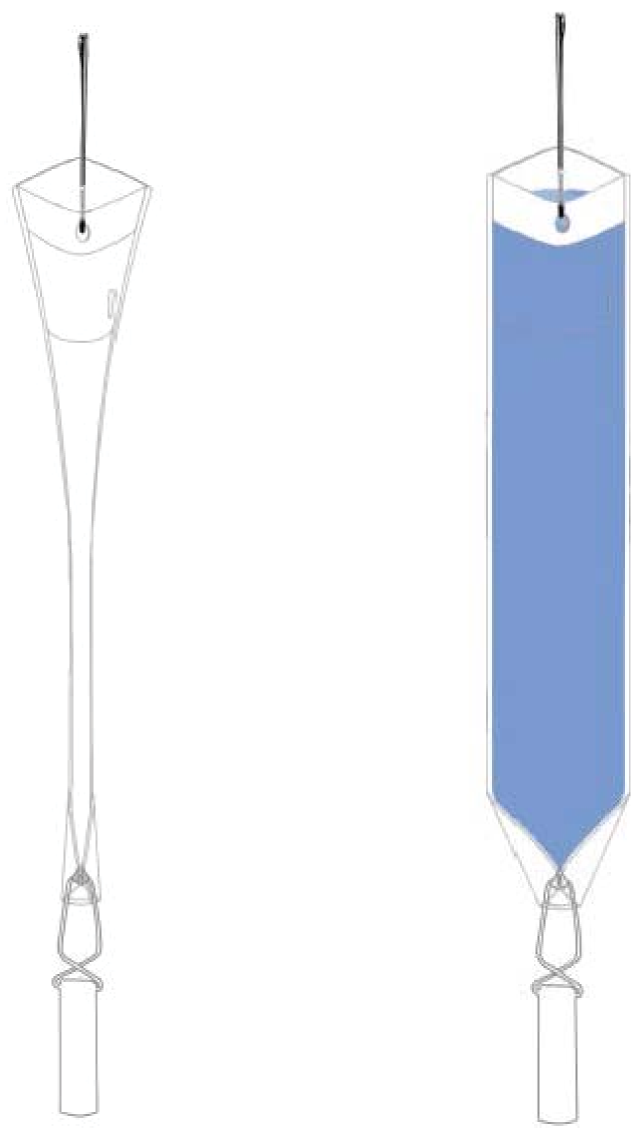
GEOSYNTEC REFERENCE NO. SOP 013

HYDRASleeve™

Simple by Design

US Patent No. 6,481,300; No. 6,837,120; No. 9,726,013; others pending

Standard Operating Procedure:
Sampling Groundwater with a HydraSleeve



This guide should be used in addition to field manuals and instructions appropriate to the chosen sampling device (i.e., HydraSleeve, SpeedBag or Super/Skinny Sleeve and W3 HybridSleeve).

Find the appropriate field manual and instructions on the HydraSleeve website at http://www.hydrasleeve.com.

For more information about the HydraSleeve, or if you have questions, contact:
GeoInsight, P.O. Box 1266, Mesilla Park, NM 88047
800-996-2225, info@hydrasleeve.com.

Table of Contents

Introduction

The HydraSleeve is classified as a no-purge (passive) grab sampling device, meaning that it is used to collect groundwater samples directly from the screened interval of a well without having to purge the well prior to sample collection. When it is used as described in this Standard Operating Procedure (SOP), the HydraSleeve causes no drawdown in the well (until the sample is withdrawn from the water column) and only minimal disturbance of the water column, because it has a very thin cross section and it displaces very little water (<100 ml) during deployment in the well. The HydraSleeve collects a sample from within the screen only. It excludes water from any other part of the water column in the well through the use of a self-sealing check valve at the top of the sampler. It is a single-use (disposable) sampler that is not intended for reuse, so there are no decontamination requirements for the sampler itself.

The use of no-purge sampling as a means of collecting representative groundwater samples depends on the natural movement of groundwater (under ambient hydraulic head) from the formation adjacent to the well screen through the screen. Robin and Gillham (1987) demonstrated the existence of a dynamic equilibrium between the water in a formation and the water in a well screen installed in that formation, which results in formation-quality water being available in the well screen for sampling at all times. No-purge sampling devices like the HydraSleeve collect this formation-quality water as the sample, under undisturbed (non-pumping) natural flow conditions. Samples collected in this manner generally provide more conservative (i.e., higher concentration) values than samples collected using well-volume purging, and values equivalent to samples collected using low-flow purging and sampling (Parsons, 2005).

