Per- and Polyfluoroalkyl Substances (PFAS) Nevada Division of Environmental Protection (NDEP) Sampling Project of Public Water Sources and Other Potential Sources

Quality Assurance Project Plan (QAPP)

April 14, 2025

Prepared by:

Broadbent & Associates, Inc.

on behalf of the

Nevada Division of Environmental Protection

Approvals:

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A2 – Table of Contents

Appendices

LIST OF ACRONYMS

ANSI:	American National Standards Institute
ASQC:	American Society for Quality Control
Broadbent:	Broadbent & Associates, Inc.
°C:	degrees Celsius
CMDP:	Compliance Monitoring Data Portal
COC:	chain of custody
EPA:	U.S. Environmental Protection Agency
FRB:	field reagent blank
GPS:	global positioning system
HAL:	Health Advisory Limit
HASP:	health and safety plan
HDPE:	high density polyethylene
HFPO-DA / GenX:	hexafluoropropylene oxide dimer acid
LCS:	laboratory control spike
MCL:	maximum contaminant level
MDL:	method detection limit
mL:	milliliter
ML:	quantitation limit
MRL:	minimum reporting limit
MS/MSD:	matrix spike/matrix spike duplicate
NELAP:	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NDEP:	Nevada Division of Environmental Protection
NRS:	Nevada Revised Statutes
NPDWR:	National Primary Drinking Water Regulation
PDF:	portable digital format
PFAS:	per- and polyfluoroalkyl substances
ppt:	parts per trillion
PQL:	practical quantitation limit
PFHxS:	perfluorohexane sulfonate
PFNA:	perfluorononanoic acid
PFOA:	perfluorooctanoic acid
PFOS:	perfluorooctane sulfonic acid
PVC:	polyvinyl chloride
PVDF:	polyvinylidene fluoride
PWS:	Public Water System
QAPP:	Quality Assurance Project Plan
QA/QC:	quality assurance/quality control
SA:	spike added
SAM:	State Administrative Manual
SDWA:	Safe Drinking Water Act
SOP:	standard operating procedure
SR:	sample result
SSR:	spiked sample result

A3 – Distribution List

The following is a list of key project personnel and their responsibilities:

Contact Name / Organization	Responsibility	Location	Phone	Email
Ethan Mason / NDEP	NDEP Team Leader	Carson City, NV	775-687-9311	e.mason@ndep.nv.gov
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A4 ‑ Project Organization

A4.1 ‑ Organizational Roles and Responsibilities

The Nevada Division of Environmental Protection (NDEP) is the entity with oversight responsibility for drinking water quality in Nevada and implementation of this QAPP. Ethan Mason is the NDEP contract monitor for this effort and will be responsible for the overall technical management of this contract. Michael Antoine is the NDEP Quality Assurance (QA) Manager for this contract and will be responsible for ensuring the usability of data for NDEP.

Broadbent & Associates, Inc. (Broadbent) is the environmental consulting firm that was awarded the PFAS sampling and analysis contract. Joshua Fortmann is a Nevada Certified Environmental Manager and is the Broadbent Project Coordinator for this effort, responsible for the management of the contract. Eurofins Eaton, LLC (Eurofins), is the Nevada-certified environmental testing laboratory that has been subcontracted by Broadbent to provide PFAS analytical services. If analytical capacity becomes a concern, Pace Analytical (also a Nevada-certified laboratory) has been selected as a secondary laboratory to provide additional analytical capacity.

A4.2 – Organizational Chart

NDEP Bureau of Safe Drinking Water contracted Broadbent to perform PFAS sample collection, and Broadbent contracted Eurofins (primary laboratory) and Pace (secondary laboratory) to provide analytical services.

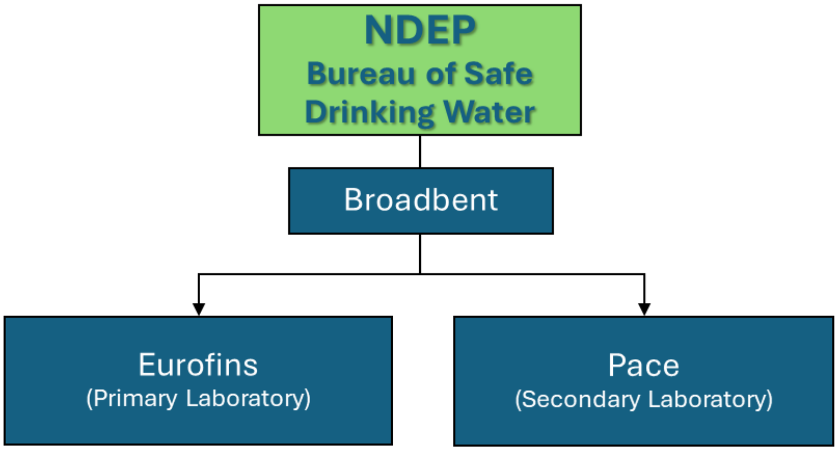

Figure 1 Organizational Chart

A5 – Problem Definition and Background

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals that have been in use since the 1940s. PFAS are found in a wide variety of consumer and industrial products. PFAS manufacturing and processing facilities, facilities using PFAS in production of other products, airports, and military installations are some of the contributors of PFAS releases into the air, soil, and water. Due to their widespread use and persistence in the environment, most people in the United States (US) have been exposed to PFAS. Studies show that certain PFAS compounds are persistent in the environment, bioaccumulate, and are toxic to laboratory animals and associated with adverse health effects in humans (including testicular cancer, kidney cancer, high cholesterol, pre-eclampsia, and thyroid problems).

There are thousands of PFAS, but the most extensively produced and studied of these chemicals are perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). In 2022, the US Environmental Protection Agency (US EPA) issued an interim updated health advisory level (HAL) for PFOA of 0.004 parts per trillion (ppt) and for PFOS of 0.02 ppt, replacing those issued in 2022. US EPA published a PFAS Strategic Roadmap in 2020, laying out likely further action from federal regulatory agencies. The health advisory offered a margin of protection from adverse health effects for all individuals, including babies exposed during pregnancy, nursing infants, children, and those exposed over a person's lifetime.

In April of 2024 the US EPA released the Final PFAS National Primary Drinking Water Regulation (NPDWR) establishing enforceable maximum contaminant levels (MCLs) for six PFAS compounds in drinking water: PFOA, PFOS, perfluorohexanesulfonic acid (PFHxS), perflourononanic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA), and mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and perflourobutane sulfonic acid (PFBS). The NPDWR provided a timeline of three years for Public Water Systems (PWS) to sample and report concentrations of PFAS in drinking water systems. In November 2024, EPA released a memorandum (provided in Appendix A) with details regarding how drinking water primacy agencies can consider previously collected PFAS drinking water data to satisfy some or all of the initial monitoring requirements. More regulatory guidance and PFAS information can be found on the US EPA's website: www.epa.gov/PFAS.

Interpreting data from analysis of PFAS in a variety of environmental sample types can be challenging due to variations in analytical protocols, quality control types and criteria, and data review procedures across laboratories and general ubiquity in the environment. Moreover, PFAS are analyzed at the ppt level, leaving little tolerance for cross-contamination of samples. Stringent quality control and adherence to sampling protocol is needed to ensure data quality and reliability to allow information decisions regarding site specific actions. This document outlines the level of quality control necessary such that any sample analyzed and reviewed can be relied upon for decision making purposes.

A6 – Project Description

This Quality Assurance Project Plan (QAPP) presents the policies, organization, objectives, functional activities, and quality assurance/quality control (QA/QC) activities designed to achieve the specific data quality goals to conduct sampling of drinking water sources and other potential drinking water sources identified by NDEP. This voluntary sampling effort by NDEP will work to characterize the extent of PFAS contamination in Nevada PWS and drinking water sources and collect initial monitoring data to satisfy the reporting requirements for the NPDWR. NDEP's goal is to collect PFAS data from all drinking water sources in Nevada to determine PFAS levels. This effort will complement the PWS internal sampling by providing additional opportunities to collect water quality samples beyond the 6 regulated PFAS compounds.

Samples will be collected from PWS and other potential sources selected by NDEP to determine PFAS concentrations for compliance with the NPDWR. Initial sampling will be coordinated and conducted by Broadbent with assistance from available facility operators. A Sampling Standard Operating Procedure (SOP) for PFAS Sample Collection is provided in Appendix B to ensure a consistent methodology is followed to minimize variables in results.

The primary laboratory selected for this project (Eurofins), and if necessary, the secondary laboratory (Pace), will report PFAS compounds based on the analytical method and as listed in Appendix C. Eurofins and Pace are Nevada certified laboratories for PFAS analysis. All analyses will be conducted using approved US EPA Method 533 (and US EPA Method 537.1 on a case-by-case basis) for drinking water samples and US EPA Method 1633 for other aqueous (e.g., surface water, non-potable water) samples.

