

PFAS Monitoring Report Rocky Flats Site, Colorado

Third Quarter Calendar Year 2025

January 2026



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

Contents

Abbreviations	ii
1.0 Introduction	1
2.0 Monitoring Highlights: Third Quarter CY 2025	4
3.0 Analytical Data: Third Quarter CY 2025	4
4.0 References	4

Figure

Figure 1. Central Operable Unit with PFAS Sampling Locations	3
--	---

Tables

Table 1. Sampling Events in Third Quarter CY 2025	4
Table 2. Analytical Results for Water Samples	6
Table 3. Field Parameter Results for Water Samples	9

Abbreviations

CDPHE	Colorado Department of Public Health and Environment
CY	calendar year
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ng/L	nanograms per liter
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PLFTS	Present Landfill Treatment System
SAP	Sampling and Analysis Plan
WQCC	Water Quality Control Commission

1.0 Introduction

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of human-made chemicals that have been in use since the 1930s and are found in a variety of industrial and commercial products. Common applications include cosmetics, food packaging, stain-resistant and water-resistant articles and treatments, nonstick coatings such as Teflon, and many others. In addition, PFAS have been used in metallurgy and have been an important ingredient in aqueous film-forming foam, also called AFFF, used in firefighting. Some PFAS have been identified as potentially harmful to human health and are being investigated at facilities across the nation.

In consultation with the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE) developed a Sampling and Analysis Plan (SAP), *Sampling Plan for PFOA/PFOS at the Rocky Flats Site, Colorado* (DOE 2019), that described a limited sampling program at the Rocky Flats Site, Colorado (Site). Eight locations were sampled to screen groundwater and surface water for the presence of two PFAS that have received the greatest scrutiny, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). These compounds were detected in samples collected in 2019 from the Site (DOE 2020). Two of the locations produced samples with concentrations exceeding EPA's 2016 nonenforceable drinking water health advisory limit of 70 nanograms per liter (ng/L) (or parts per trillion) for the sum of the concentrations of PFOA + PFOS. These two locations are (1) a monitoring well near the former Rocky Flats Fire Department and associated training area, and (2) the influent to the Present Landfill Treatment System (PLFTS) that treats seepage from the former landfill.

Based on the 2019 screening results, DOE developed a new SAP in 2021, the *Sampling and Analysis Plan for PFAS at the Rocky Flats Site, Colorado* (DOE 2021), that specified additional sampling to further assess the presence of PFAS at the Site. The 2021 SAP described the special clothing, sampling preparations, sampling staff preparations, and other special requirements that are specific to collecting samples for the analysis of PFAS. The 2021 SAP increased the number of sample locations from 8 to 12. The four additional sample locations are near the former fire department and the PLFTS—the two locations that presented the highest concentrations of PFOA + PFOS in 2019. The target analytes were increased to 28 PFAS, including PFOA, PFOS, and other PFAS listed in Colorado Water Quality Control Commission (WQCC) Policy 20-1 (WQCC 2020), hereafter called the Colorado WQCC Policy, as well as three PFAS that are not listed in that policy. This sampling was to be conducted quarterly for at least eight quarters, a duration of 2 years through the second quarter of 2023. Quarterly sampling continued beyond the original duration at the request of CDPHE.

The 2021 SAP was revised in the fourth quarter of calendar year (CY) 2023 to reduce the number of sample locations from 12 to 6 and include the collection of split samples to allow a statistical comparison of results obtained through two different analytical methods. Split samples were first collected from the six selected locations in the second quarter of CY 2023 at DOE's initiative. In the second and the following (third) quarter of CY 2023, the other six locations were still sampled, but those samples were analyzed using modified EPA Method 537.1. Only the selected six locations were sampled in the fourth quarter of CY 2023 and first quarter of CY 2024 using the split sampling approach. This split sampling supported a statistical comparison of analytical data generated through the two analytical methods, modified

EPA Method 537.1 and EPA Method 1633 (DOE 2023). The former method was used starting in 2019 and is a modification of a drinking water method that was not formally approved for use with environmental matrices such as groundwater and surface water. The fourth draft of Method 1633 was approved by EPA for aqueous matrices in July 2023 and was finalized for other environmental matrices in January 2024.