Applications of the HydraSleeve

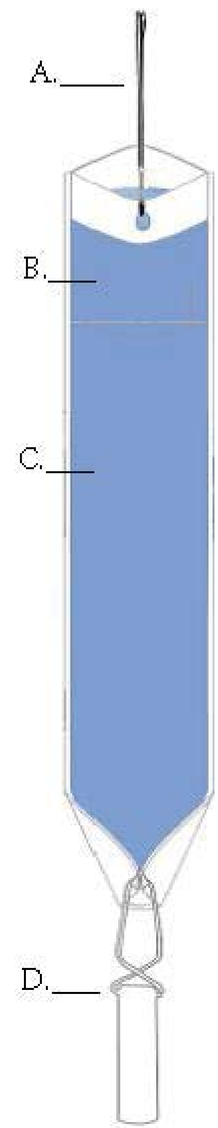
The HydraSleeve can be used to collect representative samples of groundwater for all analytes (volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], common metals, trace metals, major cations and anions, dissolved gases, total dissolved solids, radionuclides, pesticides, PCBs, explosive compounds, and all other analytical parameters). Designs are available to collect samples from wells from 1” inside diameter and larger. The HydraSleeve can collect samples from wells of any yield, but it is especially well-suited to collecting samples from low-yield wells, where other sampling methods can’t be used reliably because their use results in dewatering of the well screen and alteration of sample chemistry (McAlary and Barker, 1987).

The HydraSleeve can collect samples from wells of any depth, and it can be used for single-event sampling or long-term groundwater monitoring programs. Because of its thin cross section and flexible construction, it can be used in narrow, constricted or damaged wells where rigid sampling devices may not fit. Using multiple HydraSleeves deployed in series along a single suspension line or tether, it is also possible to conduct in-well vertical profiling in wells in which contaminant concentrations are thought to be stratified.

As with all groundwater sampling devices, HydraSleeves should not be used to collect groundwater samples from wells in which separate (non-aqueous) phase hydrocarbons (i.e., gasoline, diesel fuel or jet fuel) are present because of the possibility of incorporating some of the separate-phase hydrocarbon into the sample.

Description of the HydraSleeve

The basic HydraSleeve (Figure 1) consists of the following components*:



- A suspension line or tether (A.), attached to the spring clip or directly to the top of the sleeve to deploy the device into and recover the device from the well. Tethers with depth indicators marked in 1-foot intervals are available from the manufacturer.
- A long, flexible, 4-mil thick lay-flat polyethylene sample sleeve (C.) sealed at the bottom (this is the sample chamber), which comes in different sizes, as discussed below with a self-sealing reed-type flexible polyethylene check valve built into the top of the sleeve (B.) to prevent water from entering or exiting the sampler except during sample acquisition.
- A reusable stainless-steel weight with clip (D.), which is attached to the bottom of the sleeve to carry it down the well to its intended depth in the water column. Bottom weights available from the manufacturer are 0.75" OD and are available in a variety of sizes. An optional top weight may be attached to the top of the HydraSleeve to carry it to depth and to compress it at the bottom of the well (not shown in Figure 1);
- A discharge tube that is used to puncture the HydraSleeve after it is recovered from the well so the sample can be decanted into sample bottles (not shown).
- Just above the self-sealing check valve at the top of the sleeve are two holes which provide attachment points for the spring clip and/or suspension line or tether. At the bottom of the sample sleeve are two holes which provide attachment points for the weight clip and weight.

*Other configurations such as top weighted assemblies, Super/SkinnySleeves, Speedbags, and W3 Hybrids are available.

Note: The sample sleeve and the discharge tube are designed for one-time use and are disposable. The spring clip, weight and weight clip may be reused after thorough cleaning. Suspension cord is generally disposed after one use although, if it is dedicated to the well, it may be reused at the discretion of the sampling personnel.

Selecting the HydraSleeve Size to Meet Site-Specific Sampling Objectives

It is important to understand that each HydraSleeve is able to collect a finite volume of sample because, after the HydraSleeve is deployed, you only get one chance to collect an undisturbed sample. Thus, the volume of sample required to meet your site-specific sampling and analytical requirements will dictate the size of HydraSleeve you need to meet these requirements.