A6.1 – Objective and Scope Statement

NDEP is implementing a voluntary monitoring program to characterize PFAS concentrations in Nevada PWS and drinking water sources. The sampling will satisfy the US EPA requirements for initial monitoring of PFAS in PWS. Sample results generated by this sampling effort will raise awareness of potential water quality issues with respect to PFAS by communicating analytical results to NDEP, and the regulated community, and by providing educational materials on how to address PFAS contamination, if necessary. Broadbent will also provide training to PWS on the implementation of PFAS sample collection procedures as prescribed by the QAPP and SOP for PFAS Sample Collection. This project will promote local partnerships between PWS and the communities they serve.

The project objectives are to conduct sampling and analysis which will provide data with an acceptable level of accuracy and precision to determine the extent (if any) of PFAS in Nevada drinking water sources. Broadbent, with assistance from available facility operators, will collect the samples, train facility operators on sampling procedures, and may provide guidance on mitigation procedures. Initial sampling will begin in 2024 and continue until all facilities/sites are sampled, or as many are sampled as the contract budget can accommodate. Follow up sampling activities may be conducted at locations identified with PFAS results in line with the PFAS NPDWR or NDEPs goals. Results that are below 1 ppt currently have a high uncertainty and would require additional sampling to confirm water quality.

A6.2 – Data Usage

Broadbent will summarize sample laboratory analytical results for presentation to NDEP. Data usage for this project will be for NPDWR compliance. In addition, any other analytes tested will be used by NDEP for further analysis of PFAS sources in that system. Environmental PFAS data will be compiled in a format suitable for ingestion into NDEP database, I-map, and NDEP PFAS Risk Assessment Modeling tool. Data will also be posted on NDEP's PFAS webpage. The data will enhance PFAS decision making capabilities and to facilitate development of the PFAS fate and transport risk assessment modeling tool.

A6.3 – Schedule of Tasks and Products

Project activities will be initiated in Fall 2024:

- October 2024 – Draft QAPP Submittal
- Mid-November 2024 – Begin sampling coordination, generate PWS training materials
- Early December 2024 – Receive Draft QAPP comments and submit Final QAPP
- Mid-December 2024 – Commence in office training for field staff on PFAS sampling procedures
- Late-December 2024 – Receive formal QAPP approval and commence sample collection
- Mid-December 2024 through 2026 – Sampling window for facilities/sites. Sample collection will be conducted on a rolling basis.

The schedule will be influenced by the timing of QAPP approval, and coordination of facility access, and will operate on a rolling basis for each facility/site individually. Broadbent will schedule sampling events following the priority list provided by NDEP.

A typical sampling schedule for each site is presented below.

Activity	Timeframe
Confirm Site Sampling Locations	~1 week
Receive Sample Bottles and Sample Training	1-2 weeks
Sampling (per site/facility)	1-2 days
Send Samples to the Laboratory	<2 days

Laboratory Processing	~1 month
Notifying NDEP	1-2 weeks
Potential Follow Up	As necessary / to be determined

Broadbent will continue to sample all NDEP identified facilities/sites within the available contract budget and term. The sampling schedule depends upon the facility/site response times when attempting to schedule sampling and the turn-around time of the laboratory.

A7 – Quality Objectives and Criteria

A7.1 – PFAS Quality Objectives

The quality objective is to provide NDEP drinking water sample analytical data at various facilities/sites for PFAS concentrations in water that meet QAPP requirement and are suitable for compliance purposes.

Management decisions regarding the control of PFAS in drinking water are based on the ability to reliably detect and quantify PFAS in drinking water. For PFAS, the possibility of outside contamination of samples is high, and the target action level concentrations are in the low parts per trillion range. To reliably achieve such low analytical detection and reporting limits, and to assure samples are free of outside contamination, robust sampling and analysis protocols and analytical methods are required. The generation of quality data is a process which relies on planning at the outset of a sampling project. The data verification process may identify potential sampling errors, such as preservation and sample handling methods, which are out of conformance with the sampling plans' data quality objectives.

PFAS sample results data will be acceptable if 1) approved SOPs are followed to minimize the potential for outside contamination to be introduced, 2) appropriate QA/QC samples are collected to ensure outside contamination is not present from either the laboratory or sampling methodology, 3) data generated can be verified or validated through established procedures listed in Section D1 of this QAPP, and 4) the detection limits achieved from the analysis are below the laboratory-specified minimum reporting levels (MRL).

Parameter	**Sample Matrix**	**Lab and Field Duplicate Samples RPD (≤2x MRL)**	**Lab and Field Duplicate Samples RPD (>2x MRL)**	**MS/MSD Recovery (≤2x MRL)**	**MS/MSD Recovery (>2x MRL)**	**Method Blank**	**LCS Recovery (2 ng/L)**	**LCS Recovery (30 ng/L, 60 ng/L)**	**MRLs (ng/L)**
PFOA	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0
PFOS	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0
HFPO-DA	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0
PFNA	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0
PFBS	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0
PFHxS	Water	≤50	≤30	50-150%	70-130%	<1/3 MRL	50-150%	70-130%	2.0

Table 1 Data Quality Indicators Summary Table

A7.2 – QC Performance Criteria for Water Chemistry

A7.2.1 – Field Precision

Precision of field sample collection procedures will be assessed by the analysis of field duplicate samples. Field duplicate samples will be collected at a minimum frequency of 1 per 10 (10%) field samples. The samples will be labelled such that the field duplicate sample is "blind" to the laboratory. A relative percent difference (RPD) of 50 percent for water samples will be used as the acceptance limit for analytes detected in both the investigative and field duplicate samples at concentrations greater than or equal to five times their quantitation limits.

A7.2.2 – Laboratory Precision

Laboratory precision will be assessed through the calculation of RPDs for laboratory duplicate sample analyses. These will be matrix spike/matrix spike duplicate (MS/MSD) and/or laboratory control samples/laboratory control sample duplicates (LCS/LCSD). The equation to be used to determine precision is presented in Section D1.1 of this QAPP. Laboratory precision acceptance criteria will be generated by the laboratory and included in the laboratory reports. Samples for MS/MSD analysis will be identified on the chain of custody (COC) at a frequency of 5% of primary samples.

A7.2.3 – Field Accuracy

The criteria for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as inadequate equipment decontamination procedures or sample contamination by ambient conditions or sample cross contamination. Field sampling accuracy will be assessed using the data from equipment blank samples and field blank samples.

Equipment blank samples will be collected at a minimum frequency of 1 per 20 field samples (5%) or 1 equipment blank per day, whichever is most frequent, when non-dedicated sampling equipment is used. Equipment blank samples will be collected by routing PFAS-free water over decontaminated sampling equipment (e.g., sampling pole) and into sample containers. Only sampling equipment and materials known to be PFAS-free (e.g., stainless steel, HDPE, PVC, polypropylene, acetate, or silicone) may be used. Non-dedicated sampling equipment includes sampling pole, sampling scoop, and bailer. Equipment blank samples will be analyzed for the same parameters as the field samples. Equipment blank samples are collected, preserved, and shipped in an identical manner as field samples. The purpose of equipment blanks is the assess the adequacy of the decontamination process, assess contamination from the total sampling event, sample preparation and measurement process where decontaminated sample equipment is used to collect samples as opposed to one-time use equipment. An equipment blank captures the ambient environmental conditions that a field blank is intended to capture but will not distinguish detections related to equipment conditions versus ambient conditions.

For non-potable water sample collection, whether or not non-dedicated sampling equipment is used, a field blank sample will be collected at a minimum frequency of one per day when non-potable samples are collected. Field blanks are prepared by pouring PFAS-free water into sample bottles at the same location as field sample collection. Field blank samples will be analyzed for the same parameters as the field samples. Field blank samples are collected, preserved, and shipped in an identical manner as field samples. The purpose of the field blank sample is to assess ambient contamination from field conditions during sampling.

For drinking water systems, a field reagent blank (FRB) will be collected at each sampling location. A FRB will be collected in laboratory prepared bottles using PFAS-free water. FRB samples are collected, preserved, and shipped in an identical manner as field samples. The purpose of the FRB sample is to assess ambient contamination from field conditions during sampling.

The samples will be labeled such that the equipment blank and field blank samples are "blind" to the laboratory.

Equipment, field blank, and FRB samples should not contain target analytes. The blank sample data will be evaluated using the procedures specified in D1.2 of this QAPP. Accuracy also will be ensured by adhering to all sample handling procedures, sample preservation requirements, and holding time periods.

Accuracy of field measurements will be assessed by analyzing calibration check samples, as applicable to the parameter being measured.

Additional types of field QC samples used in this project are described in Section B5.