Quarterly monitoring for PFAS at the Site underwent further adjustment in late 2024 following discussions with CDPHE and EPA. The resulting SAP was issued in October 2024 (DOE 2024). This SAP focuses on continued quarterly sampling and use of EPA Method 1633 for three Site locations: the two surface water Points of Compliance (WALPOC and WOMPOC) and the surface water location downstream of the PLFTS (NNG01) (Figure 1).

Results of PFAS-focused monitoring are provided in quarterly reports; the report for the fourth quarter of each calendar year is combined with an annual report. The quarterly reports are brief data summaries, and the annual reports include additional information. Sampling as described in the 2021 SAP began in the third quarter of CY 2021; the third quarter of CY 2025 represents the 17th consecutive quarter of sampling, and the fourth quarter of sampling in accordance with the SAP issued in 2024. Refer to the 2024 annual PFAS report (DOE 2025) for additional information on PFAS sampling conducted at the Rocky Flats Site to date.

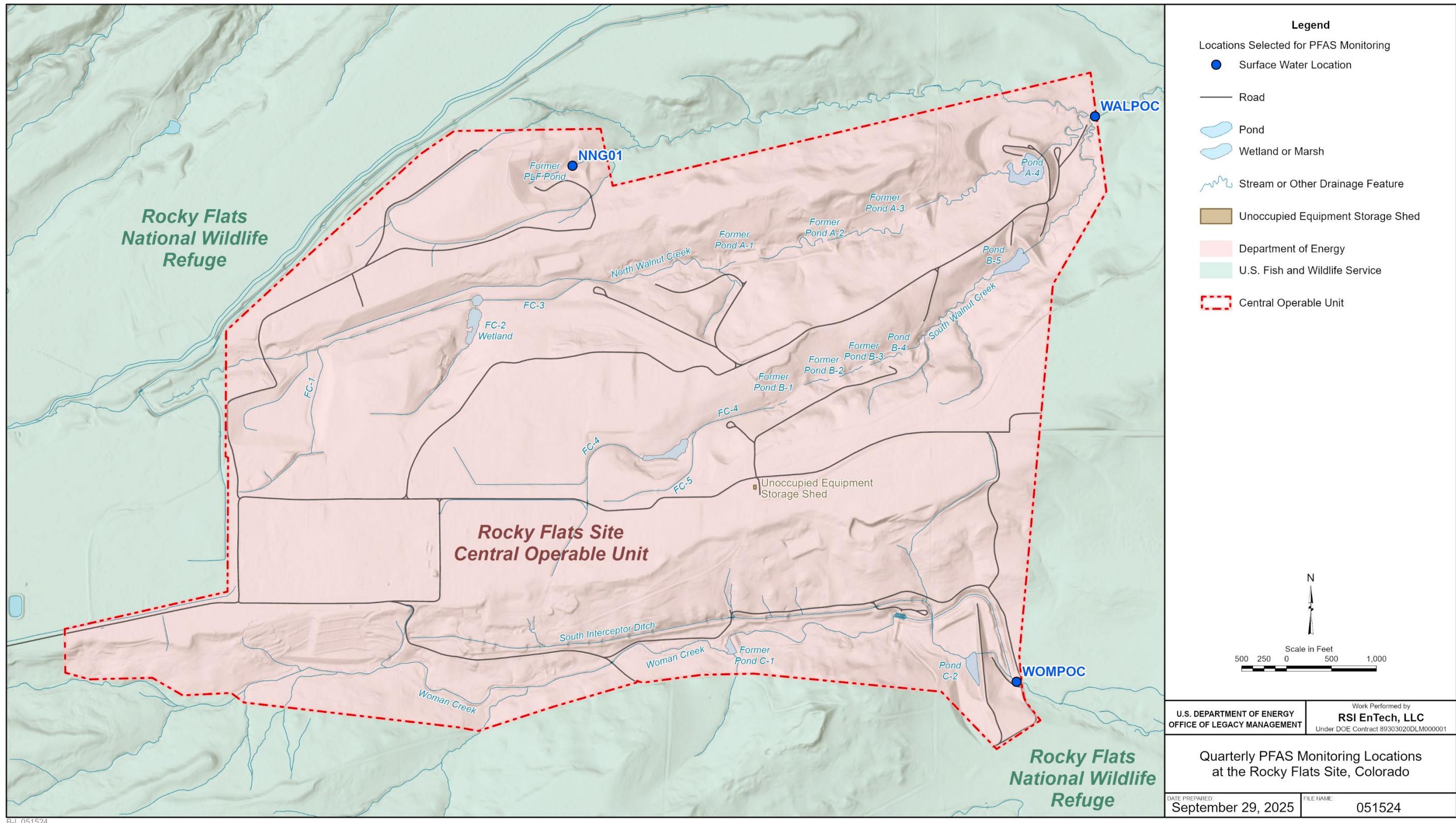


Figure 1. Central Operable Unit with PFAS Sampling Locations

2.0 Monitoring Highlights: Third Quarter CY 2025

Only one of the three locations, NNG01, was successfully sampled during the third quarter of CY 2025. Surface-water Points of Compliance WALPOC and WOMPOC were both dry. Sampling events are summarized in Table 1.

Table 1. Sampling Events in Third Quarter CY 2025

Location ID		Sample ID	Sample Date and Time	Sample Type
Actual	Dummy ^a			
NNG01		RFS01-18.2507015-013	9/29/2025 13:00	F
NNG01	2783	RFS01-18.2507015-002	9/29/2025 12:50	FB

Note:

^a “Dummy” location codes are assigned to quality assurance/quality control samples (limited to sample type FB in the third quarter of CY 2025) that are physically collected at the actual locations indicated. Refer to the *Sampling and Analysis Plan for PFAS at the Rocky Flats Site, Colorado* (DOE 2024) for additional information on sample types.