Table 1. Dimensions and Volumes of HydraSleeve Models.

Diameter	Volume	Length	Lay-Flat Width	Filled Dia.
2-Inch HydraSleeves				
Standard 600 mls HydraSleeve	~600mls	30"	2.5"	1.4"
Standard 1-liter HydraSleeve	~1 Liter	38"	3"	1.9"
Super/SkinnySleeve 1-liter	~1 Liter	38"	2.5"	1.5"*
Super/SkinnySleeve 1.5-liter	~1.5 Liters	52"	2.5"	1.5"*
Super/SkinnySleeve 2-liter	~2 Liters	66"	2.5"	1.5"*
4-Inch HydraSleeves				
Standard 2.5 liter	~2 Liters	38"	4"	2.7"

* outside diameter on the Heavy Duty Universal Super/SkinnySleeves is 1.5" however when using with schedule 40 hardware the O.D. of the assembly will be 1.9"

It's also recommended that you size the diameter of the HydraSleeve according to the diameter of the well (i.e. use 2-inch HydraSleeves in 2-inch wells). Using smaller sleeves in larger diameter wells (i.e. 2-inch HydraSleeves in 4-inch wells) will result in a longer fill rate and will require special retrieval instructions (explained later).

The volume of sample collected by the HydraSleeve varies with the diameter and length of the HydraSleeve. Dimensions and volumes of available HydraSleeve models are detailed in Table 1.

HydraSleeves can be custom-fabricated by GeoInsight in varying diameters and lengths to meet specific volume requirements. HydraSleeves can also be deployed in series (i.e., multiple HydraSleeves attached to one tether) to collect additional sample to meet specific volume requirements, as described below.

If you have questions regarding the availability of sufficient volume of sample to satisfy laboratory requirements for analysis, it is recommended that you contact the laboratory to discuss the minimum volumes needed for each suite of analytes. Laboratories often require only 10% to 25% of the volume they specify to complete analysis for specific suites of analytes, so they can often work with much smaller sample volumes that can easily be supplied using a HydraSleeve.

HydraSleeve Deployment

Information Required Before Deploying a HydraSleeve

Before installing a HydraSleeve in any well, you will need to know the following:

- The inside diameter of the well
- The length of the well screen
- The water level in the well
- The position of the well screen in the well
- The total depth of the well

The inside diameter of the well is used to determine the appropriate HydraSleeve diameter for use in the well. The other information is used to determine the proper placement of the HydraSleeve in the well to collect a representative sample from the screen (see HydraSleeve Placement, below), and to determine the appropriate length of tether to attach to the HydraSleeve to deploy it at the appropriate position in the well.

Most of this information (with the exception of the water level) should be available from the well log; if not, it will have to be collected by some other means. The inside diameter of the well can be measured at the top of the well casing, and the total depth of the well can be measured by sounding the bottom of the well with a weighted tape. The position and length of the well screen may have to be determined using a down-hole camera if a well log is not available. The water level in the well can be measured using any commonly available water-level gauge.

HydraSleeve Placement

The HydraSleeve is designed to collect a sample directly from the well screen. It fills by pulling it up through the screen a distance equivalent to the length of the sampler when correctly sized to the well diameter. This upward motion causes the top check valve to open, which allows the device to fill. To optimize sample recovery, it is recommended that the HydraSleeve be placed in the well so that the bottom weight rests on the bottom of the well and the top of the HydraSleeve is as close to the bottom of the well screen as possible. This should allow the sampler to fill before the top of the device reaches the top of the screen as it is pulled up through the water column, and ensure that only water from the screen is collected as the sample. In short-screen wells, or wells with a short water column, it may be necessary to use a top-weight on the HydraSleeve to compress it in the bottom of the well so that, when it is recovered, it has room to fill before it reaches the top of the screen.

Example

2" ID PVC well, 50' total depth, 10' screen at the bottom of the well, with water level above the screen (the entire screen contains water).

Correct Placement (figure 2): Using a standard HydraSleeve for a 2" well (2.5" flat width/1.5" filled OD x 30" long, 600 ml volume), deploy the sampler so the weight (a 5 oz., 2.5" long weight with a 2" long clip) rests at the bottom of the well. The top of the sleeve is thus set at ~34" above the bottom of the well. When the sampler is recovered, it will be pulled upward approximately 30" before it is filled; therefore, it is full (and the top check valve closes) at approximately 64" (5.3 feet) above the bottom of the well, which is well before the sampler reaches the top of the screen. In this example, only water from the screen is collected as a sample.