A7.2.4 – Laboratory Accuracy

Laboratory accuracy will be assessed by determining percent recoveries from LCS analyses. An LCS will be analyzed at a frequency of 1 per laboratory batch of 20 or fewer samples of the same matrix. Accuracy relative to the sample matrix will be assessed by determining percent recoveries from the analysis of MS samples. The equation to be used to determine accuracy for this project is presented in D1.2 of this QAPP. Laboratory accuracy acceptance criteria will be generated by the laboratory and included in the laboratory reports.

QC samples will be analyzed at rates consistent with the analytical method(s). The results will be evaluated as described in the applicable section of the PFAS method used and US EPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537 (US EPA, 2018a).

A7.3 – Data Representativeness

The sampling effort is designed to identify public drinking water sources impacted by PFAS and to provide sample analytical results for NPDWR compliance. Sampling at facilities/sites will be conducted at locations closest to the source intake. This sampling is performed from engineered sampling ports or faucets, most commonly at the direction of the PWS Operator for the most representative system sample. All procedures for effective sampling results will be collected as outlined in section B2 – Sampling Method. Due to the multifaceted nature of this sampling effort and the goals of the NDEP, other samples may be taken to better understand the relationships between PFAS contamination and the PWSs in Nevada.

Under this QAPP, PFAS sampling and analysis method activities will be primarily focused on characterizing PFAS concentrations in drinking water sources in selected areas of Nevada. Priorities will be set based on the timing of previously collected samples for NPDWR compliance or at the discretion of NDEP.

A8 – Special Training

Sample collection personnel will be trained by Broadbent to ensure they follow the SOP for PFAS Sample Collection (Appendix B) to minimize PFAS introduction during sampling. Broadbent will maintain training records of sampling personnel. When FRB samples have PFAS present, replicate sample results are inconsistent, or when procedures are not being followed, additional training will be provided. Laboratory personnel training records are maintained by the laboratory. The analytical laboratory is required to be accredited by the National Environmental Laboratory Accreditation Program (NELAP) to demonstrate compliance with US EPA's requirement that the laboratory have a documented quality system that complies with American National Standards Institute/American Society for Quality Control (ANSI/ASQC) E4 94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R 2 ("EPA Requirements for Quality Management Plans", March 2001). The analytical laboratories selected for this project are accredited by NELAP for the analyses identified in this QAPP.

Broadbent will provide PFAS sample collection training for the operators at the drinking water systems being sampled. After the initial sample collection training performed and documented by Broadbent, each drinking water system will be responsible for performing subsequent training, maintaining a record of training, and following the SOP for PFAS Sample Collection protocol to ensure compliance with sampling requirements.

A9 – Documents and Records

The final QAPP will be provided to the appropriate project personnel through email by the Project Coordinator as detailed in the distribution list. Draft and final QAPP versions will be sent to each person on the distribution list via email or file sharing if the file exceeds 20 megabytes. The date of revision will be included in the document name and in the footer of the document.

The chain-of-custody and any other sampling-related forms shall be maintained in their original form by the authorized sample collector. Information from contractors and sampling personnel will be maintained as required by NDEP. Sample collection personnel will submit all original forms to the Project Coordinator. Broadbent will summarize the analytical results for samples submitted and provide method detection limits (MDLs), quantitation limits (MLs or PQLs), data qualifiers, and associated QC results in a data report (electronic and paper copies), as well as providing a narrative summary of QC measurement results and both the paper and electronic reports to the NDEP in a timely manner (within 2 months of sample delivery to laboratory). Data should be censored at the MDL, with results above the MDL and below the PQL reported “as is” with an estimated (J) qualifier. Results less than the MDL should be reported as the value of the MDL, with a U qualifier (non-detect). Results greater than the quantitation limit (ML or PQL) is reported “as is” without a U or J qualifier. NDEP will assess any data change and continue to report the PQL for record purposes. Water systems to align with the PFAS Rule will be educated on the importance of defined data fields and interpretation of sampling results.

All PFAS analytical results will be provided in an electronic format agreed upon by NDEP to facilitate ingestion into BSDW databases and the PFAS Risk Assessment Modeling tool[1]. Data will be released to the public and as/when available. Thru the use of online tools present at NDEP and posted on the NDEP PFAS webpage. Data shall be provided in tabular format. For samples collected at PWS source locations (wells, springs, intakes), the data should contain the unique PWS identification (ID) number and State Assigned Source ID number (e.g., NV0000190_W33). Coordinates in decimal degrees (North American Datum of 1983 [NAD 83]) may also be provided for additional accuracy. For samples collected in other locations, coordinates must be provided.

The format for all data recording will be consistent with the requirements and procedures used for data assessment, verification and validation described in this QAPP. Files generated according to applicable SOPSs (e.g., raw data, results of QC checks, problems encountered) will be documented and reported to the NDEP QA Manager.

All communications regarding study plan changes or refinements, such as changes to facilities/sites, staff, or parameters will be archived and maintained in accordance with SAM 0400 by the Project Coordinator.

All PFAS concentrations at or above the US EPA MCL will be communicated from the Broadbent Project Coordinator to the NDEP Project Officer within 96 hours of final level review and laboratory management's approval/validation of the analytical batch in which the exceedance was detected. Electronic data for inclusion into these various databases may be provided subsequent to the laboratory report and/or detection notification required.

A9.1 – Document/Record Control

The recording media for the project will be a combination of PFAS-free paper and electronic means to document site conditions. Data gathered using paper will be recorded using pen, and changes to such data records will be made by drawing a single line through the error with an initial by the responsible person. Similar methods will be used for electronic data recording.

Agency management, Project Coordinator, and QA Managers will approve updates to the QAPP, as needed. The Project Coordinator shall retain copies of all management reports, memoranda, and all correspondence between team members. Retention of records should emphasize any deviations from the signed QAPP, including the rationale for those changes.

A9.2 – Document Storage

The Project Coordinator will maintain a central project directory, that will act as a repository for all data collected or generated as part of this project.

Broadbent will maintain project records on a Broadbent server for a duration of five years. Broadbent server data is backed up on cloud servers. All files will be retained by NDEP according to the NDEP

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[1] BSDW database provides additional details to the NDEP about location of sampling of potential contaminants and projects. The PFAS Risk Assessment Modeling tool is a tool being developed under contract for BSDW to identify the extend of PFAS contamination in the state and to model fate & transport of PFAS in Nevada.

records retention policy in the SAM 400 and NRS 239. The laboratory will maintain all records consistent with the laboratory’s record retention policies. Lab reports will be maintained in accordance with SAM 0400. Lab results will be made available to the public and any interested party at request.

B1 – Sampling Process Design

General sampling design is described below. Broadbent will work with each facility/site to identify and confirm sample collection locations and sampling logistics.

Primary Analytical Laboratory- Eurofins

Eurofins Eaton Analytical (Pomona, California) will be used for analysis of drinking water samples by US EPA Method 533 and 537.1, and Eurofins Test America (West Sacramento, California) will be used for analysis of non-potable water samples by US EPA Method 1633.

Secondary Analytical Laboratory- Pace

Pace (Ormond Beach, Florida) will be used for analysis of drinking water samples by US EPA Method 533 and 537.1, and Pace (Minneapolis, Minnesota) will be used for analysis of non-potable water samples by US EPA Method 1633.

B1.1 – Types and Numbers of Samples Required

The number of samples will vary depending on the site. Water samples will be collected from PWS and identified surface water intakes for drinking water systems. Drinking water samples collected from PWS will be analyzed for 25 PFAS compounds (listed in Appendix C) using US EPA Method 533. At the discretion of NDEP, drinking water samples may also be analyzed using US EPA Method 537.1. Sample collection at a PWS will include collecting a field sample and FRB at each identified sampling location. Collected water will be preserved using appropriate methods, as outlined in Appendix B and US EPA Method 533 (US EPA, 2019), US EPA Method 537.1 (US EPA, 2018), or US EPA Method 1633(US EPA, 2024). All sample types will be indicated on the chain of custody.

B1.2 – Design of the Sampling

Samples will be discrete grab samples from each drinking water source at each facility/site. In locations where samples are regularly obtained for PWS use, collections will be made according to best practices. Based on the expertise of the operators, PWS samples should be representative of the pretreatment and post-treatment processes when collecting samples. Due to the multifaceted nature of this sampling other collections may be made to enhance NDEPs understanding of PFAS contamination to water quality at the discretion of the Project Manager. All sampling will reference the updated Standard Analytical Methods being used by the EPA to determine possible PFAS contamination. NDEP will align changes to sampling schedule as needed with approved EPA methods and NDEP certified labs.

B1.3 – Sampling Locations and Frequencies

The sampling sites will consist of priority drinking water source sites and surface water intakes as provided by the NDEP in Appendix D. The Sample Location list may be modified at the discretion of NDEP based on the presence of water treatment systems and/or site access constraints. Samples may be collected at the PWS source and at the entry point to the distribution system. For this project, the initial samples will be taken at designated facility/site locations. NDEP may request follow up sampling if PFAS are detected above HALs or MCLs in the initial sample or if the facility requires additional monitoring for compliance. After the facility operators have been trained for PFAS sampling, the facility may conduct its' own supplemental sample collection.