Abbreviations:

F = field

FB = field blank

3.0 Analytical Data: Third Quarter CY 2025

Analytical data for the third quarter of CY 2025 are provided in Table 2, and field parameter data are provided in Table 3. Both tables are attached at the end of this report.

4.0 References

DOE (U.S. Department of Energy), 2019. *Sampling Plan for PFOA/PFOS at the Rocky Flats Site, Colorado*, LMS/RFS/S22080, Office of Legacy Management, April.

DOE (U.S. Department of Energy), 2020. *Summary Report: Results of Assessment for PFOA/PFOS at the Rocky Flats Site, Colorado*, LMS/RFS/S29191, Office of Legacy Management, April.

DOE (U.S. Department of Energy), 2021. *Sampling and Analysis Plan for PFAS at the Rocky Flats Site, Colorado*, LMS/RFS/S33207-0.0, Office of Legacy Management, July.

DOE (U.S. Department of Energy), 2023. Interim Directive ID-23-08, “Reduce PFAS Sampling Locations at the Rocky Flats Site, Colorado from 12 to 6, and Collect Split Samples for PFAS Analysis by Two Different Analytical Methods,” Office of Legacy Management, October 11.

DOE (U.S. Department of Energy), 2024. *Sampling and Analysis Plan for PFAS at the Rocky Flats Site, Colorado*, LMS/RFS/S33207-1.0, Office of Legacy Management, October.

DOE (U.S. Department of Energy), 2025. *Annual PFAS Monitoring Report, Rocky Flats Site, Colorado, Calendar Year 2024*, LMS/RFS/50541, Office of Legacy Management, April.

WQCC (Water Quality Control Commission), 2020. *Policy for Interpreting the Narrative Water Quality Standards for Per- and Polyfluoroalkyl Substances (PFAS)*, Policy 20-1, 5 CCR 1002-31 Section 31.11(1)(a)(iv) and 5 CCR 1002-41 Section 41.5(A)(1), Colorado Department of Public Health and Environment, approved July 14, expires July 31, 2025.