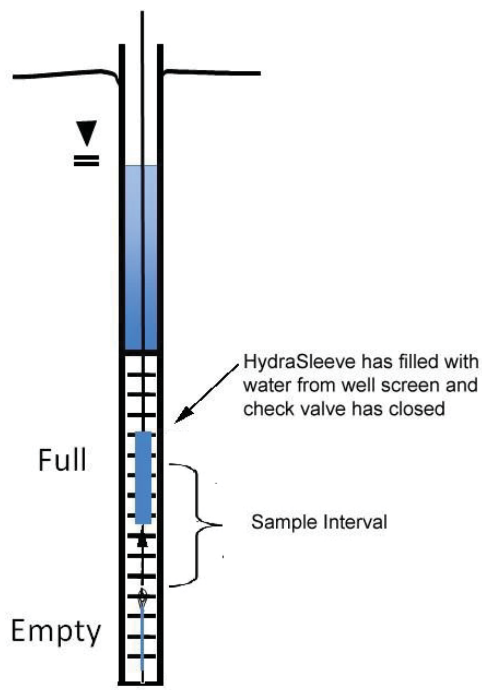


Figure 2. Correct Placement of HydraSleeve.

Incorrect Placement (figure 3): If the well screen in this example was only 5' long, and the HydraSleeve was placed as above, it would not fill before the top of the device reached the top of the well screen, so the sample would include water from above the screen, which may not have the same chemistry.

<u>The solution?</u> Deploy the HydraSleeve with a top weight, so that it is collapsed to within 6" of the bottom of the well. When the HydraSleeve is recovered, it will fill within 36" (3 feet) from the bottom of the well, or 2-feet before the sampler reaches the top of the screen, so it collects only water from the screen as the sample.

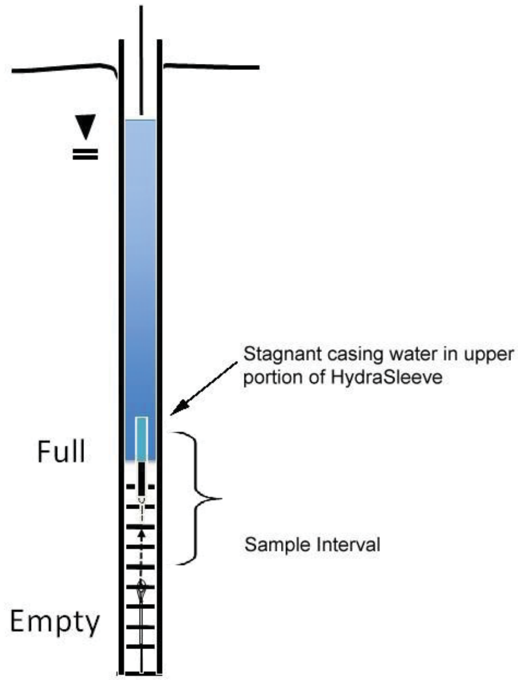


Figure 3. Incorrect placement of HydraSleeve.

This example illustrates one of many types of HydraSleeve placements. More complex placements are discussed in a later section.

NOTE: Using smaller diameter HydraSleeves (2-inch) in larger diameter wells (4-inch) causes a slower fill rate. Special retrieval methods are necessary if this is your set up (shown later in this document).

Procedures for Sampling with the HydraSleeve

Collecting a groundwater sample with a HydraSleeve is usually a simple one-person operation.

> **Note:** Before deploying the HydraSleeve in the well, collect the depth-to-water measurement that you will use to determine the preferred position of the HydraSleeve in the well. This measurement may also be used with measurements from other wells to create a groundwater contour map. If necessary, also measure the depth to the bottom of the well to verify actual well depth to confirm your decision on placement of the HydraSleeve in the water column.
>
> Measure the correct amount of tether needed to suspend the HydraSleeve in the well so that the weight will rest on the bottom of the well (or at your preferred position in the well). Make sure to account for the need to leave a few feet of tether at the top of the well to allow recovery of the sleeve.

> **Note:** Always wear sterile gloves when handling and discharging the HydraSleeve.