If a site cannot be sampled due to access issues, the contractor shall communicate with NDEP in taking provisional action to identify an alternate site or assist in gaining access, if feasible.

Pre-Sampling Procedures

Broadbent will work with the facility/site to coordinate a schedule for sampling. A proposed sampling date/time must meet the following criteria:

  - Sufficient time allowed for the sampler to access the facility/site.
  - Coordination with facility/site management for specific site access requirements such as locked gates or doors.
  - Coordination with the laboratory so they can schedule sample receipt and analysis.

Sampling

- Once the pre-sampling procedures have been completed, the Project Coordinator will identify which locations will be sampled, authorize samples to be collected and direct the sampler. The Project Coordinator will authorize any follow up sampling events with approval of NDEP.

  The Project Coordinator will document any decisions made to authorize samples that deviate from the process shown in Figure 2 below.

- Sample Bottle Delivery and Pick-up
  - The sample kit will be sent to the authorized sampler
  - Included in the package will be:
    - Sample bottles (specified number of bottles requested from laboratory for field samples and QC samples)
    - Cooler
    - Chain of Custody (Appendix F)
    - Return shipping label

- Sampling Teams
  - **Two-person sampling teams are recommended**. Distributing the workload to ensure attention to the SOP for PFAS Sample Collection (Appendix B) is easier with a two-person team. Also, having another team member present will increase awareness to surrounding conditions and actions that can adversely affect the quality of the sampling effort. Team members should watch each other's movement and activities where possible and identify immediately if someone is observed not following protocol. When sampling for PFAS, a two-person team allows one person to be a dedicated "sample" handler, and the other person the dedicated "document" handler. One team member obtains the samples, and the other team member records the samples on the

COC form with the sample collection information. If only one person is conducting the sampling: first collect the sample and place sample containers in the dedicated Ziploc® type sample bag, then ensure care is taken to properly record all samples on the COC. Follow all other precautions noted in this guidance.

- Shipping
    - The authorized sample collector must schedule collection and delivery dates so that samples are received by the laboratory **within 48 hours of having been collected**. For this reason, it is preferrable for samples to be collected on Monday, Tuesday, and Wednesday. If the sampling schedule requires Friday sample shipment, contact the laboratory to confirm a laboratory employee will be present on Saturday to receive the samples.
    - After the sample is taken, it must be extracted at the laboratory within 28 days of sampling.
    - The samples shall be shipped on ice to the laboratory by overnight service.
        - Cooler specific instructions will be provided by the laboratory as part of bottle order shipments
        - See Appendix B for laboratory address and contact information

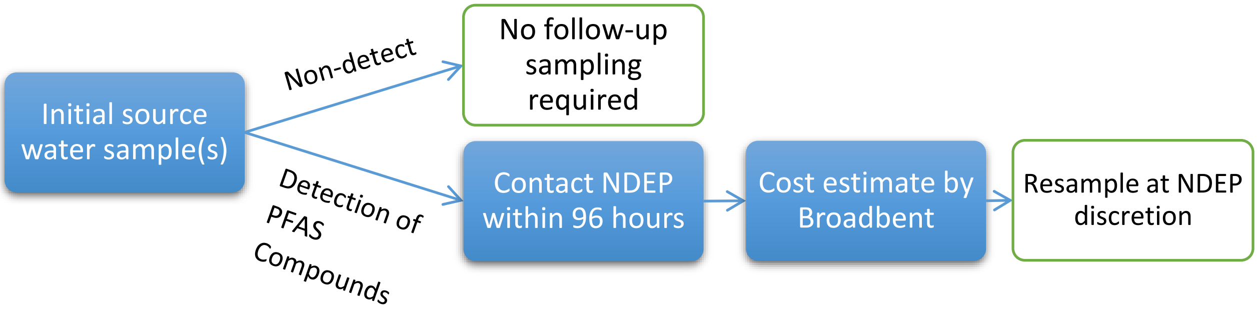


Figure 2 Sample Process Flow Chart

B2 – Sampling Method

All initial and follow-up samples will be collected as grab samples and according to the instructions within this document and as provided in Appendix B.

Table 3 in Section B4 presents a summary of the sample containers, sample volume, preservation requirements, and maximum holding time. Sample containers and bottles will be pre-preserved, pre-cleaned, and will not be rinsed prior to sample collection.

Sample collectors shall conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. The sample collector will thoroughly wash hands prior to donning new nitrile gloves at each sampling point to avoid exposure to pollutants and other chemical, physical, and biological hazards, and to prevent cross-contamination of samples. The sample collector will not touch the insides of bottles or lids and caps during sampling.

All chemical data, field data, and data analysis methods and procedures in this document follow those specified in US EPA Method 533 (US EPA, 2019), US EPA Method 537.1 (US EPA, 2018), and US EPA Method 1633 (US EPA, 2024).

B3 – Sample Handling and Custody

Sample handling shall be consistent with the SOP For PFAS Sample Collection in Appendix B. Sample handlers should complete the chain of custody form before sampling, with any technical assistance needed from contractors.

A unique sample ID will be assigned to each sample. Upon collection, each sample will be labeled and include sample ID, date/time, sampler initials, preservative, and analysis requested.

Sample Nomenclature

To maintain an organized sampling scheme, the Project Coordinator and field staff will implement the following formatting rules when naming samples.

PWS ID Number-State Assigned Source ID Number - This is a unique identifier assigned to every PWS and source (e.g. well) by the NDEP.

Sample ID Format:

- [Sample ID]-[QA/QC Type (if applicable)]
- Example 1 – Field reagent blank: NVXXXXXXX_XXX_FRB
- Example 2 – Field sample collected: NVXXXXXXX_XXX

The components of these sample name formats are as follows:

1. Sample ID – This is an alphanumeric code that uniquely identifies each pre-defined sample point.
2. QA/QC Type (if applicable) - QC type codes should be included for QC samples and are listed below in Table 2.

	Description
Sample ID	Unique identifier assigned by the NDEP
NVXXXXXXX_XXX	Unique Sample ID describing the point where the sample was collected
QA/QC Type	This describes the type of QA/QC sample when applicable
_FRB	Field Reagent Blank
_DUP	Duplicate
_FB	Field Blank
_EB	Equipment Blank

Table 2 Sample Nomenclature

B4 – Analytical Methods

Analyte	Sample Matrix	Analytical Method Reference	Sample Container (1)	Sample Preservation	Holding Time
PFAS analytes (Appendix C Table 1)	Drinking Water	US EPA 533	250 milliliter (mL) Polypropylene or HDPE	Ammonium acetate 1.0 gram per liter (g/L) 6° Celsius	28 days
PFAS analytes (Appendix C Table 2)	Drinking Water	US EPA 537.1	250 mL Polypropylene or HDPE	Trizma 5.0 g/L 6° Celsius	14 days
PFAS analytes (Appendix C Table 3)	Surface Water	US EPA 1633	1-500 mL Polypropylene or HDPE and 1-250 mL Polypropylene or HDPE	6° Celsius	28 days

(1) Additional sample volume will be collected for QC samples including duplicates and MS/MSD

Table 3 Sample Container and Analytical Method Details

Samples will be submitted with a 10-day turnaround time from the laboratory. The laboratory will be responsible for sample disposal following analysis. Detailed procedures for laboratory analytical methods are provided in Appendix G.

B5 – Quality Control

Due to the required low detection limits of PFAS in drinking water, US EPA Method 533 and US EPA Method 537.1 require the collection of a FRB sample at the same time that the field sample (source sample) is collected. These QC samples must be discussed with the laboratory prior to sampling to ensure proper sample containers and materials are on hand when sampling begins in the field. Field duplicate samples will be collected at a minimum frequency of 1 per 10 (10%) field samples and MS/MSD QC samples will be collected at a minimum frequency of 1 per 20 (5%) field samples.

QC samples will match those described in US EPA Method 533 (US EPA, 2019), US EPA Method 537.1, or US EPA Method 1633.

FIELD REAGENT BLANK (Required for US EPA Method 533 and US EPA Method 537.1)

An FRB is collected to assess the potential for PFAS cross-contamination being introduced during the sampling process. The FRB consists of a pre-preserved sample bottle filled by the laboratory with PFAS-free water and shipped to the site with the other sample bottles. For each FRB, an empty sample bottle (with no preservative) must also be included. At the sample site, the sampler will open the FRB and pour it into the empty sample bottle. An FRB must be collected at each sample site (i.e., each source being sampled) and placed in the ice chest used to store and transport samples. The FRB will be analyzed if there are reported PFAS concentrations in the field sample.