Table 2. Analytical Results for Water Samples

Location Code	Location Type	Date Sampled	Sample Code	CAS No.	Analyte	Sample Type	Result (ng/L)	Lab Qualifier	Data Validation Qualifier	Detection Limit (ng/L)	Analytical Method
NNG01	SL	9/29/2025	RFS01-18.2507015-013	113507-82-7	Perfluoro(2-ethoxyethane)sulfonic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	13252-13-6	Perfluoro-2-propoxypropionic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	151772-58-6	Nonanoic acid, 3,6-dioxaheptanoic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	1691-99-2	N-ethyl perfluoroctanesulfonamidoethanol	F	1.9	U		1.9	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	1763-23-1	Perfluorooctanesulfonic acid (PFOS)	F	18			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	2058-94-8	Perfluoroundecanoic acid (PFUnA)	F	0.37	UN		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	2355-31-9	N-methyl perfluoroctanesulfonamidoacetic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	24448-09-7	N-methyl perfluoroctanesulfonamidoethanol	F	1.9	U		1.9	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	2706-90-3	Perfluoropentanoic acid (PFPeA)	F	19			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	2706-91-4	Perfluoropentane Sulfonic acid (PFPS)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	27619-97-2	6:2 fluorotelomersulfonic acid	F	1.1	U		1.1	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	2991-50-6	N-ethyl perfluoroctanesulfonamidoacetic acid	F	4.0		J	0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	307-24-4	Perfluorohexanoic acid (PFHxA)	F	29			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	307-55-1	Perfluorododecanoic acid (PFDoA)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	31506-32-8	N-methyl perfluoroctanesulfonamide	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	335-67-1	Perfluorooctanoic acid (PFOA)	F	83			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	335-76-2	Perfluorodecanoic acid (PFDA)	F	0.58	J		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	335-77-3	Perfluorodecanesulfonic acid (PFDS)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	F	14			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	356-02-5	3-Perfluoropropyl propanoic acid	F	0.75	U		0.75	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	375-22-4	Perfluorobutanoic acid (PFBA)	F	93			0.75	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	375-73-5	Perfluorobutanesulfonic acid (PFBS)	F	3.1			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	375-85-9	Perfluoroheptanoic acid (PFHpA)	F	15			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	375-92-8	Perfluoroheptanesulfonic Acid (PFHpS)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	375-95-1	Perfluorononanoic acid (PFNA)	F	1.7			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	376-06-7	Perfluorotetradecanoic acid (PFTeA)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	377-73-1	Perfluoro-3-methoxypropanoic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	39108-34-4	8:2 fluorotelomersulfonic acid	F	1.1	U		1.1	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	4151-50-2	N-ethyl perfluoroctanesulfonamide	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	68259-12-1	Perfluorononane Sulfonic acid (PFNS)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	72629-94-8	Perfluorotridecanoic Acid (PFTriA)	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	754-91-6	Perfluorooctane Sulfonamide (FOSA)	F	1.6			0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	756426-58-1	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	F	0.37	UN		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	757124-72-4	4:2 Fluorotelomer sulfonate (4:2 FTS)	F	0.75	U		0.75	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	763051-92-9	11-Chloroeicosfluoro-3-oxaundecane-1-sulfonic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	79780-39-5	Perfluorododecanesulfonic acid	F	0.37	U		0.37	EPA 1633

Table 2. Analytical Results for Water Samples (continued)