I. Assembling the Basic HydraSleeve*

1. Remove the HydraSleeve from its packaging, unfold it, and hold it by its top.
2. Crimp the top of the HydraSleeve by folding the hard polyethylene reinforcing strips at the holes.
3. Attach the spring clip to the holes to ensure that the top will remain open until the sampler is retrieved.
4. Attach the tether to the spring clip by tying a knot in the tether.

> **Note: Alternatively, if spring clips are not being utilized, attach the tether to one (NOT both) of the holes at the top of the Hydrasleeve by tying a knot in the tether.**

5. Fold the flaps with the two holes at the bottom of the HydraSleeve together to align the holes and slide the weight clip through the holes.
6. Attach a weight to the bottom of the weight clip to ensure that the HydraSleeve will descend to the bottom of the well.

*See Super/SkinnySleeve assembly manual and HydraSleeve Field Manual for other assembly instructions.

II. Deploying the HydraSleeve

1. Using the tether, carefully lower the HydraSleeve to the bottom of the well, or to your preferred depth in the water column

   During installation, hydrostatic pressure in the water column will keep the self-sealing check valve at the top of the HydraSleeve closed, and ensure that it retains its flat, empty profile for an indefinite period prior to recovery.

Note: Make sure that it is not pulled upward at any time during its descent. If the HydraSleeve is pulled upward at a rate greater than 0.5'/second at any time prior to recovery, the top check valve will open and water will enter the HydraSleeve prematurely.

2. Secure the tether at the top of the well by placing the well cap on the top of the well casing and over the tether.

Note: Alternatively, you can tie the tether to a hook on the bottom of the well cap (you will need to leave a few inches of slack in the line to avoid pulling the sampler up as the cap is removed at the next sampling event).

III. Equilibrating the Well

The equilibration time is the time it takes for conditions in the water column (primarily flow dynamics and contaminant distribution) to restabilize after vertical mixing occurs (caused by installation of a sampling device in the well).

- Situation: The HydraSleeve is deployed for the first time or for only one time in a well

  The basic HydraSleeve is very thin in cross section and displaces very little water (<100 ml) during deployment so, unlike most other sampling devices, it does not disturb the water column to the point at which long equilibration times are necessary to ensure recovery of a representative sample.

  In some cases, like when useing the SpeedBags, the HydraSleeve can be recovered immediately (with no equilibration time) or within a few hours. In regulatory jurisdictions that impose specific requirements for equilibration times prior to recovery of no-purge sampling devices, these requirements should be followed.

  NOTE: If using top weights additional equilibration time is needed to allow the top weight time to compress the HydraSleeve into the bottom of the well.

- Situation: The HydraSleeve is being deployed for recovery during a future sampling event.

  In periodic (i.e., quarterly, semi-annual, or annual) sampling programs, the sampler for the current sampling event can be recovered and a new sampler (for the next sampling event) deployed immediately thereafter, so the new sampler remains in the well until the next sampling event.

Thus, a long equilibration time is ensured and, at the next sampling event, the sampler can be recovered immediately. This means that separate mobilizations, to deploy and then to recover the sampler, are not required. HydraSleeves can be left in a well for an indefinite period of time without concern.

IV. HydraSleeve Recovery and Sample Collection

1. Hold on to the tether while removing the well cap.
2. Secure the tether at the top of the well while maintaining tension on the tether (but without pulling the tether upwards)
3. Measure the water level in the well.
4. Use one of the following 3 retrieval methods. In all 3 scenarios, when the HydraSleeve is full, the top check valve will close. You should begin to feel the weight of the HydraSleeve on the tether and it will begin to displace water. The closed check valve prevents loss of sample and entry of water from zones above the well screen as the HydraSleeve is recovered.

   a. In one smooth motion, pull the tether up 30"-60" (the length of the sampler) at a rate of about 1 foot per second (or faster). The motion will open the top check valve and allow the HydraSleeve to fill (it should fill in about 1:1 ratio or the length of the HydraSleeve if the sleeve is sized to fit the well). This is analogous to coring the water column in the well from the bottom up.

   b. There are times it is recommended that the HydraSleeve be oscillated in the screen zone to ensure it is full before leaving the screen area. Pull up 1-3 feet, let the sleeve assembly drop back down and repeat 3-5 times before pulling the sleeve to the surface. The collection zone will be the oscillation zone. ***When in doubt use this retrieval method.***

   c. SpeedBags require check valve activation and oscillation during recovery: When retrieving the SpeedBag, pull up hard 1-2 feet to open the check valve; let the assembly drop back down to the starting point; REPEAT THIS PROCESS 4 TIMES; and then quickly recover the SpeedBag through the well sceen to the surface.