FIELD SAMPLE (Required)

The Field Sample is the sample collected from the source at a location prior to any treatment, to qualify as a “source sample”. Drinking water samples will be collected at the closest feasible access point to the source intake.

B6 – Calibration Procedures and Equipment

Calibration of field instrumentation (e.g., water quality meter) is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards are determined by the manufacturer guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with the QA monitoring and repairs program. These records will be checked during periodic equipment review and internal and external QA/QC audits.

All laboratory equipment will be tested, calibrated, and maintained in accordance with the applicable method(s) approved by the laboratory. There are no field instruments anticipated for this project.

B7 – Data Management

Each PFAS data result obtained from a facility/site will be identified by the Sample ID. Data shall be provided to NDEP in tabular format. A portable digital format (PDF) and electronic data deliverable (EDD) will be provided for each laboratory report. The analytical laboratory will submit an EDD to the NDEP Compliance Monitoring Data Portal (CMDP). Coordinates in decimal degrees (WGS 84 or NAD 83) or UTM’s may also be provided for additional accuracy. For samples collected in other locations, coordinates must be provided. The analytical laboratory data generated from the project are compliance data.

B7.1 – Laboratory Data Management

The data will be maintained in an electronic or hard-copy format. All material records will be maintained for the full duration of the project.

B7.2 – Data Management Summary

The Project Coordinator will maintain the project file in a dedicated folder. The objective is to have a complete record of all decisions about modifications of data collection, assessment, verification, validation, or interpretation between the QAPP signoff and project report completion. Data received from the laboratory will be stored by Broadbent on their servers for a duration of five years. The laboratory will maintain all records consistent with the laboratory’s record retention policies.

The data will be collected with the following documents that will be completed for this project:

1. Chain of Custody Form (Appendix F): All pertinent sampling information will be recorded on a sampling form, including (but not limited to): Sample ID, sample time, and any other pertinent observations. A digital copy of the Chain of Custody should be emailed to the Project

Coordinator. The hard copy of the Chain of Custody form will be mailed along with the samples to the laboratory.

2. Laboratory reports
    a. Laboratory reports will be sent to the Project Coordinator
    b. The Project Coordinator will notify NDEP and the sampled facility if directed to do so by NDEP

The documents may be converted into electronic versions. The Project Coordinator will be responsible for maintaining the data from the COC and laboratory reports.

Broadbent will consult with NDEP to analyze the data and make recommendations. The implementation of any recommendations is beyond the scope of this project.

C1 – Assessments and Response Actions

C1.1 – Assessments

Periodic assessment of facility/site sample sites, field equipment, and laboratory equipment is necessary to ensure that sampling is efficient and data obtained meets quality objectives. This is an ongoing process that continues every day the project is implemented. Routine assessments and communication are required to ensure any problems are quickly identified and resolved.

C1.2 – Response Actions

Despite best preparations, assessments may find situations requiring corrective actions. Small day-to-day level assessment findings are often addressed by the individual doing the assessment in the field or in the laboratory and are common enough to the process to not necessitate a formal response.

QA staff are aware that response may be necessary (many of these will result in changes to the analytical reporting via data qualifiers and comments) if any of the following occur:

- QC data are outside the acceptable windows for precision and accuracy
- Blanks contain target analytes above acceptable levels
- Undesirable trends are detected in spike recoveries or relative percent difference between duplicates
- There are unusual changes in detection limits
- Deficiencies are detected by the laboratory, Project Coordinator, or NDEP QA Manager
- Inquiries concerning data quality are received

Laboratory corrective actions will follow regular laboratory procedures and SOPs. Any laboratory corrective action with the potential to affect data quality will be communicated within 24 hours to the Project Coordinator. The laboratory will evaluate if data requires any additional qualifiers and/or if it is usable for its originally intended purpose.

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective action system will be:

- Checking the predetermined limits for data acceptability beyond which corrective action is required

- Identifying and defining problems
- Assigning responsibility for investigating the problem
- Investigating and determining the cause of the problem
- Determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses)
- Assigning and accepting responsibility for implementing the corrective action
- Implementing the corrective action and evaluating the effectiveness
- Verifying that the corrective action has eliminated the problem
- Documenting the corrective action taken and outcome

Field corrective actions may include site access issues or sampling tap access or cross contamination concerns. The need for correcting any of these issues will be minimized to the best of the field staff's ability with ample planning and preparation. Issues encountered in the field should be discussed with the Project Coordinator in 'real-time' if possible.

C1.3 – Reporting and Resolution of Issues

Any findings of practice or procedure that do not conform to the written QAPP will be corrected as soon as possible. Broadbent Project Coordinator and NDEP QA Manager will be notified regarding deviations.

C1.4 – Data Completeness

Overall success of the project will be determined by the described sampling resulting in successful useable results. Potential data gaps will be monitored as the project progresses, and the schedule will be revised to fill these gaps where they are determined to be significant or to potentially impact the fulfillment of project objectives.

C2 – Reports to Management

Broadbent staff shall be in continuous contact with their immediate supervisor or the Project Coordinator. Reports will include, but not be limited to sample schedules, summaries of activities performed, technical support, etc.

C2.1 –Sample Results

Laboratories will report the PFAS compounds (Appendix C) identified in the methods as determined by sample source. Sampling results shall be reported in nanograms per liter (ng/L). All analytical laboratory reports shall only report the compounds identified in the methods as determined by sample source. Laboratory reports will be sent to the Project Coordinator. The Project Coordinator will notify the NDEP of the results, along with recommendations.

NDEP and the Project Coordinator will determine the appropriate response and will document decisions to proceed with facility notification.

D1 – Verification and Validation Methods

The analytical data generated during this project must be of sufficient quality to decide whether a facility/site shows detectable concentrations of US EPA Method specific analytes (Appendix C). To ensure that this objective is achieved, Broadbent will implement and adhere to the following requirements, data verification and validation activities:

- The laboratories shall adhere to QC measures as stated in US EPA Method 533, US EPA Method 537.1, or US EPA Method 1633.
- At the discretion of NDEP, facilities/sites that exhibit PFAS detections may be resampled and reanalyzed by Broadbent (as described in Section B1.3) to verify the detection. Resampling will significantly reduce the potential for analytical false positives.

The NDEP QA Manager will evaluate all components of the sampling process and analytical reports to determine whether the data quality objective has been met and that data are appropriate as a basis for recommendations regarding the presence of PFAS in facilities/sites. The NDEP QA Manager will convey this information to the rest of the team.

D1.1 - Precision

Precision of field sampling procedures will be evaluated by assessing the RPD data from field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate LCS analyses. The RPD between two measurements is calculated using the following simplified formula:

Where:

$$\text{RPD} = \frac{|R1-R2|}{(R1+R2)/2} \times 100\%$$

R_1 = Value of first result

R_2 = Value of second result

RPD data will provide the means to evaluate the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures. It should be noted that the RPD of two measurements can be very high when the concentrations approach the quantitation limit of an analysis.

D1.2 - Accuracy/Bias

The data from method blank samples, surrogate compound spikes, LCS, and MS/MSD will be used to determine accuracy and potential bias of the sample data.

The data from method blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method blank contamination will have been identified during the data validation process. Sample data associated with method blank contamination are evaluated during the data validation procedure to determine if analytes detected in samples associated with contaminated method blanks are "real" or are impacted by laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration in the method blank sample taking into account adjustments for sample preparation and dilution factors. In general, the sample data are qualified as non-detect "U" if both the sample and blank concentrations are less than the reporting limit or less than 2x the reporting limit for common laboratory organic contaminants (acetone, 2-butanone and methylene chloride). The "U" qualifier indicates that the result is a laboratory artifact based on the method blank contamination.

The data from equipment blank and field blank samples provide an indication of field conditions that may result in bias of sample data. Sample data associated with contaminated equipment blank samples will have been identified during the data validation process. The evaluation procedure and qualification of sample data associated with equipment contamination are performed in a similar manner as the evaluation procedure for method blank sample contamination.

MS sample data provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. MS samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during the data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCS. LCS are artificial samples prepared in the laboratory using a blank matrix fortified with analytes from a standard reference material that is independent of the calibration standards. LCS are prepared and analyzed in the same manner as the field samples. The percent recovery data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each analyte or analyte group.

Percent recovery is calculated using the following formula:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

Where:

SSR = Spiked Sample Result

SR = Sample Result or

Background SA = Spike Added

Appendix A

EPA Memorandum – PFAS National Primary Drinking Water Regulation Monitoring and Reporting

Appendix B

Standard Operating Procedure for PFAS Sample Collection

1. Introduction

This procedure is intended for personnel authorized to collect samples in support of this QAPP. The samples collected are to identify levels of PFAS (per- and polyfluoroalkyl substances) being regulated by the Final PFAS National Primary Drinking Water Regulation (NPDWR). The six PFAS chemicals being regulated are perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorohexanesulfonic acid (PFHxS), perflourononanic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA), and mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and perflourobutane sulfonic acid (PFBS). Nevada Department of Environmental Protection (NDEP) may also collect data on non-regulated PFAS chemicals to better understand sources of PFAS in water systems.