Location Code	Location Type	Date Sampled	Sample Code	CAS No.	Analyte	Sample Type	Result (ng/L)	Lab Qualifier	Data Validation Qualifier	Detection Limit (ng/L)	Analytical Method
NNG01	SL	9/29/2025	RFS01-18.2507015-013	812-70-4	3-Perfluoroheptyl propanoic acid	F	1.9	U		1.9	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	863090-89-5	Perfluoro-4-methoxybutanoic acid	F	0.37	U		0.37	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid	F	1.9	U		1.9	EPA 1633
NNG01	SL	9/29/2025	RFS01-18.2507015-013	919005-14-4	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	F	0.37	U		0.37	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	113507-82-7	Perfluoro(2-ethoxyethane)sulfonic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	13252-13-6	Perfluoro-2-propoxypropionic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	151772-58-6	Nonafluoro-3,6-dioxaheptanoic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	1691-99-2	N-ethyl perfluorooctanesulfonamidoethanol	FB	2.1	U		2.1	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	1763-23-1	Perfluorooctanesulfonic acid (PFOS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	2058-94-8	Perfluoroundecanoic acid (PFUnA)	FB	0.41	U N		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	2355-31-9	N-methyl perfluorooctanesulfonamidoacetic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	24448-09-7	N-methyl perfluorooctanesulfonamidoethanol	FB	2.1	U		2.1	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	2706-90-3	Perfluoropentanoic acid (PFPeA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	2706-91-4	Perfluoropentane Sulfonic acid (PFPS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	27619-97-2	6:2 fluorotelomersulfonic acid	FB	1.2	U		1.2	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	2991-50-6	N-ethyl perfluorooctanesulfonamidoacetic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	307-24-4	Perfluorohexanoic acid (PFHxA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	307-55-1	Perfluorododecanoic acid (PFDoA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	31506-32-8	N-methyl perfluorooctanesulfonamide	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	335-67-1	Perfluorooctanoic acid (PFOA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	335-76-2	Perfluorodecanoic acid (PFDA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	335-77-3	Perfluorodecanesulfonic acid (PFDS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	356-02-5	3-Perfluoropropyl propanoic acid	FB	0.82	U		0.82	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	375-22-4	Perfluorobutanoic acid (PFBA)	FB	0.82	U		0.82	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	375-73-5	Perfluorobutanesulfonic acid (PFBS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	375-85-9	Perfluoroheptanoic acid (PFHpA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	375-92-8	Perfluoroheptanesulfonic Acid (PFHpS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	375-95-1	Perfluorononanoic acid (PFNA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	376-06-7	Perfluorotetradecanoic acid (PFTeA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	377-73-1	Perfluoro-3-methoxypropanoic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	39108-34-4	8:2 fluorotelomersulfonic acid	FB	1.2	U		1.2	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	4151-50-2	N-ethyl perfluorooctanesulfonamide	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	68259-12-1	Perfluorononane Sulfonic acid (PFNS)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	72629-94-8	Perfluorotridecanoic Acid (PFTriA)	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	754-91-6	Perfluoroocatane Sulfonamide (FOSA)	FB	0.41	U		0.41	EPA 1633

Table 2. Analytical Results for Water Samples (continued)

Location Code	Location Type	Date Sampled	Sample Code	CAS No.	Analyte	Sample Type	Result (ng/L)	Lab Qualifier	Data Validation Qualifier	Detection Limit (ng/L)	Analytical Method
2783	QC	9/29/2025	RFS01-18.2507015-002	756426-58-1	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	FB	0.41	UN		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	757124-72-4	4:2 Fluorotelomer sulfonate (4:2 FTS)	FB	0.82	U		0.82	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	763051-92-9	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	79780-39-5	Perfluorododecane sulfonic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	812-70-4	3-Perfluorohexyl propanoic acid	FB	2.1	U		2.1	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	863090-89-5	Perfluoro-4-methoxybutanoic acid	FB	0.41	U		0.41	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid	FB	2.1	U		2.1	EPA 1633
2783	QC	9/29/2025	RFS01-18.2507015-002	919005-14-4	4,8-Dioxa-3H-perfluorononanoic acid (DONA)	FB	0.41	U		0.41	EPA 1633

Notes:

All samples were analyzed by Eurofins Denver.

All samples were unfiltered.

Abbreviations:

CAS No. = Chemical Abstracts Service registry number

F (Sample Type column) = field

FB = field blank

J = estimated

N = laboratory control samples / laboratory control sample duplicate: Recovery exceeds upper or lower control limits

QC = quality control (dummy location code)

SL = surface location

U = analytical result below detection limit

Table 3. Field Parameter Results for Water Samples

Location Code	Date Sampled	Parameter	Result	Unit
NNG01	9/29/2025	Turbidity	13.6	NTU
NNG01	9/29/2025	Alkalinity, Total (as CaCO ₃)	344	mg/L
NNG01	9/29/2025	Specific Conductance	889	µmhos/cm
NNG01	9/29/2025	pH	6.77	s.u.
NNG01	9/29/2025	Temperature	26.39	C

Abbreviations:

CaCO₃ = calcium carbonate

mg/L = milligrams per liter

µmhos/cm = micromhos per centimeter

NTU = nephelometric turbidity units

s.u. = standard unit