5. Continue pulling the tether upward until the HydraSleeve is at the top of the well.
6. Discard the small volume of water trapped in the Hydrasleeve above the check valve by pinching it off at the top under the stiffeners (above the check valve).

V. Sample Discharge

NOTE: Sample collection should be done immediately after the HydraSleeve has been brought to the surface to preserve sample integrity.

Be sure you have discarded the water sitting above the check valve – see step #6 above.

1. Remove the discharge tube from its sleeve.
2. Hold the HydraSleeve at the check valve
3. Puncture the HydraSleeve at least 3-4 inches below the reinforcement strips with the pointed end of the discharge tube. NOTE: For some contaminants (VOC's/sinkers) the best location for discharge is the middle to bottom of the sampler. This would be representative of the deeper portion of the well screen.
4. Discharge water from the HydraSleeve into your sample containers. Control the discharge from the HydraSleeve by either raising the bottom of the sleeve, by squeezing it like a tube of toothpaste, or both.
5. Continue filling sample containers until all are full.

Measurement of Field Indicator Parameters

Field indicator parameter measurement is generally done during well purging and sampling to confirm when parameters are stable and sampling can begin. Because no-purge sampling does not require purging, field indicator parameter measurement is not necessary for the purpose of confirming when purging is complete.

If field indicator parameter measurement is required to meet a specific non-purging regulatory requirement, it can be done by taking measurements from water within a HydraSleeve that is not used for collecting a sample to submit for laboratory analysis (i.e., a second HydraSleeve installed in conjunction with the primary sample collection HydraSleeve [see Multiple Sampler Deployment below]).

Alternate Deployment Strategies

Deployment in Wells with Limited Water Columns

For wells in which only a limited water column needs to be sampled, the HydraSleeve can be deployed with an optional top weight in addition to a bottom weight. The top weight will collapse the HydraSleeve to a very short (approximately 6" to 24") length, depending on the length and volume of the sampler. This allows the HydraSleeve to fill in a water column only 3' to 10' in height (again) depending on the sampler size. Note the SuperSleeves accomplish the same thing but provide greater sample volume at a lower per sample cost.

Multiple Sampler Deployment

Multiple sampler deployment in a single well screen can accomplish two purposes:

1. It can collect additional sample volume to satisfy site or laboratory-specific sample volume requirements.
2. It can be used to collect samples from multiple intervals in the screen to allow identification of possible contaminant stratification.

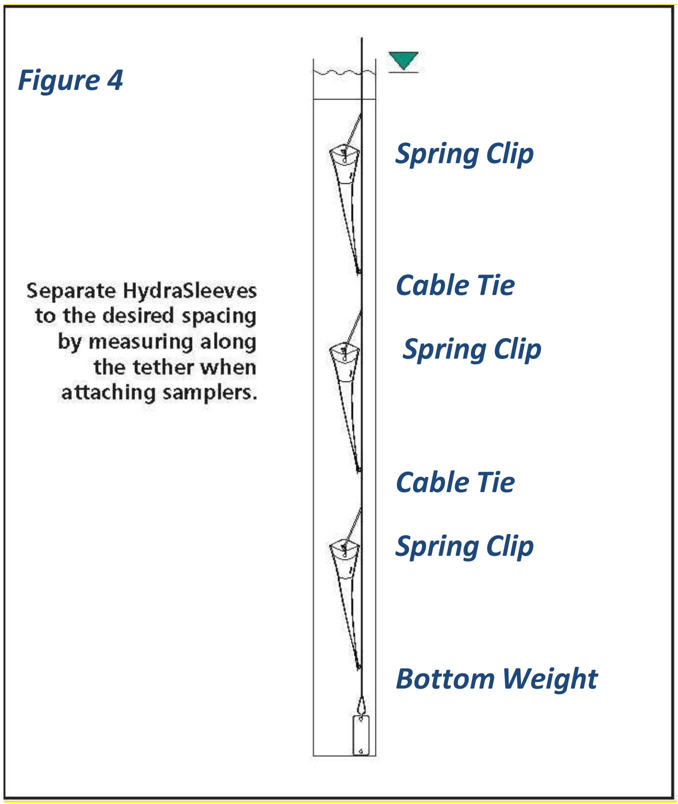


Figure 5. Multiple HydraSleeve deployment

If there is a need for only 2 samplers, they can be installed as follows. The first sampler can be attached to the tether as described above, a second attached to the bottom of the first using your desired length of tether between the two and the weight attached to the bottom of the second sampler (figure 6). This method can only be used with 2 samplers; 3 or more HydraSleeves in tandem need to be attached as described above.