This sampling effort is being carried out under US EPA federal regulation NPDWR, which requires initial monitoring of PFAS for of public drinking water systems to be conducted before 2027.

Broadbent will coordinate with the facility/site, to identify the sampling locations and number of samples needed. To meet federal regulation this project requires multiple samples be collected from each sampling location over the period of a year. Initial monitoring results will determine the frequency that samples will need to be collected. NDEP may request follow up sampling if detections exceed the Maximum Contaminant Levels (MCLs) described in the NPDWR, or if additional sampling is needed for compliance. If sampling must deviate from this guidance, the sampler will contact the Project Coordinator for approval and record detailed notes of any deviation and approval in their field forms.

Broadbent will arrange for the sample collectors to receive sample bottles and to ship the samples to the laboratory for analysis. If facility operators are performing sample collection, they will need to contact the laboratory to arrange for sample bottle receipt. See sections 5 and 9 below for shipping guidance.

2. Definitions

°C	Degrees Celsius
COC	Chain of Custody
US EPA	United States Environmental Protection Agency
FRB	Field Reagent Blank
HAL	Health Advisory Limit
HDPE	High Density Polyethylene
mL	milliliter
NDEP	Nevada Division of Environmental Protection
PFAS	per- and polyfluoroalkyl substances
PVC	Polyvinyl Chloride
US EPA	United States Environmental Protection Agency

3. Safety Requirements

A health and safety plan should be prepared prior to commencing all field work on site and should be reviewed regularly and updated throughout the project as changes in conditions or work methods occur.

Reference should be made to safety requirements and considerations described in specific sampling procedures. The following provides a brief summary of some typical safety issues associated with water sampling.

Weather

Consider the effect that adverse weather conditions may have on the safety of the sampling process.

Confined spaces

Sample collection at some sites may require confined space entry. Only confined space trained staff will enter confined spaces and they will follow all project-specific safety requirements. The need to enter a confined space should be identified during the sample scheduling process, so confined space trained staff and recovery equipment can be assigned for sample collection.

4. Sampling Equipment and Procedure

a. Drinking Water

1. Sampling Equipment
    a. You will receive 250-milliliter (mL) polypropylene sample bottles in which the samples must be collected. These bottles will contain ammonium acetate or Trizma© which helps chemically preserve the sample.
    b. You will also receive Field Reagent Blanks (FRB), which are sample bottles filled with PFAS-free water (verified by the laboratory) and preservatives, as well as an empty sample bottle. These are to be used as outlined in the sample procedure below.
    c. You will receive a cooler in which to store the samples for shipping back to the laboratory.
    d. The sampler will need to procure wet ice for storing the samples inside the cooler.
    e. Secure shut the cooler with packing tape before shipping.

2. Sunscreen and personal care products may contain PFAS creating the potential for cross-contamination. If possible, use products that have been tested and documented to be PFAS-free. In all cases, sunscreen and insect repellents should be applied away from the sample location. Following application, wash hands thoroughly and don nitrile gloves prior to sample collection. Minimize use of the following products on the day of the sample event, preferably **24 hours prior to the event**:
    a. Cosmetics, moisturizers, fragrances, creams, or other personal care products (including hair products). Exceptions: Products that are tested and documented to be 100% PFAS-free.
    b. Other items that are likely to contain PFAS and to be avoided include:
        i. Paper packaging for food or fast food.
        ii. New or unwashed clothing.
        iii. Clothing washed with fabric softeners or dried with anti-static sheets.

    iv. Synthetic water-resistant/or stain-resistant materials (such as waterproof clothing and shoes such as Gore-Tex™), waterproof or coated Tyvek® material (special attention to boots).
    v. Teflon® and other fluoropolymer-containing materials (e.g., polyvinylidene fluoride [PVDF], Kynar®, Neoflon®, Tefzel®).
    vi. Waterproof/treated paper on field notebooks.
    vii. Waterproof markers (such as Sharpie®).
    viii. Chemical or blue ice, which may contain PFAS and may not reduce and/or maintain the temperature of the samples adequately.
    ix. Avoid sampling in the rain if possible (if necessary, use vinyl or polyvinyl chloride [PVC] rain gear).

3. Sampling Teams
    a. **Two-person sampling teams are highly recommended**. Distributing the workload to ensure attention to sampling procedures is easier with a two-person team.
    b. When sampling for PFAS, a two-person team allows one person to be a dedicated "sample" handler, and the other person the dedicated "document" handler. One team member obtains the samples, and the other team member records the samples on the COC form with the sample collection information. If only one person is conducting the sampling: first collect the FRB, then the field sample and place sample containers in the dedicated Ziploc® type sample bag, then ensure care is taken to properly record all samples on the COC. Follow all other precautions noted in this guidance.

4. Sampling Planning

    When setting up a sampling appointment with drinking water operator collect information about sampling location

    a. Is the sample location in a building or confined space?
    b. Will sample port purging require equipment to contain water?
    c. Is the water chlorinated or treated between intake and sample port?

5. Sampling Procedure
    a. The sample handler must wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.
    b. Bottle labels and the COC should be completed before sample collection with the exception of the sample time.
    c. The sample tap should be flushed for a minimum of 5 minutes to ensure the impact of local sources of PFAS cross-contamination, such as Teflon® tape and valve seats, are minimized. The presence of Teflon® and other fluoropolymer-containing materials should be clearly noted in the field note sheet or electronic note sheet. **Don't flush the tap while collecting the Field Reagent Blank (FRB).** Be sure to remove aerators, screens, washers, and water

filters from the tap prior to flushing, and remove any hoses used for flushing prior to sample collection.

d. FRB Procedure

i) Collect the FRB prior to the collection of the Field Sample.

- ii) At the sampling site, the sample personnel must open the empty FRB sample bottle, pour the pre-preserved PFAS-free reagent water into the sample bottle, and seal and label this bottle as the FRB. Record the FRB identification number on the COC form.
- iii) The FRB is shipped back to the laboratory along with the field samples. The empty container that the field reagent water was poured out of must also be shipped back to the laboratory in the same shipment.

e. Uncap the sample bottle. **Do not place the bottle cap on any surface when collecting the sample, and avoid all contact with the inside of the sample bottle or its cap.** It is best practice to hold the sample lid with the inside down to avoid dust or other particles from collecting.

f. Fill sample bottles, taking care not to flush out the sample preservation reagent. Samples do not need to be collected headspace free, but a volume of 250 mL is necessary for the sample analysis. Do not overfill.

g. After collecting the sample, cap the bottle and agitate by inverting the sample bottle three to five times. Keep the sample sealed from time of collection until extraction.

b. Environmental Samples

1. Sampling Equipment
   - a. You will receive 500-mL polypropylene sample bottles in which the samples must be collected.
   - b. You will receive a cooler in which to store the samples for shipping back to the laboratory.
   - c. The sampler will need to procure wet ice for storing the samples inside the cooler.
   - d. Secure shut the cooler with packing tape before shiping.
2. Minimize use of the following products on the day of the sample event, preferably **24 hours prior to the event**:
   - a. Cosmetics, moisturizers, sun-blocks, insect repellants, fragrances, creams, or other personal care products (including hair products). Exceptions: Products that are known to be 100% natural.
   - b. Other items that are likely to contain PFAS and to be avoided include:
     - x. Paper packaging for food or fast food.
     - xi. New or unwashed clothing.
     - xii. Clothing washed with fabric softeners or dried with anti-static sheets.
     - xiii. Synthetic water-resistant/or stain-resistant materials (such as waterproof clothing and shoes such as Gore-Tex™), waterproof or coated Tyvek® material (special attention to boots).
     - xiv. Teflon® and other fluoropolymer-containing materials (e.g., polyvinylidene fluoride [PVDF], Kynar®, Neoflon®, Tefzel®).
     - xv. Waterproof/treated paper on field notebooks.
     - xvi. Waterproof markers (such as Sharpie®, etc.).
     - xvii. Chemical or blue ice, which may contain PFAS and may not reduce and/or maintain the temperature of the samples adequately.