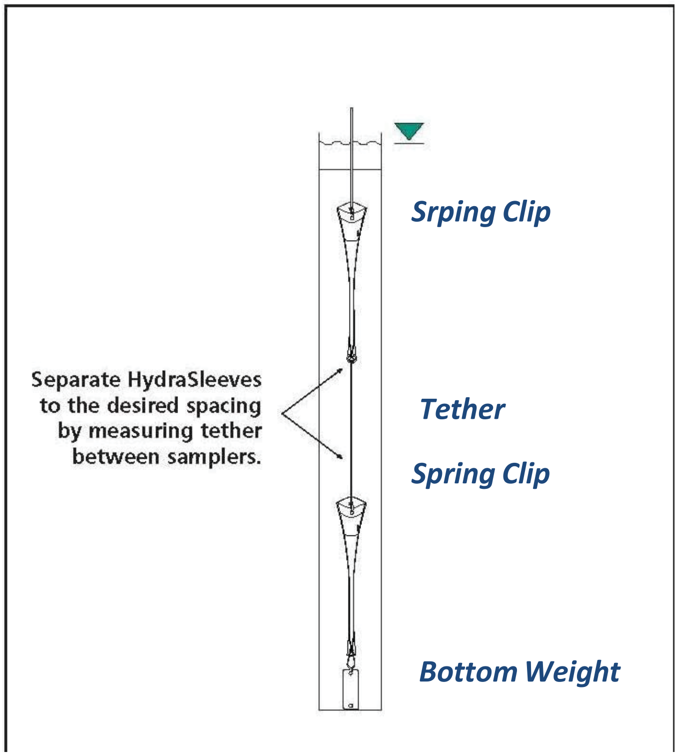


Figure 5. Alternative method for deploying multiple HydraSleeves.

In either case, when attaching multiple HydraSleeves in series, more weight will be required to hold the samplers in place in the well than would be required with a single sampler. Recovery of multiple samplers and collection of samples is done in the same manner as for single sampler deployments.

Post-Sampling Activities

The recovered HydraSleeve and the sample discharge tubing should be disposed as per the solid waste management plan for the site. To prepare for the next sampling event, a new HydraSleeve can be deployed in the well (as described previously) and left in the well until the next sampling event, at which time it can be recovered.

The weight and weight clip can be reused on this sampler after they have been thoroughly cleaned as per the site equipment decontamination plan. The tether may be dedicated to the well and reused or discarded at the discretion of sampling personnel.

References

McAlary, T. A. and J. F. Barker, 1987, Volatilization Losses of Organics During groundwater Sampling From Low-Permeability Materials, groundwater Monitoring Review, Vol. 7, No. 4, pp. 63-68

Parsons, 2005, Results Report for the Demonstration of No-Purge groundwater Sampling Devices at Former McClellan Air Force Base, California; Contract F44650-99-D-0005, Delivery Order DKO1, U.S. Army Corps of Engineers (Omaha District), U.S. Air Force Center for Environmental Excellence, and U.S. Air Force Real Property Agency

Robin, M. J. L. and R. W. Gillham, 1987, Field Evaluation of Well Purging Procedures, groundwater Monitoring Review, Vol. 7, No. 4, pp. 85-93

CREECH AFB

Groundwater Monitoring Checklist

Well Information

Well Name	ERP ID#	Date Completed	Previous Measured Total Depth (FT BTOC)	Screened Interval (FT BGS)	Casing Elevation (FT MSL)	Casing Material/Diameter (inches)	Latitude (WGS84)	Longitude (WGS84)	Previous DTW: (FT BTOC)	Current DTW: (FT BTOC)
										Date/Time: DTW:

Hydrasleeve

Size of Sleeve (L)	Calculated Intake Depth (FT BTOC)	Measured Distance Between Grade and TOC (FT)	Is Screen Fully Wetted (Y/N)?		NOTE: If measured distance between grade and TOC is >6" from initial set point OR screen is not fully saturated and groundwater levels have changed >1' from the previous monitoring event, a change in the hydrasleeve intake depth is necessary
`			Previously:	Currently:	