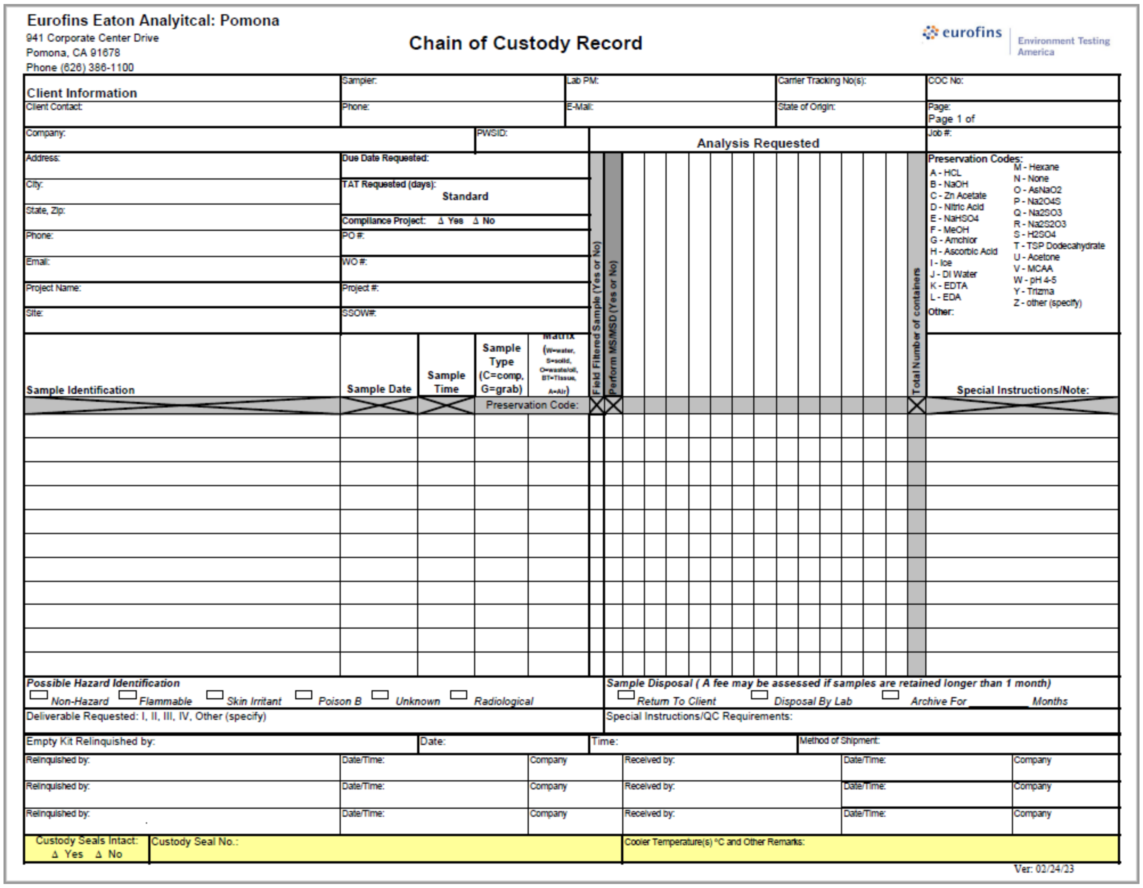
        xviii. Avoid sampling in the rain if possible (if necessary, use vinyl or polyvinyl chloride [PVC] rain gear).

3. Sampling Teams
    a. **Two-person sampling teams are highly recommended**. Distributing the workload to ensure attention to sampling procedures is easier with a two-person team.
    b. When sampling for PFAS, a two-person team allows one person to be a dedicated “sample” handler, and the other person the dedicated “document” handler. One team member obtains the samples, and the other team member records the samples on the COC form with the sample collection information. If only one person is conducting the sampling: first collect the field sample and place sample containers in the dedicated Ziploc® type sample bag. Ensure care is taken to properly record all samples on the COC. Follow all other precautions noted in this guidance.

4. Sampling Procedure
    a. The sample handler must wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAS contamination during sampling can occur from common sources such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.
    b. Bottle labels and the COC should be completed before sample collection with the exception of the sample time.
    c. Use a decontaminated sampling pole to collect samples when the sample container can’t be used for direct sample collection.
        i) Use only sample collection equipment, tubing beakers, and/or scoop materials that are known to be PFAS-free such as stainless steel, HDPE, PVC, polypropylene, acetate, or silicone.
        ii) Equipment rinsate blank samples should be collected to make certain non-dedicated sampling equipment (e.g., sampling pole) has been completely decontaminated.
    d. Uncap the sample bottle. **Do not place the bottle cap on any surface when collecting the sample, and avoid all contact with the inside of the sample bottle or its cap.** It is best practice to hold the sample lid with the inside down to avoid dust or other particles from collecting.
    e. Place the container directly into the water body, open end vertically down and submerge to a depth of six inches or the mid-depth of the waterbody. Fill with an arc motion with the bottle mouth facing upstream. Avoid collecting surface films or agitating and collecting bottom sediment.
    f. Fill sample bottles to the shoulder. Samples do not need to be collected headspace free, but a volume of 500 mL is necessary for the sample analysis. Do not overfill.
    g. Collect at least two aliquots of all aqueous samples to allow sufficient volume for determination of percent solids and for pre-screening analysis. The second aliquot may be collected in a smaller sample container (e.g. 250-mL or 125-mL containers).
    h. After collecting the sample, cap the bottle. Keep the sample sealed from time of collection until extraction.

5. SAMPLE SHIPMENT AND STORAGE – Samples must be chilled during shipment and must not exceed 10 °C during the first 48 hours after collection.
    a. All samples will be packed according to the following guidelines and then shipped overnight to the designated lab.
    b. After sampling, insert sample containers into Ziploc® bags. Tie a knot at the top of the inner bag around the sample containers.
    c. Ice should not be placed outside of the cooler liner or the cooler may leak as the ice melts. As an alternative to a cooler liner, ice may be contained in double-plastic bags (e.g., 1- or 2-gallon Ziploc® bags).
    d. Place completed COC in a Ziploc® bag and place them in the cooler on top of the outer liner.

6. Chain of Custody and Sample Collection Form



Eurofins Eaton Analyitcal: Pomona
941 Corporate Center Drive
Pomona, CA 91678
Phone (626) 386-1100

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler:	Lab PM:	Carrier Tracking No(s):	COC No:
Client Contact:	Phone:	E-Mail:	State of Origin:	Page: Page 1 of
Company:	PWSID:			Job #:

Address:
City:
State, Zip:
Phone:
Email:
Project Name:
Site:

Due Date Requested:
TAT Requested (days): Standard
Compliance Project: Δ Yes Δ No
PO #:
WO #:
Project #:
SSOW#:

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Y - Trizma
	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)														Total Number of containers	Special Instructions/Note:
			Preservation Code:																		

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ________ Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

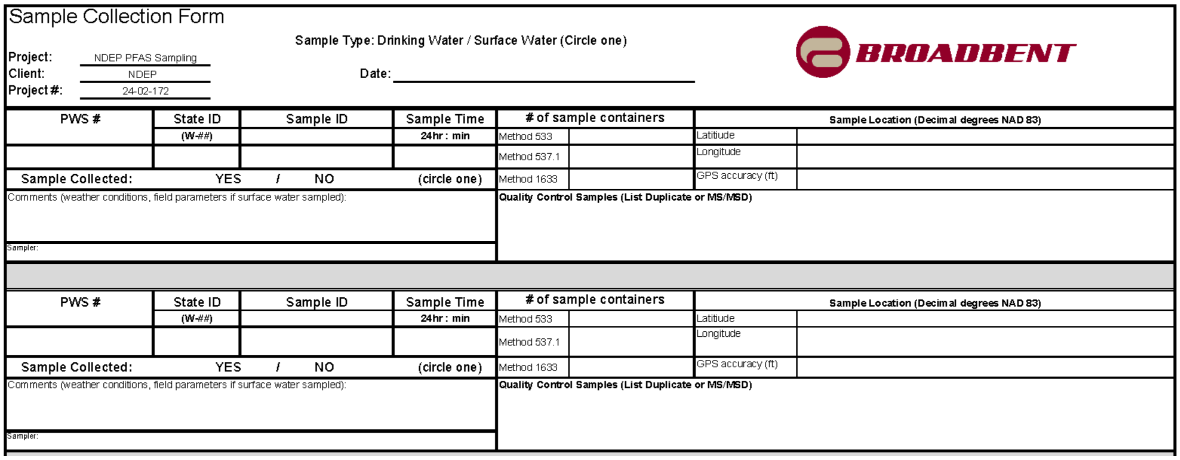
Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 02/24/23

Figure 2 Chain of Custody (COC) form



Sample Collection Form

Sample Type: Drinking Water / Surface Water (Circle one)

BROADBENT

Project: NDEP PFAS Sampling
Client: NDEP
Project #: 24-02-172

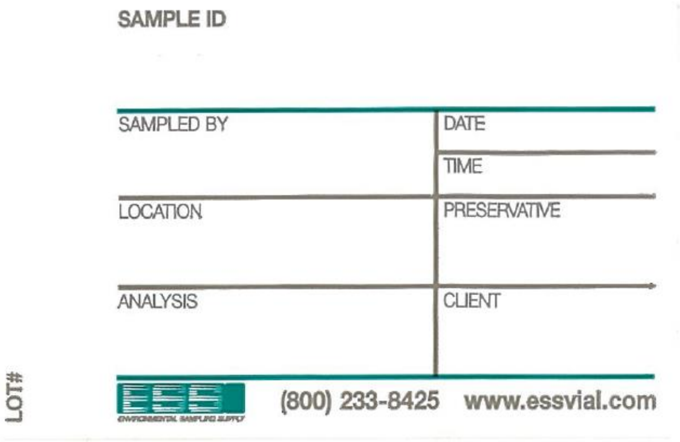
Date: ____________________

PWS #	**State ID**	**Sample ID**	**Sample Time**	**# of sample containers**		**Sample Location (Decimal degrees NAD 83)**	
	(W-##)		**24hr : min**	Method 533		Latitude	
				Method 537.1		Longitude	
Sample Collected: YES / NO (circle one)				Method 1633		GPS accuracy (ft)	
Comments (weather conditions, field parameters if surface water sampled):				**Quality Control Samples (List Duplicate or MS/MSD)**			
Sampler:							

PWS #	**State ID**	**Sample ID**	**Sample Time**	**# of sample containers**		**Sample Location (Decimal degrees NAD 83)**	
	(W-##)		**24hr : min**	Method 533		Latitude	
				Method 537.1		Longitude	
Sample Collected: YES / NO (circle one)				Method 1633		GPS accuracy (ft)	
Comments (weather conditions, field parameters if surface water sampled):				**Quality Control Samples (List Duplicate or MS/MSD)**			
Sampler:							

Figure 3 Sample Collection Form

7. On the Chain of Custody, write the following information:
   a. The sampler's (your) name, position, signature and date.
   b. Date (MM/DD/YYYY) and time (24 hour time) that each sample is being taken
   c. If applicable, write comments, including any potential abnormalities during sampling procedures. Examples: water pressure was high causing water to splash out of bottle, bottle was too big to fit under drinking fountain and water spilled, etc.
8. On the sampling bottle, write the sample ID, your initials, date and time of the sample, and general location. Write the method appropriate preservative in preservative box, and "PFAS" in analysis. See example in Figure 3.



SAMPLE ID

SAMPLED BY

DATE

TIME

LOCATION

PRESERVATIVE

ANALYSIS

CLIENT

LOT#

ENVIRONMENTAL SAMPLING SUPPLY

(800) 233-8425 www.essvial.com

Figure 4 Example Sample Bottle Label

The custody seal is a sticker that can be put over the lid of the cooler to show that nothing has been opened since the sample was taken. Please sign the seal and print the sampler's (your) name and date.

9. Ship the cooler back to the designated laboratory in accordance to the shipping instructions. Include the chain of custody form.

Samples must be received by the lab within 48 hours of collection, so please ensure you return the samples promptly to:

US EPA Method 533 and 537.1:

Samples Receiving
Eurofins Eaton Analytical
941 Corporate Center Dr.
Pomona, CA 91678

US EPA Method 1633:

Samples Receiving
Eurofins TestAmerica
880 Riverside Pkwy.
West Sacramento CA 95605

10. Scan and email a copy of the completed Chain of Custody form and Sampling form to the Project Coordinator.
11. Call or email the laboratory to make sure that the laboratory receives the samples.

Eurofins - Pomona
Project Manager: Anisha Zachariah
Email: Anisha.Zachariah@ET.EurofinsUS.com
Phone: 626-386-1142

Results from this monitoring effort and information about PFAS will be provided to you as soon as practical.

5. References

EPA Small and Rural Systems Fact Sheet. United States Environmental Protection Agency. April 2024.

Method 533: Determination of Per- And Polyfluoroalkyl Substances in Drinking water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry. United States Environmental Protection Agency. November 2019

Method 537.1: Determination of Selected Per- And Polyfluorinated Alkyl Substances in Drinking water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry. United States Environmental Protection Agency. November 2018

Method 1633: Analysis of Per- And Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS. United States Environmental Protection Agency. November 2024

General PFAS Sampling Guidance. Michigan Department of Environmental Quality. October 2018.

US EPA Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537 (US EPA, 2018a)

Appendix C

List of EPA Method 533 PFAS analytes

Target Analyte Name	Abbreviation	Reg # (CAS)
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluoroundecanoic acid	PFUnA	2058-94-8
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Perfluorobutanoic acid	PFBA	375-22-4
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluoropentanesulfonic acid	PFPeS	2706-91-4

List of EPA Method 537.1 PFAS analytes

Target Analyte Name	**Abbreviation**	**Reg # (CAS)**
N-ethyl Perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methyl Perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
Hexafluoropropylene oxide dimer acid	HFPO-DA / GenX	13252-13-6[a]
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4

List of EPA Method 1633 PFAS analytes

Target Analyte Name	**Abbreviation**	**CAS Number**
Ether sulfonic acids		
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
Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4
EIS Compounds		
Perfluoro-n-[^{13}C$_4$]butanoic acid	^{13}C4 -PFBA	N/A
Perfluoro-n-[^{13}C5]pentanoic acid	^{13}C5 -PFPeA	
Perfluoro-n-[1,2,3,4,6-^{13}C5]hexanoic acid	^{13}C5 -PFHxA	
Perfluoro-n-[1,2,3,4-^{13}C4]heptanoic acid	^{13}C4 -PFHpA	
Perfluoro-n-[^{13}C8]octanoic acid	^{13}C8 -PFOA	
Perfluoro-n-[^{13}C9]nonanoic acid	^{13}C9 -PFNA	
Perfluoro-n-[1,2,3,4,5,6-^{13}C6]decanoic acid	^{13}C6 -PFDA	
Perfluoro-n-[1,2,3,4,5,6,7-^{13}C7]undecanoic acid	^{13}C7 -PFUnA	
Perfluoro-n-[1,2-^{13}C2]dodecanoic acid	^{13}C2 -PFDoA	
Perfluoro-n-[1,2-^{13}C2]tetradecanoic acid	^{13}C2 -PFTeDA	
Perfluoro-1-[2,3,4-^{13}C3]butanesulfonic acid	^{13}C3 -PFBS	
Perfluoro-1-[1,2,3-^{13}C3]hexanesulfonic acid	^{13}C3 -PFHxS	
Perfluoro-1-[^{13}C8]octanesulfonic acid	^{13}C8 -PFOS	
Perfluoro-1-[^{13}C8]octanesulfonamide	^{13}C8 -PFOSA	
N-methyl-d3 -perfluoro-1-octanesulfonamidoacetic acid	D3 -NMeFOSAA	
N-ethyl-d5 -perfluoro-1-octanesulfonamidoacetic acid	D5 -NEtFOSAA	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-^{13}C2]hexan sulfonic acid	^{13}C2 -4:2FTS	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-^{13}C2]octanesulfonic acid	^{13}C2 -6:2FTS	
1*H*,1*H*,2*H*,2*H*-Perfluoro-1-[1,2-^{13}C2]decanesulfonic acid	^{13}C2 -8:2FTS	
Tetrafluoro-2-heptafluoropropoxy-^{13}C3 -propanoic acid	^{13}C3 -HFPO-DA	
N-methyl-d7 -perfluorooctanesulfonamidoethanol	D7 -NMeFOSE	
N-ethyl-d9 -perfluorooctanesulfonamidoethanol	D9 -NEtFOSE	
N-ethyl-d5 -perfluoro-1-octanesulfonamide	D5 -NEtFOSA	
N-methyl-d3 -perfluoro-1-octanesulfonamide	D3 -NMeFOSA	

List of EPA Method 1633 PFAS analytes (continued)

NIS Compounds		N/A
Perfluoro-n-[2,3,4-$^{13}C_3$]butanoic acid	$^{13}C_3$-PFBA	
Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid	$^{13}C_4$-PFOA	
Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid	$^{13}C_2$-PFDA	
Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanesulfonic acid	$^{13}C_4$-PFOS	
Perfluoro-n-[1,2,3,4,5-$^{13}C_5$] nonanoic acid	$^{13}C_5$-PFNA	
Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid	$^{13}C_2$-PFHxA	
Perfluoro-1-hexane[$^{18}O_2$]sulfonic acid	$^{18}O_2$-PFHxS	

Appendix D

Sample Locations

Appendix E

Sample Collection Form

Appendix F

Chain of Custody Record

Appendix G

Laboratory SOPs

WTR_NDEP_PFAS_QAPP_Final_04232025

Final Audit Report 2025-04-23

Created: 2025-04-23

By: Ethan Mason (e.mason@ndep.nv.gov)

Status: Signed

Transaction ID: CBJCHBCAABAAUGMXi9g80ukahJFqqdIy_zrpiR-yocpM

"WTR_NDEP_PFAS_QAPP_Final_04232025" History

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