Was HydraSleeve Adjusted in Field? Yes / No	If yes, which components were adjusted?	
Final Intake Depth (FT BTOC)	Date and Time HydraSleeve Set	Date and Time HydraSleeve Retrieved

Field Parameters

Sample ID:	Date and Time Sampled:	Temp (°C)	Spec. Cond. (µS/cm)	DO (mg/l)	pH (S.U.)	ORP (mV)	Turbidity (NTU)	Appearance / Odor:

QC Samples

Field Duplicate Sample ID:	Date and Time Sampled:	MS/MSD Collected?: Yes / No	Associated Field Blank ID:	Associated Trip Blank ID:

Checklist

Depth to Water: Yes / No	Transducer Downloaded: N/A	Sample Analysis: PFC_IDA_D5.3-DoD list of 24	Samples Packed: Yes / No

Notes

Please make a note of the well condition and any issues that arose during sampling:

ATTACHMENT 6:
Field Forms

Daily PFAS Sampling Checklist

Date: ___________________ Site Name: _____________________________________

Weather (*temperature/precipitation*): ____

Please check all boxes that apply and describe any exceptions in the notes section below along with QA/QC methods used to assess potential sample cross-contamination as a result.

Field Clothing and PPE:

- ☐ No water- or stain-resistant clothing (e.g., GORE-TEX®)
- ☐ During collection of water and sediment samples, no water- or stain-resistant boots OR water- or stain-resistant boots covered by PFAS-free over-boots
- ☐ Field boots (or over-boots) are made of polyurethane, PVC, rubber, or untreated leather
- ☐ Waders or rain gear are made of polyurethane, PVC, vinyl, wax-coated or rubber
- ☐ Clothing has not been recently laundered with a fabric softener
- ☐ 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

Field Equipment:

- ☐ Sample containers and equipment in direct contact with the sample are made of HDPE, polypropylene, silicone, acetate or stainless steel, not LDPE or glass
- ☐ Sample caps are made of HDPE or polypropylene and are not lined with Teflon™
- ☐ No materials containing Teflon™, Viton™, or fluoropolymers
- ☐ No materials containing LDPE in direct contact with the sample (e.g., LDPE tubing, Ziploc® bags)
- ☐ 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)

Decontamination:

- ☐ Reusable field equipment (e.g., inner drill rods, samplers) decontaminated prior to reuse
- ☐ "PFAS-free" water is on-site for decontamination of field equipment
- ☐ Alconox® or Liquinox® used as decontamination detergent

Food and Drink:

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

Notes:____
____
____
____
____

Field Team Leader Name (Print): ______________________________

Field Team Leader Signature: ___________________________ Date/Time: _________________

Daily Field Notes	
Project Name	Date
Project Number	Time of Arrival / Departure
Location	Weather
Subject	Site Conditions
Personnel	
Equipment	
Calibration	
Activities	

Recorded by:

Page ___ of ___

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Corporate Headquarters
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www.pinyon-env.com

Safety Tailgate Meeting

Date: ______________________________ Time: ____________________________________

Location: ____

Instructor/Presenter: ____

Project Name and Number: ____

Topic of Discussion:

____
____
____
____
____
____

Attendees:

Print Name	Signature
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Pìnyon Environmental, Inc.

Well Sampling Record	
Project Name	
Project Number	
Well ID / ADWR #	
Date Completed	
Casing Material	
Casing Diameter (in)	
Screen (ft btoc)	
Well Total Depth (ft btoc)	
Survey Information	

Deployment	
Date / Time	
Type of Sampler	
Size of Sampler	
DTW (ft btoc)	
Deployment Depth (ft btoc)	
Personnel	
Notes	

Retrieval and/or Sampling	
Date / Time	
DTW (ft btoc)	
Sampler Integrity	
Personnel	
Notes	

Field Parameters

Date / Time	Water Temp (˚C)	pH (SU)	ORP (mV)	Sp Cond (µS/cm)	DO (mg/L)	Turbidity

Sample ID		
QAQC Samples		
Containers		
Preservatives		
Analysis		
Sampler Reset	Yes	No

The HydraSleeve deployment depth, relative to the depth to water and wetted screened interval, was in alignment at the time of retrieval: ____________________Yes___________________No

Notes: