

Appendix H

Data Validation Reports

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-0882
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: July 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-FB01-052422	E2109-FS	Water
2	NRSJC-EB01-052422	E2116-FS	Water
3	NRSJC-EB01-052522	E2122-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for two aqueous equipment blank samples and one aqueous field blank sample collected on May 24-25, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-FB01-052422	None - ND	-	-	-
NRSJC-EB01-052422	None - ND	-	-	-
NRSJC-EB01-052522	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 7/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

Client ID

NRSJC-FB01-052422

Battelle ID

E2109-FS

Sample Type

SA

Collection Date

05/24/2022

Extraction Date

06/03/2022

Analytical Instrument

Sciex 6500+ (AE) LC/MS/MS

% Moisture

NA

Matrix

AQ

Sample Size

0.263

Size Unit-Basis

L

Analyte

CAS No.

Result (ng/L)

Extract ID

DF

Analysis Date

DL

LOD

LOQ

PFHxA	307-24-4	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.868	2.38	4.75
PFHpA	375-85-9	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.894	2.38	4.75
PFOA	335-67-1	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.960	2.38	4.75
PFNA	375-95-1	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.792	2.38	4.75
PFDA	335-76-2	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.745	2.38	4.75
PFUnA	2058-94-8	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.715	2.38	4.75
PFDoA	307-55-1	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.722	2.38	4.75
PFTrDA	72629-94-8	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.705	2.38	4.75
PFTeDA	376-06-7	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.752	2.38	4.75
NMeFOSAA	2355-31-9	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.979	2.38	4.75
NEFOSAA	2991-50-6	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.941	2.38	4.75
PFBS	375-73-5	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.823	2.38	4.75
PFHxS	355-46-4	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.948	2.38	4.75
PFOS	1763-23-1	2.38 U	E2109-FS(0)	1.000	6/22/2022	1.02	2.38	4.75
HFPO-DA	13252-13-6	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.822	2.38	4.75
Adona	919005-14-4	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.826	2.38	4.75
9Q-PF3ONS	756426-58-1	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.979	2.38	4.75
11Q-PF3OUdS	763051-92-9	2.38 U	E2109-FS(0)	1.000	6/22/2022	0.856	2.38	4.75



Project Client: CH2M
 Project Name: CIO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

2

Client ID NRSJC-EB01-052422

Battelle ID E2116-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CASNo.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.878	2.40	4.81
PFHpA	375-85-9	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.905	2.40	4.81
PFOA	335-67-1	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.971	2.40	4.81
PFNA	375-95-1	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.801	2.40	4.81
PFDA	335-76-2	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.754	2.40	4.81
PFUnA	2058-94-8	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.723	2.40	4.81
PFDoA	307-55-1	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.731	2.40	4.81
PFTrDA	72629-94-8	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.713	2.40	4.81
PFTeDA	376-06-7	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.761	2.40	4.81
NMeFOSAA	2355-31-9	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.990	2.40	4.81
NiFOSAA	2991-50-6	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.952	2.40	4.81
PFBS	375-73-5	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.833	2.40	4.81
PFHxS	355-46-4	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.959	2.40	4.81
PFOS	1763-23-1	2.40 U	E2116-FS(0)	1,000	6/22/2022	1.03	2.40	4.81
HiFO-DA	13252-13-6	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.832	2.40	4.81
Adona	919005-14-4	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.836	2.40	4.81
9CI-PF3ONS	756426-58-1	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.990	2.40	4.81
11CI-PF3OUds	763051-92-9	2.40 U	E2116-FS(0)	1,000	6/22/2022	0.866	2.40	4.81

NW 7/12/22



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

3

Client ID NRSJC-EB01-052522

Battelle ID E2122-FS

Sample Type SA

Collection Date 05/25/2022

Extraction Date 06/03/2022

Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

% Moisture NA

Matrix AQ

Sample Size 0.261

Size Unit-Basis L

Analyte	CASNo.	Result (ng/L)	Extract ID	DF	Analysis Date	DIL	LOD	LOQ
PFHxA	307-24-4	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.875	2.39	4.79
PFHpA	375-85-9	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.901	2.39	4.79
PFDA	335-67-1	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.967	2.39	4.79
PFNA	375-95-1	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.798	2.39	4.79
PFDA	335-76-2	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.751	2.39	4.79
PFUnA	2058-94-8	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.720	2.39	4.79
PFDoA	307-55-1	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.728	2.39	4.79
PFTrDA	72629-94-8	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.711	2.39	4.79
PFTeDA	376-06-7	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.758	2.39	4.79
NMeFOSAA	2355-31-9	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.987	2.39	4.79
NEFOSAA	2991-50-6	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.948	2.39	4.79
PFBS	375-73-5	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.830	2.39	4.79
PFHxS	355-46-4	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.955	2.39	4.79
PFOS	1763-23-1	2.39 U	E2122-FS(0)	1.000	6/22/2022	1.02	2.39	4.79
HFPO-DA	13252-13-6	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.829	2.39	4.79
Adona	919005-14-4	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.832	2.39	4.79
9C-PF3ONS	756426-58-1	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.987	2.39	4.79
11Q-PF3OUds	763051-92-9	2.39 U	E2122-FS(0)	1.000	6/22/2022	0.863	2.39	4.79

NW 7/12/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-0883
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: July 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-B6-SS02-000H	E2102-FS	Soil
2	NRSJC-S1-SS06-000H	E2103-FS	Soil
3	NRSJC-S1-SS05-000H	E2104-FS	Soil
4	NRSJC-S1-SS07-000H	E2105-FS	Soil
5	NRSJC-S1-SS20-000H	E2106-FS	Soil
6	NRSJC-S1-SB20-0203	E2107-FS	Soil
7	NRSJC-S1-SB20P-0203	E2108-FS	Soil
8	NRSJC-S6-SS09-000H	E2110-FS	Soil
8MS	NRSJC-S6-SS09-000HMS	E2111MS-FS	Soil
8MSD	NRSJC-S6-SS09-000HMSD	E2112MSD-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for eight soil samples collected on May 24, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-EB01-052422	None - ND	-	-	-
NRSJC-FB01-052422	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are shown below. The precision was acceptable.

Compound	NRSJC-S1-SB20-0203 ng/g	NRSJC-S1-SB20P-0203 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 7/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CIO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SS02-000H

Battelle ID E2102-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 17.08
 Matrix SO
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DIL	LOD	LOQ
PFTxA	307-24-4	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.179	0.502	1.00
PFTpA	375-85-9	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.161	0.502	1.00
PFTTrDA	72629-94-8	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
NEFOSAA	2991-50-6	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.172	0.502	1.00
PFTxS	355-46-4	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.313 J	E2102-FS(0)	1,000	6/22/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.161	0.502	2.01
9C-PF3ONS	756426-58-1	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.155	0.502	2.01
11C-PF3OUDS	763051-92-9	0.502 U	E2102-FS(0)	1,000	6/22/2022	0.151	0.502	2.01



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

2

Client ID NRSJC SI-SS06-000H

Battelle ID E2103-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 17.88
 Matrix SO
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DIL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.160	0.500	1.00
PFTrDA	72629-94-8	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.159	0.500	2.00
NiFOSAA	2991-50-6	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.171	0.500	1.00
PFtS	355-46-4	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.218 J	E2103-FS(0)	1,000	6/22/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.160	0.500	2.00
9C-PF3ONS	756426-58-1	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.154	0.500	2.00
11C-PF3OUDS	763051-92-9	0.500 U	E2103-FS(0)	1,000	6/22/2022	0.150	0.500	2.00

NW 7/12/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

3

Client ID NRSJC-SI-SS05-000H

Battelle ID E2104-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 22.32
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.160	0.501	1.00
PFTtDA	72629-94-8	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
NBrFOSAA	2991-50-6	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.160	0.501	2.00
9Q-PF3ONS	756426-58-1	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.154	0.501	2.00
11Q-PF3OUDS	763051-92-9	0.501 U	E2104-FS(0)	1,000	6/22/2022	0.150	0.501	2.00



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

4

Client ID NRSJC-SI-SS07-000H

Battelle ID E2105-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 %Moisture 21.91
 Matrix SO
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.160	0.499	0.998
PFTrDA	72629-94-8	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.159	0.499	2.00
NEFOSAA	2991-50-6	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.171	0.499	0.998
PFtS	355-46-4	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.160	0.499	2.00
9Cl-PF3ONS	756426-58-1	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.154	0.499	2.00
11Cl-PF3OudS	763051-92-9	0.499 U	E2105-FS(0)	1,000	6/22/2022	0.150	0.499	2.00



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

5

Client ID NRSJC-SI-SS20-000H

Battelle ID E2106-FS

Sample Type SA

Collection Date 05/24/2022

Extraction Date 06/03/2022

Analytical Instrument Sciex 5500 (AQ) LC/MS/MS

%Moisture 33.33

Matrix SO

Sample Size 4.990

Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.159	0.501	2.00
NEFOSAA	2991-50-6	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.160	0.501	2.00
9Cl-PF3ONS	756426-58-1	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.154	0.501	2.00
11Cl-PF3OUDS	763051-92-9	0.501 U	E2106-FS(0)	1.000	6/22/2022	0.150	0.501	2.00

NW 7/12/22



Project Client: CH2M
 Project Name: CIO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-SI-SB20-0203

Battelle ID E2107-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 24.64
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.159	0.498	0.996
PFTriDA	72629-94-8	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.158	0.498	1.99
NEFOSAA	2991-50-6	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.159	0.498	1.99
9Cl-PF3ONS	756426-58-1	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.153	0.498	1.99
11Cl-PF3OudS	763051-92-9	0.498 U	E2107-FS(0)	1,000	6/22/2022	0.149	0.498	1.99



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

7

Client ID NRSJC-SI-SB20P-0203

Battelle ID E2108-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 20.45
 Matrix SO
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PfHxA	307-24-4	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.178	0.500	1.00
PfHpA	375-85-9	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.160	0.500	1.00
PFTrDA	72629-94-8	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.159	0.500	2.00
NEFOSAA	2991-50-6	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.171	0.500	1.00
PfHxS	355-46-4	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.160	0.500	2.00
9Q-PF3ONS	756426-58-1	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.154	0.500	2.00
11Q-PF3OudS	763051-92-9	0.500 U	E2108-FS(0)	1,000	6/22/2022	0.150	0.500	2.00

mw 7/12/22



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

Client ID

NRSJC-SB-SS09-000H

Battelle ID

E2110-FS

Sample Type

SA

Collection Date

05/24/2022

Extraction Date

06/03/2022

Analytical Instrument

Sciex 5500 (AQ) LC/MS/MS

% Moisture

23.10

Matrix

SO

Sample Size

5.030

Size Unit-Basis

g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PfHxA	307-24-4	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.177	0.497	0.994
PfHpA	375-85-9	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.167	0.497	0.994
PFOA	335-67-1	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.213	0.497	0.994
PFNA	375-95-1	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.156	0.497	0.994
PFDA	335-76-2	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.157	0.497	0.994
PFUnA	2058-94-8	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.155	0.497	0.994
PFDoA	307-55-1	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.159	0.497	0.994
PFTrDA	72629-94-8	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.160	0.497	0.994
PFTeDA	376-06-7	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.161	0.497	1.99
NMeFOSAA	2355-31-9	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.158	0.497	1.99
NEFOSAA	2991-50-6	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.164	0.497	1.99
PFBS	375-73-5	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.170	0.497	0.994
PFTxS	355-46-4	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.172	0.497	0.994
PFOS	1763-23-1	0.284 J	E2110-FS(0)	1,000	6/22/2022	0.174	0.497	0.994
HFPO-DA	13252-13-6	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.158	0.497	1.99
Adona	919005-14-4	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.159	0.497	1.99
9D-PF3ONS	756426-58-1	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.153	0.497	1.99
11D-PF3OUdS	763051-92-9	0.497 U	E2110-FS(0)	1,000	6/22/2022	0.149	0.497	1.99

mw 7/12/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-0884
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: July 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S6-SS10-000H	E2113-FS	Soil
2	NRSJC-S6-SS08-000H	E2114-FS	Soil
3	NRSJC-S7-SS13-000H	E2115-FS	Soil
4	NRSJC-S5-SS16-000H	E2117-FS	Soil
5	NRSJC-S5-SB21-0203	E2118-FS	Soil
6	NRSJC-S5-SS19-000H	E2119-FS	Soil
6MS	NRSJC-S5-SS19-000HMS	E2120MS-FS	Soil
6MSD	NRSJC-S5-SS19-000HMSD	E2121MSD-FS	Soil
7	NRSJC-S5-SS18-000H	E2123-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for seven soil samples collected on May 24-25, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-EB01-052422	None - ND	-	-	-
NRSJC-FB01-052422	None - ND	-	-	-
NRSJC-EB01-052522	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 7/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CIO-4117: Northwest FFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-SS10-000H

Battelle ID E2113-FS
 Sample Type SA
 Collection Date 05/24/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 23.57
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
NBFOSAA	2991-50-6	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.160	0.501	2.00
9Q-PF3ONS	756426-58-1	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.154	0.501	2.00
11Q-PF3OUDS	763051-92-9	0.501 U	E2113-FS(0)	1,000	6/22/2022	0.150	0.501	2.00

mw 7/12/22



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-SS08-000H

Battelle ID E2114-FS

Sample Type SA

Collection Date 05/24/2022

Extraction Date 08/03/2022

Analytical Instrument Sciex 5500 (AQ) LC/MS/MS

% Moisture 15.77

Matrix SO

Sample Size 4.990

Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
NtFOSAA	2991-50-6	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.160	0.501	2.00
9Q-PF3ONS	756426-58-1	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.154	0.501	2.00
11Q-PF3OUDS	763051-92-9	0.501 U	E2114-FS(0)	1,000	6/22/2022	0.150	0.501	2.00



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

3

Client ID

NRSJC-S7-SS13-000H

Battelle ID

E2115-FS

Sample Type

SA

Collection Date

05/24/2022

Extraction Date

06/03/2022

Analytical Instrument

Sciex 5500 (AQ) LC/MS/MS

% Moisture

9.14

Matrix

SO

Sample Size

4.980

Size Unit-Basis

g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PfHxA	307-24-4	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.179	0.502	1.00
PfHpA	375-85-9	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.161	0.502	1.00
PFTrDA	72629-94-8	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
NEFOSAA	2991-50-6	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.155	0.502	2.01
11CI-PF3OUDS	763051-92-9	0.502 U	E2115-FS(0)	1,000	6/22/2022	0.151	0.502	2.01

NW 7/12/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

4

Client ID NRSJC-S5-SS16-000H

Battelle ID E2117-FS
 Sample Type SA
 Collection Date 05/25/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 %Moisture 6.92
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFTwA	307-24-4	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.178	0.501	1.00
PFTpA	375-85-9	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
NBEFOSAA	2991-50-6	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.171	0.501	1.00
PFTwS	355-46-4	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.154	0.501	2.00
11CI-PF3OUDS	763051-92-9	0.501 U	E2117-FS(0)	1,000	6/22/2022	0.150	0.501	2.00

new 7/12/22



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

5

Client ID

NRSJC-S5-SB21-0203

Battelle ID

E2118-FS

Sample Type

SA

Collection Date

05/25/2022

Extraction Date

06/03/2022

Analytical Instrument

Sciex 5500 (AQ) LC/MS/MS

% Moisture

12.27

Matrix

SO

Sample Size

4.980

Size Unit-Basis

g

Analyte

CASNo.

Result (ng/g_Dry)

Extract ID

DF

Analysis
Date

DL

LOD

LOQ

PFHxA	307-24-4	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.161	0.502	1.00
PFTrDA	72629-94-8	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
NEFOSAA	2991-50-6	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.155	0.502	2.01
11CI-PF3OUDS	763051-92-9	0.502 U	E2118-FS(0)	1,000	6/22/2022	0.151	0.502	2.01

m 7/12/22



Project Client: CH2M
 Project Name: CIO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-SS-SS19-000H

Battelle ID E2119-FS
 Sample Type SA
 Collection Date 05/25/2022
 Extraction Date 06/03/2022
 Analytical Instrument Sciex 5500 (AQ) LC/MS/MS
 % Moisture 17.03
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
NEFOSAA	2991-50-6	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.160	0.501	2.00
9C-PF3ONS	756426-58-1	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.154	0.501	2.00
11C-PF3OUDS	763051-92-9	0.501 U	E2119-FS(0)	1,000	6/22/2022	0.150	0.501	2.00

ML 7/12/22



Project Client: CH2M

Project Name: CTO-4117: Northwest PFAS Investigation

Project No.: G25161.X1.XX.0026.000001

7

Client ID NRSJC-S6-SS18-000H

Battelle ID E2123-FS

Sample Type SA

Collection Date 05/25/2022

Extraction Date 06/03/2022

Analytical Instrument Sciex 5500 (AQ) LC/MS/MS

% Moisture 13.18

Matrix SO

Sample Size 5.010

Size Unit-Basis g

Analyte	CASNo.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFtA	307-24-4	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.160	0.499	0.998
PFTrDA	72629-94-8	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.159	0.499	2.00
NEFOSAA	2991-50-6	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.171	0.499	0.998
PFtS	355-46-4	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.160	0.499	2.00
9Q-PF3ONS	756426-58-1	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.154	0.499	2.00
11Q-PF3OUs	763051-92-9	0.499 U	E2123-FS(0)	1,000	6/22/2022	0.150	0.499	2.00

NW 7/12/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-0980
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: July 30, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-B6-FB01-060922	E2955-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample collected on June 9, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries

- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-B6-FB01-060922	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 7/31/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-FB01-060922

Battelle ID E2955-FS
 Sample Type SA
 Collection Date 06/09/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.219
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.04	2.85	5.71
PFHpA	375-85-9	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.07	2.85	5.71
PFOA	335-67-1	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.15	2.85	5.71
PFNA	375-95-1	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.951	2.85	5.71
PFDA	335-76-2	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.895	2.85	5.71
PFUnA	2058-94-8	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.858	2.85	5.71
PFDoA	307-55-1	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.868	2.85	5.71
PFTTrDA	72629-94-8	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.847	2.85	5.71
PFTeDA	376-06-7	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.903	2.85	5.71
NMeFOSAA	2355-31-9	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.18	2.85	5.71
NEtFOSAA	2991-50-6	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.13	2.85	5.71
PFBS	375-73-5	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.989	2.85	5.71
PFHxS	355-46-4	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.14	2.85	5.71
PFOS	1763-23-1	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.22	2.85	5.71
HFPO-DA	13252-13-6	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.987	2.85	5.71
Adona	919005-14-4	2.85 U	E2955-FS(0)	1.000	7/11/2022	0.992	2.85	5.71
9CI-PF3ONS	756426-58-1	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.18	2.85	5.71
11CI-PF3OUdS	763051-92-9	2.85 U	E2955-FS(0)	1.000	7/11/2022	1.03	2.85	5.71

NW 7/30/22
 Analyzed by: Griffith, Lauren
 Printed: 7/12/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-0981
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: July 30, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-B6-SB01-0102	E2946-FS	Soil
2	NRSJC-B6-SB01-2930	E2947-FS	Soil
2MS	NRSJC-B6-SB01-2930MS	E2948-FSMS	Soil
2MSD	NRSJC-B6-SB01-2930MSD	E2949-FSMSD	Soil
3	NRSJC-B6-SB02-3637	E2950-FS	Soil
4	NRSJC-B6-SS03-000H	E2951-FS	Soil
5	NRSJC-B6-SS03P-000H	E2952-FS	Soil
6	NRSJC-B6-SB03-2930	E2953-FS	Soil
7	NRSJC-B6-SS04-000H	E2954-FS	Soil
8	NRSJC-B6-SB04-2728	E2956-FS	Soil
9	NRSJC-B6-SB04-2930	E2957-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for nine soil samples collected on June 1-9, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-B6-FB01-060922	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
5	13C2-PFTeDA	44%	UJ

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are shown below. The precision was acceptable.

Compound	NRSJC-B6-SS03-000H ng/g	NRSJC-B6-SS03P-000H ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 7/31/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SB01-0102

Battelle ID E2946-FS
 Sample Type SA
 Collection Date 06/01/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 17.58
 Matrix SOIL
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.318 J	E2946-FS(0)	1.000	7/9/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.160	0.501	1.00
PFTTrDA	72629-94-8	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.751 J	E2946-FS(0)	1.000	7/9/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.160	0.501	2.00
9Cl-PF3ONS	756426-58-1	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.154	0.501	2.00
11Cl-PF3OUdS	763051-92-9	0.501 U	E2946-FS(0)	1.000	7/9/2022	0.150	0.501	2.00

mw 7/30/22

Analyzed by: Schumitz, Denise
 Printed: 7/12/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SB01-2930

Battelle ID E2947-F5
 Sample Type SA
 Collection Date 06/02/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 6.44
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.160	0.500	1.00
PFTeDA	72629-94-8	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E2947-F5(0)	1.000	7/9/2022	0.150	0.500	2.00

NW 7/30/22



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SB02-3637

Battelle ID E2950-FS
 Sample Type SA
 Collection Date 06/03/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 19.41
 Matrix SOIL
 Sample Size 5.060
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.176	0.494	0.988
PFHpA	375-85-9	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.166	0.494	0.988
PFOA	335-67-1	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.211	0.494	0.988
PFNA	375-95-1	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.155	0.494	0.988
PFDA	335-76-2	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.156	0.494	0.988
PFUnA	2058-94-8	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.154	0.494	0.988
PFDoA	307-55-1	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.158	0.494	0.988
PFTroDA	72629-94-8	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.159	0.494	0.988
PFTeDA	376-06-7	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.160	0.494	1.98
NMeFOSAA	2355-31-9	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.157	0.494	1.98
NEtFOSAA	2991-50-6	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.163	0.494	1.98
PFBS	375-73-5	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.169	0.494	0.988
PFHxS	355-46-4	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.171	0.494	0.988
PFOS	1763-23-1	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.173	0.494	0.988
HFPO-DA	13252-13-6	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.157	0.494	1.98
Adona	919005-14-4	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.158	0.494	1.98
9CI-PF3ONS	756426-58-1	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.152	0.494	1.98
11CI-PF3OUdS	763051-92-9	0.494 U	E2950-FS(0)	1.000	7/9/2022	0.148	0.494	1.98

NW 7/30/22

Analyzed by: Schumitz, Denise
 Printed: 7/12/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SS03-000H

Battelle ID E2951-FS
 Sample Type SA
 Collection Date 06/06/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 12.13
 Matrix SOIL
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.161	0.502	1.00
PFTTrDA	72629-94-8	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.155	0.502	2.01
11CI-PF3OUdS	763051-92-9	0.502 U	E2951-FS(0)	1.000	7/9/2022	0.151	0.502	2.01



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-SS03P-000H

Battelle ID E2952-FS
 Sample Type SA
 Collection Date 06/06/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 12.10
 Matrix SOIL
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.160	0.499	0.998
PFTTrDA	72629-94-8	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.154	0.499	2.00
11CI-PF3OUdS	763051-92-9	0.499 U	E2952-FS(0)	1.000	7/9/2022	0.150	0.499	2.00

new 7/30/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

b

Client ID NRSJC-B6-SB03-2930

Battelle ID E2953-FS
 Sample Type SA
 Collection Date 06/07/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 15.15
 Matrix SOIL
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.161	0.502	1.00
PFTTrDA	72629-94-8	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.155	0.502	2.01
11CI-PF3OUdS	763051-92-9	0.502 U	E2953-FS(0)	1.000	7/9/2022	0.151	0.502	2.01

7/30/22

Analyzed by: Schumitz, Denise
 Printed: 7/12/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

7

Client ID NRSJC-B6-S504-000H

Battelle ID E2954-FS
 Sample Type SA
 Collection Date 06/08/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sclex 6500+ (AF) LC/MS/MS
 % Moisture 32.94
 Matrix SOIL
 Sample Size 4.690
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.190	0.533	1.07
PFHpA	375-85-9	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.179	0.533	1.07
PFOA	335-67-1	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.228	0.533	1.07
PFNA	375-95-1	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.167	0.533	1.07
PFDA	335-76-2	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.168	0.533	1.07
PFUnA	2058-94-8	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.166	0.533	1.07
PFDoA	307-55-1	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.171	0.533	1.07
PFTTrDA	72629-94-8	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.172	0.533	1.07
PFTeDA	376-06-7	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.173	0.533	2.13
NMeFOSAA	2355-31-9	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.170	0.533	2.13
NEtFOSAA	2991-50-6	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.176	0.533	2.13
PFBS	375-73-5	0.356 J	E2954-FS(0)	1.000	7/9/2022	0.182	0.533	1.07
PFHxS	355-46-4	2.59	E2954-FS(0)	1.000	7/9/2022	0.184	0.533	1.07
PFOS	1763-23-1	0.356 J	E2954-FS(0)	1.000	7/9/2022	0.187	0.533	1.07
HFPO-DA	13252-13-6	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.170	0.533	2.13
Adona	919005-14-4	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.171	0.533	2.13
9CI-PF3ONS	756426-58-1	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.164	0.533	2.13
11CI-PF3OUdS	763051-92-9	0.533 U	E2954-FS(0)	1.000	7/9/2022	0.160	0.533	2.13

new 7/30/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

8

Client ID NRSJC-B6-SB04-2728

Battelle ID E2956-FS
 Sample Type SA
 Collection Date 06/09/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 13.79
 Matrix SOIL
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.156	0.501	1.00
PFDaA	307-55-1	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.160	0.501	1.00
PFTTrDA	72629-94-8	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.154	0.501	2.00
11CI-PF3OUDS	763051-92-9	0.501 U	E2956-FS(0)	1.000	7/9/2022	0.150	0.501	2.00

7/30/22

Analyzed by: Schumitz, Denise
 Printed: 7/12/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

9

Client ID NRSJC-B6-SB04-2930

Battelle ID E2957-FS
 Sample Type SA
 Collection Date 06/09/2022
 Extraction Date 06/15/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 7.76
 Matrix SOIL
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.161	0.502	1.00
PFTTrDA	72629-94-8	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.161	0.502	2.01
9Cl-PF3ONS	756426-58-1	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.155	0.502	2.01
11Cl-PF3OUdS	763051-92-9	0.502 U	E2957-FS(0)	1.000	7/9/2022	0.151	0.502	2.01

NEW 7/30/22

Analyzed by: Schumitz, Denise
 Printed: 7/12/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1021
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: October 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S6-SB10-1415	E3223-FS	Soil
2	NRSJC-S6-SB10P-1415	E3224-FS	Soil
3	NRSJC-S6-SB08-3H04	E3226-FS	Soil
4	NRSJC-S6-SB09-3H05	E3227-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for four soil samples collected on June 10 & 15, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

14

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S6-FB01-061022	None - ND	-	-	-
NRSJC-S6-EB01-061522	None - ND	-	-	-
NRSJC-S6-FB01-061522	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S6-SB10-1415 ng/g	NRSJC-S6-SB10P-1415 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 10/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-S810-1415

Battelle ID E3223-FS
 Sample Type SA
 Collection Date 06/10/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 6.76
 Matrix SOIL
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.154	0.501	2.00
11CI-PF3OUdS	763051-92-9	0.501 U	E3223-FS(0)	1.000	7/15/2022	0.150	0.501	2.00

NW 10/12/22



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-SB10P-1415

Battelle ID E3224-F5
 Sample Type SA
 Collection Date 06/10/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 6.04
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.160	0.500	1.00
PFTeDA	72629-94-8	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E3224-F5(0)	1.000	7/15/2022	0.150	0.500	2.00

7/10/2022
 Analyzed by: Schumitz, Denise

Printed: 9/20/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-SB08-3H04

Battelle ID E3226-FS
 Sample Type SA
 Collection Date 06/15/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 6.27
 Matrix SOIL
 Sample Size 4.970
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.179	0.503	1.01
PFHpA	375-85-9	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.169	0.503	1.01
PFOA	335-67-1	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.215	0.503	1.01
PFNA	375-95-1	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.158	0.503	1.01
PFDA	335-76-2	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.159	0.503	1.01
PFUnA	2058-94-8	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.157	0.503	1.01
PFDoA	307-55-1	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.161	0.503	1.01
PFTiDA	72829-94-8	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.162	0.503	1.01
PFTeDA	376-06-7	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.163	0.503	2.01
NMeFOSAA	2355-31-9	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.160	0.503	2.01
NEtFOSAA	2991-50-6	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.166	0.503	2.01
PFBS	375-73-5	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.172	0.503	1.01
PFHxS	355-46-4	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.174	0.503	1.01
PFOS	1763-23-1	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.176	0.503	1.01
HFPO-DA	13252-13-6	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.160	0.503	2.01
Adona	919005-14-4	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.161	0.503	2.01
9CI-PF3ONS	756426-58-1	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.155	0.503	2.01
11CI-PF3OUd5	763051-92-9	0.503 U	E3226-FS(0)	1.000	7/15/2022	0.151	0.503	2.01

NW 10/12/22



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-SB09-3H05

Battelle ID E3227-FS
 Sample Type SA
 Collection Date 06/15/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 8.61
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.160	0.500	1.00
PFTroA	72629-94-8	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E3227-FS(0)	1.000	7/15/2022	0.150	0.500	2.00

7/10/2022

Analyzed by: Schumitz, Denise
 Printed: 9/20/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1022
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 8, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S6-FB01-061022	E3225-FS	Water
2	NRSJC-S6-EB01-061522	E3228-FS	Water
3	NRSJC-S6-FB01-061522	E3229-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous equipment blank sample and two aqueous field blank samples collected on June 10-15, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were not qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S6-FB01-061022	None - ND	-	-	-
NRSJC-S6-EB01-061522	None - ND	-	-	-
NRSJC-S6-FB01-061522	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All samples were inadvertently double spiked with internal standards. No action was taken by the reviewer.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 8/8/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-F801-061022

Battelle ID E3225-FS
 Sample Type SA
 Collection Date 06/10/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.268
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.852	2.33	4.66
PFHpA	375-85-9	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.878	2.33	4.66
PFOA	335-67-1	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.942	2.33	4.66
PFNA	375-95-1	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.777	2.33	4.66
PFDA	335-76-2	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.731	2.33	4.66
PFUnA	2058-94-8	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.701	2.33	4.66
PFDoA	307-55-1	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.709	2.33	4.66
PFTeDA	72629-94-8	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.692	2.33	4.66
PFTeDA	376-06-7	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.738	2.33	4.66
NMeFOSAA	2355-31-9	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.961	2.33	4.66
NEtFOSAA	2991-50-6	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.924	2.33	4.66
PFBS	375-73-5	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.808	2.33	4.66
PFHxS	355-46-4	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.930	2.33	4.66
PFOS	1763-23-1	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.998	2.33	4.66
HFPO-DA	13252-13-6	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.807	2.33	4.66
Adona	919005-14-4	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.811	2.33	4.66
9CI-PF3ONS	756426-58-1	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.961	2.33	4.66
11CI-PF3OUdS	763051-92-9	2.33 U	E3225-FS(0)	1.000	7/15/2022	0.840	2.33	4.66

mw 8/8/22



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-56-EB01-061522

Battelle ID E3228-FS
 Sample Type SA
 Collection Date 06/15/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.830	2.27	4.55
PFHpA	375-85-9	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.855	2.27	4.55
PFOA	335-67-1	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.918	2.27	4.55
PFNA	375-95-1	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.757	2.27	4.55
PFDA	335-76-2	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.713	2.27	4.55
PFUnA	2058-94-8	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.684	2.27	4.55
PFDoA	307-55-1	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.691	2.27	4.55
PFTTrDA	72629-94-8	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.675	2.27	4.55
PFTeDA	376-06-7	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.719	2.27	4.55
NMeFOSAA	2355-31-9	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.936	2.27	4.55
NEtFOSAA	2991-50-6	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.900	2.27	4.55
PFBS	375-73-5	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.787	2.27	4.55
PFHxS	355-46-4	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.906	2.27	4.55
PFOS	1763-23-1	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.973	2.27	4.55
HFPO-DA	13252-13-6	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.786	2.27	4.55
Adona	919005-14-4	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.790	2.27	4.55
9CI-PF3ONS	756426-58-1	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.936	2.27	4.55
11CI-PF3OUdS	763051-92-9	2.27 U	E3228-FS(0)	1.000	7/15/2022	0.819	2.27	4.55

NW 8/8/22

Analyzed by: Bailey, Kevin
 Printed: 7/22/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-FB01-061522

Battelle ID E3229-FS
 Sample Type SA
 Collection Date 06/15/2022
 Extraction Date 06/21/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.248
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.920	2.52	5.04
PFHpA	375-85-9	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.949	2.52	5.04
PFOA	335-67-1	2.52 U	E3229-FS(0)	1.000	7/15/2022	1.02	2.52	5.04
PFNA	375-95-1	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.840	2.52	5.04
PFDA	335-76-2	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.790	2.52	5.04
PFUnA	2058-94-8	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.758	2.52	5.04
PFDoA	307-55-1	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.766	2.52	5.04
PFTeDA	72629-94-8	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.748	2.52	5.04
PFTeDA	376-06-7	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.797	2.52	5.04
NMeFOSAA	2355-31-9	2.52 U	E3229-FS(0)	1.000	7/15/2022	1.04	2.52	5.04
NEtFOSAA	2991-50-6	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.998	2.52	5.04
PFBS	375-73-5	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.873	2.52	5.04
PFHxS	355-46-4	2.52 U	E3229-FS(0)	1.000	7/15/2022	1.01	2.52	5.04
PFOS	1763-23-1	2.52 U	E3229-FS(0)	1.000	7/15/2022	1.08	2.52	5.04
HFPO-DA	13252-13-6	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.872	2.52	5.04
Adona	919005-14-4	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.876	2.52	5.04
9CI-PF3ONS	756426-58-1	2.52 U	E3229-FS(0)	1.000	7/15/2022	1.04	2.52	5.04
11CI-PF3OUdS	763051-92-9	2.52 U	E3229-FS(0)	1.000	7/15/2022	0.908	2.52	5.04

NW 8/8/22

Analyzed by: Bailey, Kevin
 Printed: 7/22/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1048
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 8, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S1-EB01-061722	E3398-FS	Water
2	NRSJC-S1-FB01-062122	E3399-FS	Water
3	NRSJC-S1-FB01-061722	E3400-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous equipment blank sample and two aqueous field blank samples collected on June 17-21, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Data Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were not qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S1-EB01-061722	None - ND	-	-	-
NRSJC-S1-FB01-062122	None - ND	-	-	-
NRSJC-S1-FB01-061722	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 8/25/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-EB01-061722

Battelle ID E3398-FS
 Sample Type SA
 Collection Date 06/17/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.256
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.892	2.44	4.88
PFHpA	375-85-9	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.919	2.44	4.88
PFOA	335-67-1	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.986	2.44	4.88
PFNA	375-95-1	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.813	2.44	4.88
PFDA	335-76-2	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.766	2.44	4.88
PFUnA	2058-94-8	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.734	2.44	4.88
PFDoA	307-55-1	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.742	2.44	4.88
PFTTrDA	72629-94-8	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.725	2.44	4.88
PFTeDA	376-06-7	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.772	2.44	4.88
NMeFOSAA	2355-31-9	2.44 U	E3398-FS(0)	1.000	7/21/2022	1.01	2.44	4.88
NEtFOSAA	2991-50-6	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.967	2.44	4.88
PFBS	375-73-5	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.846	2.44	4.88
PFHxS	355-46-4	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.974	2.44	4.88
PFOS	1763-23-1	2.44 U	E3398-FS(0)	1.000	7/21/2022	1.04	2.44	4.88
HFPO-DA	13252-13-6	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.845	2.44	4.88
Adona	919005-14-4	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.849	2.44	4.88
9CI-PF3ONS	756426-58-1	2.44 U	E3398-FS(0)	1.000	7/21/2022	1.01	2.44	4.88
11CI-PF3OUdS	763051-92-9	2.44 U	E3398-FS(0)	1.000	7/21/2022	0.880	2.44	4.88

NW 8(8/22



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

2 NW

Client ID NRSJC-S-1-FB01-062122

Battelle ID E3399-FS
 Sample Type SA
 Collection Date 06/21/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.245
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.932	2.55	5.10
PFHpA	375-85-9	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.960	2.55	5.10
PFOA	335-67-1	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.03	2.55	5.10
PFNA	375-95-1	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.850	2.55	5.10
PFDA	335-76-2	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.800	2.55	5.10
PFUnA	2058-94-8	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.767	2.55	5.10
PFDoA	307-55-1	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.776	2.55	5.10
PFTTrDA	72629-94-8	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.757	2.55	5.10
PFTeDA	376-06-7	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.807	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.05	2.55	5.10
NEtFOSAA	2991-50-6	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.01	2.55	5.10
PFBS	375-73-5	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.884	2.55	5.10
PFHxS	355-46-4	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.02	2.55	5.10
PFOS	1763-23-1	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.09	2.55	5.10
HFPO-DA	13252-13-6	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.883	2.55	5.10
Adona	919005-14-4	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.887	2.55	5.10
9Cl-PF3ONS	756426-58-1	2.55 U	E3399-FS(0)	1.000	7/21/2022	1.05	2.55	5.10
11Cl-PF3OUdS	763051-92-9	2.55 U	E3399-FS(0)	1.000	7/21/2022	0.919	2.55	5.10

NW 8/25/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

3

Client ID NRSJC-S1-FB01-061722

Battelle ID E3400-FS
 Sample Type SA
 Collection Date 06/17/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.245
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.932	2.55	5.10
PFHpA	375-85-9	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.960	2.55	5.10
PFOA	335-67-1	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.03	2.55	5.10
PFNA	375-95-1	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.850	2.55	5.10
PFDA	335-76-2	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.800	2.55	5.10
PFUnA	2058-94-8	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.767	2.55	5.10
PFDoA	307-55-1	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.776	2.55	5.10
PFTTrDA	72629-94-8	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.757	2.55	5.10
PFTeDA	376-06-7	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.807	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.05	2.55	5.10
NeFOSAA	2991-50-6	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.01	2.55	5.10
PFBS	375-73-5	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.884	2.55	5.10
PFHxS	355-46-4	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.02	2.55	5.10
PFOS	1763-23-1	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.09	2.55	5.10
HFPO-DA	13252-13-6	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.883	2.55	5.10
Adona	919005-14-4	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.887	2.55	5.10
9CI-PF3ONS	756426-58-1	2.55 U	E3400-FS(0)	1.000	7/21/2022	1.05	2.55	5.10
11CI-PF3OUdS	763051-92-9	2.55 U	E3400-FS(0)	1.000	7/21/2022	0.919	2.55	5.10

NW 8/8/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1049
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S1-SB06-0708	E3401-FS	Soil
1MS	NRSJC-S1-SB06-0708MS	E3402-FSMS	Soil
1MSD	NRSJC-S1-SB06-0708MSD	E3403-FSMSD	Soil
2	NRSJC-S1-SB07-0304	E3404-FS	Soil
3	NRSJC-S1-SB05-3H4H	E3405-FS	Soil
4	NRSJC-S1-SB06-2526	E3406-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for four soil samples collected on June 16-21, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 28 days for soil samples and analyzed within 30 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S1-EB01-061722	None - ND	-	-	-
NRSJC-S1-FB01-061722	None - ND	-	-	-
NRSJC-S1-FB01-062122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-SB06-0708

Battelle ID E3401-FS
 Sample Type SA
 Collection Date 06/20/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 29.36
 Matrix SO
 Sample Size 4.940
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.180	0.506	1.01
PFHpA	375-85-9	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.170	0.506	1.01
PFOA	335-67-1	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.217	0.506	1.01
PFNA	375-95-1	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.159	0.506	1.01
PFDA	335-76-2	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.160	0.506	1.01
PFUnA	2058-94-8	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.158	0.506	1.01
PFDoA	307-55-1	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.162	0.506	1.01
PFTriDA	72629-94-8	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.163	0.506	1.01
PFTeDA	376-06-7	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.164	0.506	2.02
NMeFOSAA	2355-31-9	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.161	0.506	2.02
NEtFOSAA	2991-50-6	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.167	0.506	2.02
PFBS	375-73-5	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.173	0.506	1.01
PFHxS	355-46-4	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.175	0.506	1.01
PFOS	1763-23-1	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.177	0.506	1.01
HFPO-DA	13252-13-6	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.161	0.506	2.02
Adona	919005-14-4	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.162	0.506	2.02
9CI-PF3ONS	756426-58-1	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.156	0.506	2.02
11CI-PF3OUdS	763051-92-9	0.506 U	E3401-FS(0)	1.000	7/21/2022	0.152	0.506	2.02

NW 12/16/22

Analyzed by: Bailey, Kevin
 Printed: 10/17/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

2

Client ID NRSJC-S1-SB07-0304

Battelle ID E3404-FS
 Sample Type SA
 Collection Date 06/17/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 30.27
 Matrix SO
 Sample Size 4.870
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.183	0.513	1.03
PFHpA	375-85-9	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.172	0.513	1.03
PFOA	335-67-1	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.220	0.513	1.03
PFNA	375-95-1	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.161	0.513	1.03
PFDA	335-76-2	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.162	0.513	1.03
PFUnA	2058-94-8	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.160	0.513	1.03
PFDoA	307-55-1	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.164	0.513	1.03
PFTTrDA	72629-94-8	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.165	0.513	1.03
PFTeDA	376-06-7	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.166	0.513	2.05
NMeFOSAA	2355-31-9	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.163	0.513	2.05
NEtFOSAA	2991-50-6	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.169	0.513	2.05
PFBS	375-73-5	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.176	0.513	1.03
PFHxS	355-46-4	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.178	0.513	1.03
PFOS	1763-23-1	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.180	0.513	1.03
HFPO-DA	13252-13-6	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.163	0.513	2.05
Adona	919005-14-4	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.164	0.513	2.05
9Cl-PF3ONS	756426-58-1	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.158	0.513	2.05
11Cl-PF3OUdS	763051-92-9	0.513 U	E3404-FS(0)	1.000	7/21/2022	0.154	0.513	2.05

ANALYZED BY: BAILEY, KEVIN

Printed: 10/17/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-SB05-3H4H

Battelle ID E3405-FS
 Sample Type SA
 Collection Date 06/16/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 30.04
 Matrix SO
 Sample Size 4.870
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.183	0.513	1.03
PFHpA	375-85-9	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.172	0.513	1.03
PFOA	335-67-1	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.220	0.513	1.03
PFNA	375-95-1	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.161	0.513	1.03
PFDA	335-76-2	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.162	0.513	1.03
PFUnA	2058-94-8	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.160	0.513	1.03
PFDoA	307-55-1	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.164	0.513	1.03
PFTTrDA	72629-94-8	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.165	0.513	1.03
PFTeDA	376-06-7	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.166	0.513	2.05
NMeFOSAA	2355-31-9	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.163	0.513	2.05
NEtFOSAA	2991-50-6	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.169	0.513	2.05
PFBS	375-73-5	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.176	0.513	1.03
PFHxS	355-46-4	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.178	0.513	1.03
PFOS	1763-23-1	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.180	0.513	1.03
HFPO-DA	13252-13-6	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.163	0.513	2.05
Adona	919005-14-4	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.164	0.513	2.05
9CI-PF3ONS	756426-58-1	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.158	0.513	2.05
11CI-PF3OUdS	763051-92-9	0.513 U	E3405-FS(0)	1.000	7/21/2022	0.154	0.513	2.05

NW 12/16/22

Analyzed by: Bailey, Kevin
 Printed: 10/17/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-SB06-2526

Battelle ID E3406-FS
 Sample Type SA
 Collection Date 06/21/2022
 Extraction Date 06/29/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 10.14
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.160	0.501	1.00
PFTeDA	72629-94-8	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.160	0.501	2.00
9Cl-PF3ONS	756426-58-1	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.154	0.501	2.00
11Cl-PF3OUdS	763051-92-9	0.501 U	E3406-FS(0)	1.000	7/21/2022	0.150	0.501	2.00

NW:2116122

Analyzed by: Bailey, Kevin
 Printed: 10/17/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1081
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 15, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S5-SB18-1415	E3552-FS	Soil
2	NRSJC-S5-SB18P-1415	E3553-FS	Soil
3	NRSJC-S5-SB16-1314	E3554-FS	Soil
4	NRSJC-S5-SB19-1011	E3555-FS	Soil
5	NRSJC-S5-SB18-0708	E3556-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for five soil samples collected on June 22-27, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times

- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were not qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S5-FB01-062322	None - ND	-	-	-
NRSJC-S5-FB01-062722	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are shown below. The precision was acceptable.

Compound	NRSJC-S5-SB18-1415 ng/g	NRSJC-S5-SB18P-1415 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 8/15/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-SB18-1415

Battelle ID E3552-FS
 Sample Type SA
 Collection Date 06/22/2022
 Extraction Date 07/01/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 9.80
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.159	0.498	0.996
PFTrDA	72629-94-8	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.159	0.498	1.99
9CI-PF3ONS	756426-58-1	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.153	0.498	1.99
11CI-PF3OUds	763051-92-9	0.498 U	E3552-FS(0)	1.000	7/27/2022	0.149	0.498	1.99

NW 8/15/22

Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-SB18P-1415

Battelle ID E3553-FS
 Sample Type SA
 Collection Date 06/22/2022
 Extraction Date 07/01/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 8.92
 Matrix SO
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.160	0.499	0.998
PFTriDA	72629-94-8	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.154	0.499	2.00
11CI-PF3OUdS	763051-92-9	0.499 U	E3553-FS(0)	1.000	7/27/2022	0.150	0.499	2.00

8/15/22
 Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-SB16-1314

Battelle ID E3554-FS
 Sample Type SA
 Collection Date 06/27/2022
 Extraction Date 07/01/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 8.41
 Matrix SO
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.161	0.502	1.00
PFTrDA	72629-94-8	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.155	0.502	2.01
11CI-PF3OUds	763051-92-9	0.502 U	E3554-FS(0)	1.000	7/27/2022	0.151	0.502	2.01

NW 8/15/22

Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-SB19-1011

Battelle ID E3555-FS
 Sample Type SA
 Collection Date 06/23/2022
 Extraction Date 07/01/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 4.73
 Matrix SO
 Sample Size 5.090
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.175	0.491	0.982
PFHpA	375-85-9	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.165	0.491	0.982
PFOA	335-67-1	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.210	0.491	0.982
PFNA	375-95-1	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.154	0.491	0.982
PFDA	335-76-2	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.155	0.491	0.982
PFUnA	2058-94-8	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.153	0.491	0.982
PFDoA	307-55-1	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.157	0.491	0.982
PFTrDA	72629-94-8	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.158	0.491	0.982
PFTeDA	376-06-7	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.159	0.491	1.96
NMeFOSAA	2355-31-9	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.156	0.491	1.96
NEtFOSAA	2991-50-6	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.162	0.491	1.96
PFBS	375-73-5	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.168	0.491	0.982
PFHxS	355-46-4	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.170	0.491	0.982
PFOS	1763-23-1	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.172	0.491	0.982
HFPO-DA	13252-13-6	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.156	0.491	1.96
Adona	919005-14-4	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.157	0.491	1.96
9CI-PF3ONS	756426-58-1	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.151	0.491	1.96
11CI-PF3OUdS	763051-92-9	0.491 U	E3555-FS(0)	1.000	7/27/2022	0.147	0.491	1.96



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-SB18-0708

Battelle ID E3556-FS
 Sample Type SA
 Collection Date 06/22/2022
 Extraction Date 07/01/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 6.23
 Matrix SO
 Sample Size 4.890
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.182	0.511	1.02
PFHpA	375-85-9	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.172	0.511	1.02
PFOA	335-67-1	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.219	0.511	1.02
PFNA	375-95-1	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.161	0.511	1.02
PFDA	335-76-2	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.162	0.511	1.02
PFUnA	2058-94-8	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.160	0.511	1.02
PFDoA	307-55-1	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.164	0.511	1.02
PFTrDA	72629-94-8	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.165	0.511	1.02
PFTeDA	376-06-7	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.166	0.511	2.04
NMeFOSAA	2355-31-9	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.163	0.511	2.04
NEtFOSAA	2991-50-6	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.169	0.511	2.04
PFBS	375-73-5	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.175	0.511	1.02
PFHxS	355-46-4	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.177	0.511	1.02
PFOS	1763-23-1	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.179	0.511	1.02
HFPO-DA	13252-13-6	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.163	0.511	2.04
Adona	919005-14-4	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.164	0.511	2.04
9CI-PF3ONS	756426-58-1	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.157	0.511	2.04
11CI-PF3OUdS	763051-92-9	0.511 U	E3556-FS(0)	1.000	7/27/2022	0.153	0.511	2.04

NW 8/15/22
 Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1082
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 15, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S5-FB01-062322	E3557-FS	Water
2	NRSJC-S5-FB01-062722	E3558-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for two aqueous field blank samples collected on June 23-27, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination

- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S5-FB01-062322	None - ND	-	-	-
NRSJC-S5-FB01-062722	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited surrogate recoveries either at 0% or very low. All compounds were qualified as estimated (UJ) using professional judgement since they're field blank samples. Both samples were re-extracted and reanalyzed in SDG 22-1321.

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R) except for the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
DI980LCS-FS	PFHxS	155%	None	All Associated ND

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 8/15/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-FB01-062322

Battelle ID E3557-FS
 Sample Type SA
 Collection Date 06/23/2022
 Extraction Date 07/05/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.245
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.932	2.55	5.10
PFHpA	375-85-9	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.960	2.55	5.10
PFOA	335-67-1	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.03	2.55	5.10
PFNA	375-95-1	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.850	2.55	5.10
PFDA	335-76-2	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.800	2.55	5.10
PFUnA	2058-94-8	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.767	2.55	5.10
PFDoA	307-55-1	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.776	2.55	5.10
PFTrDA	72629-94-8	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.757	2.55	5.10
PFTeDA	376-06-7	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.807	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.05	2.55	5.10
NEtFOSAA	2991-50-6	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.01	2.55	5.10
PFBS	375-73-5	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.884	2.55	5.10
PFHxS	355-46-4	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.02	2.55	5.10
PFOS	1763-23-1	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.09	2.55	5.10
HFPO-DA	13252-13-6	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.883	2.55	5.10
Adona	919005-14-4	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.887	2.55	5.10
9CI-PF3ONS	756426-58-1	2.55 U	E3557-FS(0)	1.000	7/27/2022	1.05	2.55	5.10
11CI-PF3OUDS	763051-92-9	2.55 U	E3557-FS(0)	1.000	7/27/2022	0.919	2.55	5.10

NW 8/15/22

Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-55-FB01-062322

Battelle ID E3557-FS
 Sample Type SA
 Collection Date 06/23/2022
 Extraction Date 07/05/2022
 Analytical Instrument Sclex 6500+ (AF) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	10 N	E3557-FS(0)	7/27/2022
13C4-PFHpA	11 N	E3557-FS(0)	7/27/2022
13C8-PFOA	11 N	E3557-FS(0)	7/27/2022
13C9-PFNA	13 N	E3557-FS(0)	7/27/2022
13C6-PFDA	14 N	E3557-FS(0)	7/27/2022
13C7-PFUnA	11 N	E3557-FS(0)	7/27/2022
13C2-PFDoA	10 N	E3557-FS(0)	7/27/2022
13C2-PFTeDA	8 N	E3557-FS(0)	7/27/2022
d3-MeFOSAA	4 N	E3557-FS(0)	7/27/2022
d5-EtFOSAA	3 N	E3557-FS(0)	7/27/2022
13C3-PFBS	2 N	E3557-FS(0)	7/27/2022
13C3-PFHxS	3 N	E3557-FS(0)	7/27/2022
13C8-PFOS	4 N	E3557-FS(0)	7/27/2022
13C3-HFPO-DA	12 N	E3557-FS(0)	7/27/2022

NW 8/15/22

Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-FB01-062722

Battelle ID E3558-FS
 Sample Type SA
 Collection Date 06/27/2022
 Extraction Date 07/05/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.252
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.906	2.48	4.96
PFHpA	375-85-9	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.934	2.48	4.96
PFOA	335-67-1	2.48 U	E3558-FS(0)	1.000	7/27/2022	1.00	2.48	4.96
PFNA	375-95-1	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.826	2.48	4.96
PFDA	335-76-2	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.778	2.48	4.96
PFUnA	2058-94-8	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.746	2.48	4.96
PFDoA	307-55-1	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.754	2.48	4.96
PFTDA	72629-94-8	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.736	2.48	4.96
PFTeDA	376-06-7	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.785	2.48	4.96
NMeFOSAA	2355-31-9	2.48 U	E3558-FS(0)	1.000	7/27/2022	1.02	2.48	4.96
NEtFOSAA	2991-50-6	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.982	2.48	4.96
PFBS	375-73-5	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.859	2.48	4.96
PFHxS	355-46-4	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.989	2.48	4.96
PFOS	1763-23-1	2.48 U	E3558-FS(0)	1.000	7/27/2022	1.06	2.48	4.96
HFPO-DA	13252-13-6	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.858	2.48	4.96
Adona	919005-14-4	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.862	2.48	4.96
9CI-PF3ONS	756426-58-1	2.48 U	E3558-FS(0)	1.000	7/27/2022	1.02	2.48	4.96
11CI-PF3OUDS	763051-92-9	2.48 U	E3558-FS(0)	1.000	7/27/2022	0.894	2.48	4.96

NW 8/15/22
 Analyzed by: Harnden, Kelsey
 Printed: 8/4/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-SS-FB01-062722

Battelle ID E3558-FS
 Sample Type SA
 Collection Date 06/27/2022
 Extraction Date 07/05/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	0 N	E3558-FS(0)	7/27/2022
13C4-PFHpA	0 N	E3558-FS(0)	7/27/2022
13C8-PFOA	0 N	E3558-FS(0)	7/27/2022
13C9-PFNA	0 N	E3558-FS(0)	7/27/2022
13C6-PFDA	0 N	E3558-FS(0)	7/27/2022
13C7-PFUnA	0 N	E3558-FS(0)	7/27/2022
13C2-PFDoA	0 N	E3558-FS(0)	7/27/2022
13C2-PFTeDA	0 N	E3558-FS(0)	7/27/2022
d3-MeFOSAA	0 N	E3558-FS(0)	7/27/2022
d5-EtFOSAA	0 N	E3558-FS(0)	7/27/2022
13C3-PFBS	0 N	E3558-FS(0)	7/27/2022
13C3-PFHxS	0 N	E3558-FS(0)	7/27/2022
13C8-PFOS	0 N	E3558-FS(0)	7/27/2022
13C3-HFPO-DA	0 N	E3558-FS(0)	7/27/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1130
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 31, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S4-SB14-0203	E3786-FS	Soil
2	NRSJC-S4-SB14-1718	E3787-FS	Soil
3	NRSJC-S4-SB15-1617	E3788-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for three soil samples collected on June 29-30, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries

- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for soil samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S4-FB01-062922	None - ND	-	-	-
NRSJC-S4-EB01-062922	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 9/1/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-SB14-0203

Battelle ID E3786-FS
 Sample Type SA
 Collection Date 06/29/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture 7.59
 Matrix SOIL
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.159	0.498	0.996
PFTeDA	72629-94-8	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.159	0.498	1.99
9CI-PF3ONS	756426-58-1	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.153	0.498	1.99
11CI-PF3OUdS	763051-92-9	0.498 U	E3786-FS(0)	1.000	8/4/2022	0.149	0.498	1.99

NW 8/31/22

Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NR5JC-S4-SB14-1718

Battelle ID E3787-F5
 Sample Type SA
 Collection Date 06/29/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture 7.26
 Matrix SOIL
 Sample Size 5.130
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.173	0.487	0.975
PFHpA	375-85-9	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.164	0.487	0.975
PFOA	335-67-1	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.209	0.487	0.975
PFNA	375-95-1	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.153	0.487	0.975
PFDA	335-76-2	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.154	0.487	0.975
PFUnA	2058-94-8	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.152	0.487	0.975
PFDoA	307-55-1	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.156	0.487	0.975
PFTTrDA	72629-94-8	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.157	0.487	0.975
PFTeDA	376-06-7	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.158	0.487	1.95
NMeFOSAA	2355-31-9	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.155	0.487	1.95
NEtFOSAA	2991-50-6	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.161	0.487	1.95
PFBS	375-73-5	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.167	0.487	0.975
PFHxS	355-46-4	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.169	0.487	0.975
PFOS	1763-23-1	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.171	0.487	0.975
HFPO-DA	13252-13-6	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.155	0.487	1.95
Adona	919005-14-4	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.156	0.487	1.95
9CI-PF3ONS	756426-58-1	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.150	0.487	1.95
11CI-PF3OUdS	763051-92-9	0.487 U	E3787-F5(0)	1.000	8/4/2022	0.146	0.487	1.95

NW 8/31/22

Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-SB15-1617

Battelle ID E3788-FS
 Sample Type SA
 Collection Date 06/30/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture 5.96
 Matrix SOIL
 Sample Size 5.060
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.176	0.494	0.988
PFHpA	375-85-9	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.166	0.494	0.988
PFOA	335-67-1	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.211	0.494	0.988
PFNA	375-95-1	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.155	0.494	0.988
PFDA	335-76-2	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.156	0.494	0.988
PFUnA	2058-94-8	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.154	0.494	0.988
PFDoA	307-55-1	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.158	0.494	0.988
PFTTrDA	72629-94-8	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.159	0.494	0.988
PFTeDA	376-06-7	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.160	0.494	1.98
NMeFOSAA	2355-31-9	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.157	0.494	1.98
NEtFOSAA	2991-50-6	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.163	0.494	1.98
PFBS	375-73-5	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.169	0.494	0.988
PFHxS	355-46-4	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.171	0.494	0.988
PFOS	1763-23-1	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.173	0.494	0.988
HFPO-DA	13252-13-6	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.157	0.494	1.98
Adona	919005-14-4	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.158	0.494	1.98
9Cl-PF3ONS	756426-58-1	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.152	0.494	1.98
11Cl-PF3OUdS	763051-92-9	0.494 U	E3788-FS(0)	1.000	8/4/2022	0.148	0.494	1.98

mw 8/31/22
 Analyzed by: Griffith, Lauren

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1131
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 31, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S4-FB01-062922	E3784-FS	Water
2	NRSJC-S4-EB01-062922	E3785-FS	Water
3	NRSJC-B6-GW01-0622	E3789-FS	Water
4	NRSJC-B6-GW02-0622	E3790-FS	Water
5	NRSJC-B6-GW03-0622	E3791-FS	Water
6	NRSJC-B6-GW04-0722	E3792-FS	Water
7	NRSJC-B6-EB01-070122	E3793-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples, two aqueous equipment blank samples and one aqueous field blank sample collected on June 29-July 1, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S4-FB01-062922	None - ND	-	-	-
NRSJC-S4-EB01-062922	None - ND	-	-	-
NRSJC-B6-EB01-070122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- EDS Sample 4 exhibited PFOS with an ion ratio outside of QC criteria and was flagged (Q) by the laboratory. The reviewer qualified this result as estimated (J).

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 9/1/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-FB01-062922

Battelle ID E3784-FS
 Sample Type SA
 Collection Date 06/29/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.240
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.951	2.60	5.21
PFHpA	375-85-9	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.980	2.60	5.21
PFOA	335-67-1	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.05	2.60	5.21
PFNA	375-95-1	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.868	2.60	5.21
PFDA	335-76-2	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.817	2.60	5.21
PFUnA	2058-94-8	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.783	2.60	5.21
PFDoA	307-55-1	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.792	2.60	5.21
PFTTrDA	72629-94-8	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.773	2.60	5.21
PFTeDA	376-06-7	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.824	2.60	5.21
NMeFOSAA	2355-31-9	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.07	2.60	5.21
NEtFOSAA	2991-50-6	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.03	2.60	5.21
PFBS	375-73-5	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.902	2.60	5.21
PFHxS	355-46-4	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.04	2.60	5.21
PFOS	1763-23-1	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.11	2.60	5.21
HFPO-DA	13252-13-6	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.901	2.60	5.21
Adona	919005-14-4	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.905	2.60	5.21
9CI-PF3ONS	756426-58-1	2.60 U	E3784-FS(0)	1.000	8/6/2022	1.07	2.60	5.21
11CI-PF3OUdS	763051-92-9	2.60 U	E3784-FS(0)	1.000	8/6/2022	0.939	2.60	5.21

NW 8/31/22

Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-EB01-062922

Battelle ID E3785-FS
 Sample Type SA
 Collection Date 06/29/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.267
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.855	2.34	4.68
PFHpA	375-85-9	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.881	2.34	4.68
PFOA	335-67-1	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.946	2.34	4.68
PFNA	375-95-1	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.780	2.34	4.68
PFDA	335-76-2	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.734	2.34	4.68
PFUnA	2058-94-8	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.704	2.34	4.68
PFDoA	307-55-1	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.712	2.34	4.68
PFTriDA	72629-94-8	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.695	2.34	4.68
PFTeDA	376-06-7	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.741	2.34	4.68
NMeFOSAA	2355-31-9	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.964	2.34	4.68
NEtFOSAA	2991-50-6	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.927	2.34	4.68
PFBS	375-73-5	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.811	2.34	4.68
PFHxS	355-46-4	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.934	2.34	4.68
PFOS	1763-23-1	2.34 U	E3785-FS(0)	1.000	8/6/2022	1.00	2.34	4.68
HFPO-DA	13252-13-6	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.810	2.34	4.68
Adona	919005-14-4	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.814	2.34	4.68
9CI-PF3ONS	756426-58-1	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.964	2.34	4.68
11CI-PF3OUdS	763051-92-9	2.34 U	E3785-FS(0)	1.000	8/6/2022	0.844	2.34	4.68



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-GW01-0622

Battelle ID E3789-FS
 Sample Type SA
 Collection Date 06/30/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.268
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.852	2.33	4.66
PFHpA	375-85-9	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.878	2.33	4.66
PFOA	335-67-1	1.33 J	E3789-FS(0)	1.000	8/6/2022	0.942	2.33	4.66
PFNA	375-95-1	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.777	2.33	4.66
PFDA	335-76-2	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.731	2.33	4.66
PFUnA	2058-94-8	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.701	2.33	4.66
PFDoA	307-55-1	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.709	2.33	4.66
PFTTrDA	72629-94-8	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.692	2.33	4.66
PFTeDA	376-06-7	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.738	2.33	4.66
NMeFOSAA	2355-31-9	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.961	2.33	4.66
NEtFOSAA	2991-50-6	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.924	2.33	4.66
PFBS	375-73-5	1.04 J	E3789-FS(0)	1.000	8/6/2022	0.808	2.33	4.66
PFHxS	355-46-4	1.49 J	E3789-FS(0)	1.000	8/6/2022	0.930	2.33	4.66
PFOS	1763-23-1	4.22 J	E3789-FS(0)	1.000	8/6/2022	0.998	2.33	4.66
HFPO-DA	13252-13-6	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.807	2.33	4.66
Adona	919005-14-4	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.811	2.33	4.66
9CI-PF3ONS	756426-58-1	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.961	2.33	4.66
11CI-PF3OUdS	763051-92-9	2.33 U	E3789-FS(0)	1.000	8/6/2022	0.840	2.33	4.66

MW 8/13/22

Analyzed by: Griffith, Lauren

Printed: 8/5/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

4

Client ID NRSJC-B6-GW02-0622

Battelle ID E3790-FS
 Sample Type SA
 Collection Date 06/30/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.63 J	E3790-FS(0)	1.000	8/6/2022	0.878	2.40	4.81
PFHpA	375-85-9	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.905	2.40	4.81
PFOA	335-67-1	2.20 J	E3790-FS(0)	1.000	8/6/2022	0.971	2.40	4.81
PFNA	375-95-1	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.801	2.40	4.81
PFDA	335-76-2	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.754	2.40	4.81
PFUnA	2058-94-8	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.723	2.40	4.81
PFDaA	307-55-1	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.731	2.40	4.81
PFTraDA	72629-94-8	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.713	2.40	4.81
PFTeDA	376-06-7	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.761	2.40	4.81
NMeFOSAA	2355-31-9	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.990	2.40	4.81
NEtFOSAA	2991-50-6	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.952	2.40	4.81
PFBS	375-73-5	2.64 J	E3790-FS(0)	1.000	8/6/2022	0.833	2.40	4.81
PFHxS	355-46-4	7.34	E3790-FS(0)	1.000	8/6/2022	0.959	2.40	4.81
PFOS	1763-23-1	18.3 J	E3790-FS(0)	1.000	8/6/2022	1.03	2.40	4.81
HFPO-DA	13252-13-6	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.832	2.40	4.81
Adona	919005-14-4	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.836	2.40	4.81
9CI-PF3ONS	756426-58-1	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.990	2.40	4.81
11CI-PF3OUdS	763051-92-9	2.40 U	E3790-FS(0)	1.000	8/6/2022	0.866	2.40	4.81

DT

mw 8/31/22
 Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-GW03-0622

Battelle ID E3791-FS
 Sample Type SA
 Collection Date 06/30/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	11.7	E3791-FS(0)	1.000	8/6/2022	0.878	2.40	4.81
PFHpA	375-85-9	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.905	2.40	4.81
PFOA	335-67-1	2.97 J	E3791-FS(0)	1.000	8/6/2022	0.971	2.40	4.81
PFNA	375-95-1	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.801	2.40	4.81
PFDA	335-76-2	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.754	2.40	4.81
PFUnA	2058-94-8	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.723	2.40	4.81
PFDoA	307-55-1	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.731	2.40	4.81
PFTTrDA	72629-94-8	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.713	2.40	4.81
PFTeDA	376-06-7	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.761	2.40	4.81
NMeFOSAA	2355-31-9	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.990	2.40	4.81
NEtFOSAA	2991-50-6	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.952	2.40	4.81
PFBS	375-73-5	17.4	E3791-FS(0)	1.000	8/6/2022	0.833	2.40	4.81
PFHxS	355-46-4	153	E3791-FS(0)	1.000	8/6/2022	0.959	2.40	4.81
PFOS	1763-23-1	16.5	E3791-FS(0)	1.000	8/6/2022	1.03	2.40	4.81
HFPO-DA	13252-13-6	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.832	2.40	4.81
Adona	919005-14-4	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.836	2.40	4.81
9CI-PF3ONS	756426-58-1	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.990	2.40	4.81
11CI-PF3OUDS	763051-92-9	2.40 U	E3791-FS(0)	1.000	8/6/2022	0.866	2.40	4.81

MW 8/3/22

Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



b

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-GW04-0722

Battelle ID E3792-FS
 Sample Type SA
 Collection Date 07/01/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.283
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	3.95 J	E3792-FS(0)	1.000	8/6/2022	0.807	2.21	4.42
PFHpA	375-85-9	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.831	2.21	4.42
PFOA	335-67-1	2.36 J	E3792-FS(0)	1.000	8/6/2022	0.892	2.21	4.42
PFNA	375-95-1	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.736	2.21	4.42
PFDA	335-76-2	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.693	2.21	4.42
PFUnA	2058-94-8	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.664	2.21	4.42
PFDoA	307-55-1	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.671	2.21	4.42
PFTTrDA	72629-94-8	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.655	2.21	4.42
PFTeDA	376-06-7	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.699	2.21	4.42
NMeFOSAA	2355-31-9	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.910	2.21	4.42
NEtFOSAA	2991-50-6	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.875	2.21	4.42
PFBS	375-73-5	5.46	E3792-FS(0)	1.000	8/6/2022	0.765	2.21	4.42
PFHxS	355-46-4	32.1	E3792-FS(0)	1.000	8/6/2022	0.881	2.21	4.42
PFOS	1763-23-1	60.6	E3792-FS(0)	1.000	8/6/2022	0.945	2.21	4.42
HFPO-DA	13252-13-6	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.764	2.21	4.42
Adona	919005-14-4	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.768	2.21	4.42
9CI-PF3ONS	756426-58-1	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.910	2.21	4.42
11CI-PF3OUdS	763051-92-9	2.21 U	E3792-FS(0)	1.000	8/6/2022	0.796	2.21	4.42

NW 8/3/22

Analyzed by: Griffith, Lauren
 Printed: 8/5/2022



7

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-B6-EB01-070122

Battelle ID E3793-FS
 Sample Type SA
 Collection Date 07/01/2022
 Extraction Date 07/12/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQUEOUS
 Sample Size 0.279
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.818	2.24	4.48
PFHpA	375-85-9	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.843	2.24	4.48
PFOA	335-67-1	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.905	2.24	4.48
PFNA	375-95-1	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.746	2.24	4.48
PFDA	335-76-2	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.703	2.24	4.48
PFUnA	2058-94-8	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.674	2.24	4.48
PFDoA	307-55-1	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.681	2.24	4.48
PFTTrDA	72629-94-8	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.665	2.24	4.48
PFTeDA	376-06-7	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.709	2.24	4.48
NMeFOSAA	2355-31-9	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.923	2.24	4.48
NEtFOSAA	2991-50-6	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.887	2.24	4.48
PFBS	375-73-5	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.776	2.24	4.48
PFHxS	355-46-4	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.893	2.24	4.48
PFOS	1763-23-1	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.959	2.24	4.48
HFPO-DA	13252-13-6	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.775	2.24	4.48
Adona	919005-14-4	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.779	2.24	4.48
9Cl-PF3ONS	756426-58-1	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.923	2.24	4.48
11Cl-PF3OUdS	763051-92-9	2.24 U	E3793-FS(0)	1.000	8/6/2022	0.807	2.24	4.48

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1190
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: October 13, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S1-GW06-0722	E4106-FS	Water
2	NRSJC-S1-GW05-0722	E4107-FS	Water
2MS	NRSJC-S1-GW05-0722MS	E4108-FSMS	Water
2MSD	NRSJC-S1-GW05-0722MSD	E4109-FSMSD	Water
3	NRSJC-S1-GW07-0722	E4110-FS	Water
4	NRSJC-S1-GW07P-0722	E4111-FS	Water
5	NRSJC-S6-GW09-0722	E4112-FS	Water
6	NRSJC-S6-GW09P-0722	E4113-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for six samples collected on July 11-12, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B 15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.
- Several compounds in several samples were flagged (I) by the laboratory indicating holding time exceedances since the extracts were analyzed outside of 28 days. However, the extracts were stored per draft EPA Method 1633 which allows for 90 days to analysis. Therefore, no action was taken on this basis.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S1-EB01-071122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria except for the following.

EDS Sample	Internal Standard	Area Count	Qualifier
2	13C4-PFOS	High	None - Sample ND
3	13C4-PFOS	High	None - Sample ND
4	13C4-PFOS	High	None - Sample ND

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S1-GW07-0722 ng/L	NRSJC-S1-GW07P-0722 ng/L	RPD	Qualifier
PFOA	2.27U	1.09	NC	None

Compound	NRSJC-S6-GW09-0722 ng/L	NRSJC-S6-GW09P-0722 ng/L	RPD	Qualifier
PFOA	2.19U	1.24	NC	None

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 10/13/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-GW06-0722

Battelle ID E4106-FS
 Sample Type SA
 Collection Date 07/11/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.274
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.833	2.28	4.56
PFHpA	375-85-9	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.859	2.28	4.56
PFOA	335-67-1	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.922	2.28	4.56
PFNA	375-95-1	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.760	2.28	4.56
PFDA	335-76-2	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.715	2.28	4.56
PFUnA	2058-94-8	2.28 U	E4106-FS(0)	1.000	9/30/2022	0.686	2.28	4.56
PFDoA	307-55-1	2.28 U	E4106-FS(0)	1.000	9/30/2022	0.693	2.28	4.56
PFTTrDA	77629-94-8	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.677	2.28	4.56
PFTeDA	376-06-7	2.28 U	E4106-FS(0)	1.000	9/30/2022	0.722	2.28	4.56
NMeFOSAA	2355-31-9	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.940	2.28	4.56
NEtFOSAA	2991-50-6	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.903	2.28	4.56
PFBS	375-73-5	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.790	2.28	4.56
PFHxS	355-46-4	2.28 U	E4106-FS(0)	1.000	9/30/2022	0.910	2.28	4.56
PFOS	1763-23-1	2.28 U	E4106-FS(0)	1.000	9/30/2022	0.976	2.28	4.56
HFPO-DA	13252-13-6	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.789	2.28	4.56
Adona	919005-14-4	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.793	2.28	4.56
9CI-PF3ONS	756426-58-1	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.940	2.28	4.56
11CI-PF3OUdS	763051-92-9	2.28 U	E4106-FS(0)	1.000	8/12/2022	0.822	2.28	4.56

MW1013122
 Analyzed by: Harnden, Kelsey
 Printed: 10/3/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-GW05-0722

Battelle ID E4107-FS
 Sample Type SA
 Collection Date 07/11/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.271
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.842	2.31	4.61
PFHpA	375-85-9	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.868	2.31	4.61
PFOA	335-67-1	2.22 J	E4107-FS(0)	1.000	8/12/2022	0.932	2.31	4.61
PFNA	375-95-1	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.768	2.31	4.61
PFDA	335-76-2	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.723	2.31	4.61
PFUnA	2058-94-8	2.31 U	E4107-FS(0)	1.000	9/30/2022	0.694	2.31	4.61
PFDoA	307-55-1	2.31 U	E4107-FS(0)	1.000	9/30/2022	0.701	2.31	4.61
PFTeDA	72629-94-8	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.685	2.31	4.61
PFTeDA	376-06-7	2.31 U	E4107-FS(0)	1.000	9/30/2022	0.730	2.31	4.61
NMeFOSAA	2355-31-9	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.950	2.31	4.61
NEtFOSAA	2991-50-6	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.913	2.31	4.61
PFBS	375-73-5	1.29 J	E4107-FS(0)	1.000	8/12/2022	0.799	2.31	4.61
PFHxS	355-46-4	2.31 U	E4107-FS(0)	1.000	9/30/2022	0.920	2.31	4.61
PFOS	1763-23-1	2.31 U	E4107-FS(0)	1.000	9/30/2022	0.987	2.31	4.61
HFPO-DA	13252-13-6	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.798	2.31	4.61
Adona	919005-14-4	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.802	2.31	4.61
9CI-PF3ONS	756426-58-1	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.950	2.31	4.61
11CI-PF3OUDS	763051-92-9	2.31 U	E4107-FS(0)	1.000	8/12/2022	0.831	2.31	4.61

MW 10/13/22

Analyzed by: Harnden, Kelsey
 Printed: 10/3/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-GW07-0722

Battelle ID E4110-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.830	2.27	4.55
PFHpA	375-85-9	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.855	2.27	4.55
PFOA	335-67-1	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.918	2.27	4.55
PFNA	375-95-1	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.757	2.27	4.55
PFDA	335-76-2	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.713	2.27	4.55
PFUnA	2058-94-8	2.27 U	E4110-FS(0)	1.000	9/30/2022	0.684	2.27	4.55
PFDoA	307-55-1	2.27 U	E4110-FS(0)	1.000	9/30/2022	0.691	2.27	4.55
PFTTrDA	72629-94-8	2.27 U	E4110-FS(0)	1.000	8/17/2022	0.675	2.27	4.55
PFTeDA	376-06-7	2.27 U	E4110-FS(0)	1.000	9/30/2022	0.719	2.27	4.55
NMeFOSAA	2355-31-9	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.936	2.27	4.55
NEtFOSAA	2991-50-6	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.900	2.27	4.55
PFBS	375-73-5	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.787	2.27	4.55
PFHxS	355-46-4	2.27 U	E4110-FS(0)	1.000	9/30/2022	0.906	2.27	4.55
PFOS	1763-23-1	2.27 U	E4110-FS(0)	1.000	9/30/2022	0.973	2.27	4.55
HFPO-DA	13252-13-6	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.786	2.27	4.55
Adona	919005-14-4	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.790	2.27	4.55
9CI-PF3ONS	756426-58-1	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.936	2.27	4.55
11CI-PF3OUDS	763051-92-9	2.27 U	E4110-FS(0)	1.000	8/12/2022	0.819	2.27	4.55

Analyzed by: Harnden, Kelsey
 Printed: 10/3/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-GW07P-0722

Battelle ID E4111-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.845	2.31	4.63
PFHpA	375-85-9	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.871	2.31	4.63
PFOA	335-67-1	1.09 J	E4111-FS(0)	1.000	8/12/2022	0.935	2.31	4.63
PFNA	375-95-1	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.771	2.31	4.63
PFDA	335-76-2	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.726	2.31	4.63
PFUnA	2058-94-8	2.31 U	E4111-FS(0)	1.000	9/30/2022	0.696	2.31	4.63
PFDoA	307-55-1	2.31 U	E4111-FS(0)	1.000	9/30/2022	0.704	2.31	4.63
PFTTrDA	72629-94-8	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.687	2.31	4.63
PFTeDA	376-06-7	2.31 U	E4111-FS(0)	1.000	9/30/2022	0.732	2.31	4.63
NMeFOSAA	2355-31-9	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.954	2.31	4.63
NEtFOSAA	2991-50-6	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.917	2.31	4.63
PFBS	375-73-5	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.802	2.31	4.63
PFHxS	355-46-4	2.31 U	E4111-FS(0)	1.000	9/30/2022	0.923	2.31	4.63
PFOS	1763-23-1	2.31 U	E4111-FS(0)	1.000	9/30/2022	0.991	2.31	4.63
HFPO-DA	13252-13-6	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.801	2.31	4.63
Adona	919005-14-4	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.805	2.31	4.63
9CI-PF3ONS	756426-58-1	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.954	2.31	4.63
11CI-PF3OUdS	763051-92-9	2.31 U	E4111-FS(0)	1.000	8/12/2022	0.834	2.31	4.63

5



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-GW09-0722

Battelle ID E4112-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.286
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.798	2.19	4.37
PFHpA	375-85-9	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.823	2.19	4.37
PFOA	335-67-1	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.883	2.19	4.37
PFNA	375-95-1	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.728	2.19	4.37
PFDA	335-76-2	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.685	2.19	4.37
PFUnA	2058-94-8	2.19 U	E4112-FS(0)	1.000	10/1/2022	0.657	2.19	4.37
PFDoA	307-55-1	2.19 U	E4112-FS(0)	1.000	10/1/2022	0.664	2.19	4.37
PFTTrDA	72679-94-8	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.649	2.19	4.37
PFTeDA	376-06-7	2.19 U	E4112-FS(0)	1.000	10/1/2022	0.691	2.19	4.37
NMeFOSAA	2355-31-9	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.900	2.19	4.37
NEtFOSAA	2991-50-6	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.865	2.19	4.37
PFBS	375-73-5	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.757	2.19	4.37
PFHxS	355-46-4	2.19 U	E4112-FS(0)	1.000	10/1/2022	0.872	2.19	4.37
PFOS	1763-23-1	2.19 U	E4112-FS(0)	1.000	10/1/2022	0.935	2.19	4.37
HFPO-DA	13252-13-6	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.756	2.19	4.37
Adona	919005-14-4	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.760	2.19	4.37
9CI-PF3ONS	756426-58-1	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.900	2.19	4.37
11CI-PF3OUdS	763051-92-9	2.19 U	E4112-FS(0)	1.000	8/12/2022	0.788	2.19	4.37

10/13/22
 Analyzed by: Harnden, Kelsey
 Printed: 10/3/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-GW09P-0722

Battelle ID E4113-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.290
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.787	2.16	4.31
PFHpA	375-85-9	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.811	2.16	4.31
PFOA	335-67-1	1.24 J	E4113-FS(0)	1.000	8/12/2022	0.871	2.16	4.31
PFNA	375-95-1	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.718	2.16	4.31
PFDA	335-76-2	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.676	2.16	4.31
PFUnA	2058-94-8	2.16 U	E4113-FS(0)	1.000	10/1/2022	0.648	2.16	4.31
PFDoA	307-55-1	2.16 U	E4113-FS(0)	1.000	10/1/2022	0.655	2.16	4.31
PFTtDA	72629-94-8	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.640	2.16	4.31
PFTeDA	376-06-7	2.16 U	E4113-FS(0)	1.000	10/1/2022	0.682	2.16	4.31
NMeFOSAA	2355-31-9	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.888	2.16	4.31
NEtFOSAA	2991-50-6	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.853	2.16	4.31
PFBS	375-73-5	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.747	2.16	4.31
PFHxS	355-46-4	2.16 U	E4113-FS(0)	1.000	10/1/2022	0.859	2.16	4.31
PFOS	1763-23-1	2.16 U	E4113-FS(0)	1.000	10/1/2022	0.922	2.16	4.31
HFPO-DA	13252-13-6	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.746	2.16	4.31
Adona	919005-14-4	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.749	2.16	4.31
9CI-PF3ONS	756426-58-1	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.888	2.16	4.31
11CI-PF3OUdS	763051-92-9	2.16 U	E4113-FS(0)	1.000	8/12/2022	0.777	2.16	4.31

NEW 10/13/22

Analyzed by: Harnden, Kelsey
 Printed: 10/3/2022

DATA VALIDATION SUMMARY REPORT NAVAL STATION EVERETT, WASHINGTON

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1191
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-SS-GW16-0722	E4114-FS	Water
2	NRSJC-SS-GW16P-0722	E4115-FS	Water
3	NRSJC-SS-GW19-0722	E4116-FS	Water
4	NRSJC-SS-GW18-0722	E4117-FS	Water
4MS	NRSJC-SS-GW18-0722MS	E4118-FSMS	Water
4MSD	NRSJC-SS-GW18-0722MSD	E4119-FSMSD	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples collected on July 12-13, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
DJ214PB-FS	PFOS	1.09	U	1, 2

Field QC Blank

- Field QC samples were not collected.

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
1	13C2-PFTeDA	39%	UJ

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values except for the following.

MS/MSD Sample	Compound	MS %R/MSD %R/RPD	Qualifier
4	PFHxS	150%/136%/OK	None - Sample ND
	PFTeDA	OK/OK/32.7	None for RPD Alone

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-SS-GW16-0722 ng/L	NRSJC-SS-GW16P-0722 ng/L	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-GW16-0722

Battelle ID E4114-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/20/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.256
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.892	2.44	4.88
PFHpA	375-85-9	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.919	2.44	4.88
PFOA	335-67-1	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.986	2.44	4.88
PFNA	375-95-1	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.813	2.44	4.88
PFDA	335-76-2	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.766	2.44	4.88
PFUnA	2058-94-8	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.734	2.44	4.88
PFDoA	307-55-1	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.742	2.44	4.88
PFTTrDA	72629-94-8	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.725	2.44	4.88
PFTeDA	376-06-7	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.772	2.44	4.88
NMeFOSAA	2355-31-9	2.44 U	E4114-FS(0)	1.000	8/12/2022	1.01	2.44	4.88
NEtFOSAA	2991-50-6	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.967	2.44	4.88
PFBS	375-73-5	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.846	2.44	4.88
PFHxS	355-46-4	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.974	2.44	4.88
PFOS	1763-23-1	2.44 U	E4114-FS(0)	1.000	8/12/2022	1.04	2.44	4.88
HFPO-DA	13252-13-6	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.845	2.44	4.88
Adona	919005-14-4	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.849	2.44	4.88
9CI-PF3ONS	756426-58-1	2.44 U	E4114-FS(0)	1.000	8/12/2022	1.01	2.44	4.88
11CI-PF3OUdS	763051-92-9	2.44 U	E4114-FS(0)	1.000	8/12/2022	0.880	2.44	4.88

SSL

MBL

NW1216122

Analyzed by: Burkitt, Nathan
 Printed: 10/28/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-GW16-0722

Battelle ID E4114-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/20/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS

<i>Surrogate Recoveries (%)</i>	<i>Recovery</i>	<i>Extract ID</i>	<i>Analysis Date</i>
13C5-PFHxA	80	E4114-FS(0)	8/12/2022
13C4-PFHpA	85	E4114-FS(0)	8/12/2022
13C8-PFOA	87	E4114-FS(0)	8/12/2022
13C9-PFNA	79	E4114-FS(0)	8/12/2022
13C6-PFDA	79	E4114-FS(0)	8/12/2022
13C7-PFUnA	69	E4114-FS(0)	8/12/2022
13C2-PFDoA	55	E4114-FS(0)	8/12/2022
13C2-PFTeDA	39	E4114-FS(0)	8/12/2022
d3-MeFOSAA	71	E4114-FS(0)	8/12/2022
d5-EtFOSAA	74	E4114-FS(0)	8/12/2022
13C3-PFBS	76	E4114-FS(0)	8/12/2022
13C3-PFbS	79	E4114-FS(0)	8/12/2022
13C8-PFOS	61	E4114-FS(0)	8/12/2022
13C3-HFPO-DA	75	E4114-FS(0)	8/12/2022

NW1216122

Analyzed by: Burkitt, Nathan
 Printed: 10/28/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-GW16P-0722

Battelle ID E4115-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/20/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.265
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.861	2.36	4.72
PFHpA	375-85-9	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.888	2.36	4.72
PFOA	335-67-1	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.953	2.36	4.72
PFNA	375-95-1	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.786	2.36	4.72
PFDA	335-76-2	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.740	2.36	4.72
PFUnA	2058-94-8	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.709	2.36	4.72
PFDoA	307-55-1	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.717	2.36	4.72
PFTeDA	72629-94-8	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.700	2.36	4.72
PFTeDA	376-06-7	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.746	2.36	4.72
NMeFOSAA	2355-31-9	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.972	2.36	4.72
NeFOSAA	2991-50-6	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.934	2.36	4.72
PFBS	375-73-5	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.817	2.36	4.72
PFHxS	355-46-4	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.941	2.36	4.72
PFOS	1763-23-1	2.36 U	E4115-FS(0)	1.000	8/12/2022	1.01	2.36	4.72
HFPO-DA	13252-13-6	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.816	2.36	4.72
Adona	919005-14-4	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.820	2.36	4.72
9CI-PF3ONS	756426-58-1	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.972	2.36	4.72
11CI-PF3OUDS	763051-92-9	2.36 U	E4115-FS(0)	1.000	8/12/2022	0.850	2.36	4.72

W1216122
 Analyzed by: Burkitt, Nathan
 Printed: 10/28/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-55-GW19-0722

Battelle ID E4116-FS
 Sample Type SA
 Collection Date 07/12/2022
 Extraction Date 07/20/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.267
 Size Unit Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.855	2.34	4.68
PFHpA	375-85-9	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.881	2.34	4.68
PFOA	335-67-1	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.946	2.34	4.68
PFNA	375-95-1	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.780	2.34	4.68
PFDA	335-76-2	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.734	2.34	4.68
PFUnA	2058-94-8	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.704	2.34	4.68
PFDoA	307-55-1	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.712	2.34	4.68
PFTrDA	72629-94-8	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.695	2.34	4.68
PFTeDA	376-06-7	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.741	2.34	4.68
NMeFOSAA	2355-31-9	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.964	2.34	4.68
NEtFOSAA	2991-50-6	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.927	2.34	4.68
PFBS	375-73-5	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.811	2.34	4.68
PFHxS	355-46-4	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.934	2.34	4.68
PFOS	1763-23-1	2.34 U	E4116-FS(0)	1.000	8/12/2022	1.00	2.34	4.68
HFPO-DA	13252-13-6	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.810	2.34	4.68
Adona	919005-14-4	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.814	2.34	4.68
9CI-PF3ONS	756426-58-1	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.964	2.34	4.68
11CI-PF3OUDS	763051-92-9	2.34 U	E4116-FS(0)	1.000	8/12/2022	0.844	2.34	4.68

12/14/22

Analyzed by: Burkitt, Nathan
 Printed: 10/28/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-GW18-0722

Battelle ID E4117-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/20/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.263
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.868	2.38	4.75
PFHpA	375-85-9	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.894	2.38	4.75
PFOA	335-67-1	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.960	2.38	4.75
PFNA	375-95-1	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.792	2.38	4.75
PFDA	335-76-2	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.745	2.38	4.75
PFUnA	2058-94-8	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.715	2.38	4.75
PFDoA	307-55-1	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.722	2.38	4.75
PFTeDA	72629-94-8	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.705	2.38	4.75
PFTeDA	376-06-7	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.752	2.38	4.75
NMeFOSAA	2355-31-9	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.979	2.38	4.75
NEtFOSAA	2991-50-6	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.941	2.38	4.75
PFBS	375-73-5	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.823	2.38	4.75
PFHxS	355-46-4	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.948	2.38	4.75
PFOS	1763-23-1	2.38 U	E4117-FS(0)	1.000	8/12/2022	1.02	2.38	4.75
HFPO-DA	13252-13-6	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.822	2.38	4.75
Adona	919005-14-4	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.826	2.38	4.75
9CI-PF3ONS	756426-58-1	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.979	2.38	4.75
11CI-PF3OUDS	763051-92-9	2.38 U	E4117-FS(0)	1.000	8/12/2022	0.856	2.38	4.75

8/12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/28/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1192
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: September 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S6-GW10-0722	E4120-FS	Water
2	NRSJC-S6-GW08-0722	E4121-FS	Water
2MS	NRSJC-S6-GW08-0722MS	E4122-FSMS	Water
2MSD	NRSJC-S6-GW08-0722MSD	E4123-FSMSD	Water
3	NRSJC-S4-GW14-0722	E4124-FS	Water
4	NRSJC-S4-GW14P-0722	E4125-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples collected on July 13, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation

- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S4-FB01-071322	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S4-GW14-0722 ng/L	NRSJC-S4-GW14P-0722 ng/L	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 9/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-GW10-0722

Battelle ID E4120-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.257
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.888	2.43	4.86
PFHpA	375-85-9	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.915	2.43	4.86
PFOA	335-67-1	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.982	2.43	4.86
PFNA	375-95-1	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.810	2.43	4.86
PFDA	335-76-2	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.763	2.43	4.86
PFUnA	2058-94-8	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.732	2.43	4.86
PFDoA	307-55-1	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.739	2.43	4.86
PFTDA	72629-94-8	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.722	2.43	4.86
PFTeDA	376-06-7	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.769	2.43	4.86
NMeFOSAA	2355-31-9	2.43 U	E4120-FS(0)	1.000	8/18/2022	1.00	2.43	4.86
NEtFOSAA	2991-50-6	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.963	2.43	4.86
PFBS	375-73-5	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.842	2.43	4.86
PFHxS	355-46-4	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.970	2.43	4.86
PFOS	1763-23-1	2.43 U	E4120-FS(0)	1.000	8/18/2022	1.04	2.43	4.86
HFPO-DA	13252-13-6	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.841	2.43	4.86
Adona	919005-14-4	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.845	2.43	4.86
9CI-PF3ONS	756426-58-1	2.43 U	E4120-FS(0)	1.000	8/18/2022	1.00	2.43	4.86
11CI-PF3OUdS	763051-92-9	2.43 U	E4120-FS(0)	1.000	8/18/2022	0.876	2.43	4.86

ANW 9/12/22
 Analyzed by: Harnden, Kelsey

Printed: 8/26/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S6-GW08-0722

Battelle ID E4121-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.272
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.839	2.30	4.60
PFHpA	375-85-9	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.865	2.30	4.60
PFOA	335-67-1	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.928	2.30	4.60
PFNA	375-95-1	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.766	2.30	4.60
PFDA	335-76-2	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.721	2.30	4.60
PFUnA	2058-94-8	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.691	2.30	4.60
PFDoA	307-55-1	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.699	2.30	4.60
PFTrDA	72629-94-8	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.682	2.30	4.60
PFTeDA	376-06-7	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.727	2.30	4.60
NMeFOSAA	2355-31-9	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.947	2.30	4.60
NEtFOSAA	2991-50-6	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.910	2.30	4.60
PFBS	375-73-5	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.796	2.30	4.60
PFHxS	355-46-4	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.916	2.30	4.60
PFOS	1763-23-1	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.983	2.30	4.60
HFPO-DA	13252-13-6	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.795	2.30	4.60
Adona	919005-14-4	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.799	2.30	4.60
9CI-PF3ONS	756426-58-1	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.947	2.30	4.60
11CI-PF3OUdS	763051-92-9	2.30 U	E4121-FS(0)	1.000	8/18/2022	0.828	2.30	4.60

NW 9/12/22



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-GW14-0722

Battelle ID E4124-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.260
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.878	2.40	4.81
PFHpA	375-85-9	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.905	2.40	4.81
PFOA	335-67-1	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.971	2.40	4.81
PFNA	375-95-1	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.801	2.40	4.81
PFDA	335-76-2	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.754	2.40	4.81
PFUnA	2058-94-8	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.723	2.40	4.81
PFDoA	307-55-1	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.731	2.40	4.81
PFTrDA	72629-94-8	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.713	2.40	4.81
PFTeDA	376-06-7	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.761	2.40	4.81
NMeFOSAA	2355-31-9	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.990	2.40	4.81
NEtFOSAA	2991-50-6	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.952	2.40	4.81
PFBS	375-73-5	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.833	2.40	4.81
PFHxS	355-46-4	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.959	2.40	4.81
PFOS	1763-23-1	2.40 U	E4124-FS(0)	1.000	8/18/2022	1.03	2.40	4.81
HFPO-DA	13252-13-6	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.832	2.40	4.81
Adona	919005-14-4	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.836	2.40	4.81
9CI-PF3ONS	756426-58-1	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.990	2.40	4.81
11CI-PF3OUdS	763051-92-9	2.40 U	E4124-FS(0)	1.000	8/18/2022	0.866	2.40	4.81

NW 9/12/22

Analyzed by: Harnden, Kelsey
 Printed: 8/26/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-GW14P-0722

Battelle ID E4125-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/21/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.267
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.855	2.34	4.68
PFHpA	375-85-9	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.881	2.34	4.68
PFOA	335-67-1	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.946	2.34	4.68
PFNA	375-95-1	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.780	2.34	4.68
PFDA	335-76-2	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.734	2.34	4.68
PFUnA	2058-94-8	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.704	2.34	4.68
PFDoA	307-55-1	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.712	2.34	4.68
PFTTrDA	72629-94-8	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.695	2.34	4.68
PFTeDA	376-06-7	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.741	2.34	4.68
NMeFOSAA	2355-31-9	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.964	2.34	4.68
NEtFOSAA	2991-50-6	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.927	2.34	4.68
PFBS	375-73-5	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.811	2.34	4.68
PFHxS	355-46-4	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.934	2.34	4.68
PFOS	1763-23-1	2.34 U	E4125-FS(0)	1.000	8/18/2022	1.00	2.34	4.68
HFPO-DA	13252-13-6	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.810	2.34	4.68
Adona	919005-14-4	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.814	2.34	4.68
9CI-PF3ONS	756426-58-1	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.964	2.34	4.68
11CI-PF3OUdS	763051-92-9	2.34 U	E4125-FS(0)	1.000	8/18/2022	0.844	2.34	4.68

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1193
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 31, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S4-GW15-0722	E4126-FS	Water
1MS	NRSJC-S4-GW15-0722MS	E4127-FSMS	Water
1MSD	NRSJC-S4-GW15-0722MSD	E4128-FSMSD	Water
2	NRSJC-S4-FB01-071322	E4129-FS	Water
3	NRSJC-S1-EB01-071122	E4130-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one water sample, one aqueous field blank sample and one aqueous equipment blank sample collected on July 11-13, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Data Completeness, Case Narrative & Custody Documentation

- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S4-FB01-071322	None - ND	-	-	-
NRSJC-S1-EB01-071122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated:

9/1/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S4-GW15-0722

Battelle ID E4126-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.278
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.821	2.25	4.50
PFHpA	375-85-9	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.846	2.25	4.50
PFOA	335-67-1	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.908	2.25	4.50
PFNA	375-95-1	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.749	2.25	4.50
PFDA	335-76-2	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.705	2.25	4.50
PFUnA	2058-94-8	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.676	2.25	4.50
PFDaA	307-55-1	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.683	2.25	4.50
PFTTrDA	72629-94-8	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.667	2.25	4.50
PFTeDA	376-06-7	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.711	2.25	4.50
NMeFOSAA	2355-31-9	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.926	2.25	4.50
NEtFOSAA	2991-50-6	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.890	2.25	4.50
PFBS	375-73-5	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.779	2.25	4.50
PFHxS	355-46-4	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.897	2.25	4.50
PFOS	1763-23-1	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.962	2.25	4.50
HFPO-DA	13252-13-6	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.778	2.25	4.50
Adona	919005-14-4	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.781	2.25	4.50
9CI-PF3ONS	756426-58-1	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.926	2.25	4.50
11CI-PF3OUdS	763051-92-9	2.25 U	E4126-FS(0)	1.000	8/13/2022	0.810	2.25	4.50



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

2

Client ID NRSJC-S4-FB01-071322

Battelle ID E4129-FS
 Sample Type SA
 Collection Date 07/13/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.280
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.815	2.23	4.46
PFHpA	375-85-9	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.840	2.23	4.46
PFOA	335-67-1	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.902	2.23	4.46
PFNA	375-95-1	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.744	2.23	4.46
PFDA	335-76-2	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.700	2.23	4.46
PFUnA	2058-94-8	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.671	2.23	4.46
PFDoA	307-55-1	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.679	2.23	4.46
PFTeDA	72629-94-8	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.663	2.23	4.46
PFTeDA	376-06-7	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.706	2.23	4.46
NMeFOSAA	2355-31-9	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.920	2.23	4.46
NEtFOSAA	2991-50-6	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.884	2.23	4.46
PFBS	375-73-5	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.773	2.23	4.46
PFHxS	355-46-4	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.890	2.23	4.46
PFOS	1763-23-1	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.955	2.23	4.46
HFPO-DA	13252-13-6	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.772	2.23	4.46
Adona	919005-14-4	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.776	2.23	4.46
9Cl-PF3ONS	756426-58-1	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.920	2.23	4.46
11Cl-PF3OUdS	763051-92-9	2.23 U	E4129-FS(0)	1.000	8/13/2022	0.804	2.23	4.46



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S1-EB01-071122

Battelle ID E4130-FS
 Sample Type SA
 Collection Date 07/11/2022
 Extraction Date 07/19/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.276
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.827	2.26	4.53
PFHpA	375-85-9	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.852	2.26	4.53
PFOA	335-67-1	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.915	2.26	4.53
PFNA	375-95-1	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.755	2.26	4.53
PFDA	335-76-2	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.710	2.26	4.53
PFUnA	2058-94-8	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.681	2.26	4.53
PFDoA	307-55-1	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.688	2.26	4.53
PFTTrDA	72629-94-8	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.672	2.26	4.53
PFTeDA	376-06-7	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.716	2.26	4.53
NMeFOSAA	2355-31-9	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.933	2.26	4.53
NEtFOSAA	2991-50-6	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.897	2.26	4.53
PFBS	375-73-5	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.784	2.26	4.53
PFHxS	355-46-4	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.903	2.26	4.53
PFOS	1763-23-1	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.969	2.26	4.53
HFPO-DA	13252-13-6	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.784	2.26	4.53
Adona	919005-14-4	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.787	2.26	4.53
9CI-PF3ONS	756426-58-1	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.933	2.26	4.53
11CI-PF3OUdS	763051-92-9	2.26 U	E4130-FS(0)	1.000	8/13/2022	0.816	2.26	4.53

ANW 8/31/22
 Analyzed by: Griffith, Lauren
 Printed: 8/15/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1321
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: August 31, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S5-FB01-062322	E3557-FS	Water
2	NRSJC-S5-FB01-062722	E3558-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for two aqueous field blank samples collected on June 23-27, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination

- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were serious deficiencies of data. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

- All compounds were qualified (X) in two samples due to grossly exceeded holding times.

The remaining data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days except for the following.

EDS Sample	Date Extracted	Date Analyzed	# of Days	Qualifier
All Samples	06/23/22	08/04/22	42	X

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S5-FB01-062322	None - ND	-	-	-
NRSJC-S5-FB01-062722	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- Both samples were re-extracted grossly outside of holding times to confirm surrogate deficiencies in package 22-1082. Use the results in package 22-1082 since the results in this package are all (X) qualified.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated:

9/1/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-FB01-062322

Battelle ID E3557-FS1
 Sample Type SA
 Collection Date 06/23/2022
 Extraction Date 08/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.257
 Size Unit-Basis L

*Use original
in SDG 22-1082*

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.888	2.43	4.86
PFHpA	375-85-9	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.915	2.43	4.86
PFOA	335-67-1	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.982	2.43	4.86
PFNA	375-95-1	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.810	2.43	4.86
PFDA	335-76-2	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.763	2.43	4.86
PFUnA	2058-94-8	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.732	2.43	4.86
PFDoA	307-55-1	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.739	2.43	4.86
PFTTrDA	72629-94-8	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.722	2.43	4.86
PFTeDA	376-06-7	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.769	2.43	4.86
NMeFOSAA	2355-31-9	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	1.00	2.43	4.86
NeFOSAA	2991-50-6	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.963	2.43	4.86
PFBS	375-73-5	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.842	2.43	4.86
PFHxS	355-46-4	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.970	2.43	4.86
PFOS	1763-23-1	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	1.04	2.43	4.86
HFPO-DA	13252-13-6	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.841	2.43	4.86
Adona	919005-14-4	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.845	2.43	4.86
9CI-PF3ONS	756426-58-1	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	1.00	2.43	4.86
11CI-PF3OUdS	763051-92-9	2.43 UT	E3557-FS1(0)	1.000	8/6/2022	0.876	2.43	4.86

W 8/31/22

Analyzed by: Harnden, Kelsey
 Printed: 8/16/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S5-FB01-062722

Battelle ID E3558-FS1
 Sample Type SA
 Collection Date 06/27/2022
 Extraction Date 08/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.263
 Size Unit-Basis L

*Use original
 w/ SDG 22-1082*

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.868	2.38	4.75
PFHpA	375-85-9	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.894	2.38	4.75
PFOA	335-67-1	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.960	2.38	4.75
PFNA	375-95-1	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.792	2.38	4.75
PFDA	335-76-2	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.745	2.38	4.75
PFUnA	2058-94-8	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.715	2.38	4.75
PFDoA	307-55-1	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.722	2.38	4.75
PFTeDA	72629-94-8	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.705	2.38	4.75
PFTeDA	376-06-7	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.752	2.38	4.75
NMeFOSAA	2355-31-9	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.979	2.38	4.75
NEtFOSAA	2991-50-6	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.941	2.38	4.75
PFBS	375-73-5	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.823	2.38	4.75
PFHxS	355-46-4	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.948	2.38	4.75
PFOS	1763-23-1	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	1.02	2.38	4.75
HFPO-DA	13252-13-6	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.822	2.38	4.75
Adona	919005-14-4	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.826	2.38	4.75
9CI-PF3ONS	756426-58-1	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.979	2.38	4.75
11CI-PF3OUdS	763051-92-9	2.38 UT	E3558-FS1(0)	1.000	8/6/2022	0.856	2.38	4.75

HT

mw8/31/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1323
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: October 12, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NSE-B2114-EB01-080122	E4954-FS	Water
2	NSE-B2114-EB02-080122	E4955-FS	Water
3	NSE-B2114-EB03-080122	E4956-FS	Water
4	NSE-B2114-FB01-080122	E4957-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for three aqueous equipment blank samples and one aqueous field blank sample collected on August 1, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times

- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days except for the following.

EDS Sample	Date Extracted	Date Analyzed	# of Days	Qualifier
All Samples	08/09/22	09/14/22	36	UJ

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NSE-B2114-EB01-080122	None - ND	-	-	-
NSE-B2114-EB02-080122	None - ND	-	-	-
NSE-B2114-EB03-080122	None - ND	-	-	-
NSE-B2114-FB01-080122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 10/12/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J ⁺	The result was an estimated quantity, but the result may be biased high.
J ⁻	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-EB01-080122

Battelle ID E4954-FS
 Sample Type SA
 Collection Date 08/01/2022
 Extraction Date 08/09/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.259
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.881	2.41	4.83
PFHpA	375-85-9	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.908	2.41	4.83
PFOA	335-67-1	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.975	2.41	4.83
PFNA	375-95-1	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.804	2.41	4.83
PFDA	335-76-2	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.757	2.41	4.83
PFUnA	2058-94-8	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.726	2.41	4.83
PFDoA	307-55-1	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.734	2.41	4.83
PFTeDA	72629-94-8	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.716	2.41	4.83
PFTeDA	376-06-7	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.764	2.41	4.83
NMeFOSAA	2355-31-9	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.994	2.41	4.83
NEtFOSAA	2991-50-6	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.956	2.41	4.83
PFBS	375-73-5	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.836	2.41	4.83
PFHxS	355-46-4	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.962	2.41	4.83
PFOS	1763-23-1	2.41 UT	E4954-FS(0)	1.000	9/14/2022	1.03	2.41	4.83
HFPO-DA	13252-13-6	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.835	2.41	4.83
Adona	919005-14-4	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.839	2.41	4.83
9CI-PF3ONS	756426-58-1	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.994	2.41	4.83
11CI-PF3OUdS	763051-92-9	2.41 UT	E4954-FS(0)	1.000	9/14/2022	0.870	2.41	4.83

NW1012122

Analyzed by: Harnden, Kelsey
 Printed: 10/1/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-EB02-080122

Battelle ID E4955-FS
 Sample Type SA
 Collection Date 08/01/2022
 Extraction Date 08/09/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.244
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.935	2.56	5.12
PFHpA	375-85-9	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.964	2.56	5.12
PFOA	335-67-1	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.03	2.56	5.12
PFNA	375-95-1	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.853	2.56	5.12
PFDA	335-76-2	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.803	2.56	5.12
PFUnA	2058-94-8	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.770	2.56	5.12
PFDoA	307-55-1	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.779	2.56	5.12
PFTeDA	72829-94-8	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.760	2.56	5.12
PFTeDA	376-06-7	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.810	2.56	5.12
NMeFOSAA	2355-31-9	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.06	2.56	5.12
NEtFOSAA	2991-50-6	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.01	2.56	5.12
PFBS	375-73-5	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.887	2.56	5.12
PFHxS	355-46-4	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.02	2.56	5.12
PFOS	1763-23-1	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.10	2.56	5.12
HFPO-DA	13252-13-6	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.886	2.56	5.12
Adona	919005-14-4	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.890	2.56	5.12
9CI-PF3ONS	756426-58-1	2.56 UT	E4955-FS(0)	1.000	9/14/2022	1.06	2.56	5.12
11CI-PF3OUdS	763051-92-9	2.56 UT	E4955-FS(0)	1.000	9/14/2022	0.923	2.56	5.12

NW 10/12/22

Analyzed by: Harnden, Kelsey
 Printed: 10/1/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-EB03-080122

Battelle ID E4956-FS
 Sample Type SA
 Collection Date 08/01/2022
 Extraction Date 08/09/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.247
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.924	2.53	5.06
PFHpA	375-85-9	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.952	2.53	5.06
PFOA	335-67-1	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.02	2.53	5.06
PFNA	375-95-1	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.843	2.53	5.06
PFDA	335-76-2	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.794	2.53	5.06
PFUnA	2058-94-8	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.761	2.53	5.06
PFDoA	307-55-1	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.769	2.53	5.06
PFTtDA	72629-94-8	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.751	2.53	5.06
PFTeDA	376-06-7	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.801	2.53	5.06
NMeFOSAA	2355-31-9	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.04	2.53	5.06
NEtFOSAA	2991-50-6	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.00	2.53	5.06
PFBS	375-73-5	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.877	2.53	5.06
PFHxS	355-46-4	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.01	2.53	5.06
PFOS	1763-23-1	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.08	2.53	5.06
HFPO-DA	13252-13-6	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.876	2.53	5.06
Adona	919005-14-4	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.880	2.53	5.06
9CI-PF3ONS	756426-58-1	2.53 UT	E4956-FS(0)	1.000	9/14/2022	1.04	2.53	5.06
11CI-PF3OUdS	763051-92-9	2.53 UT	E4956-FS(0)	1.000	9/14/2022	0.912	2.53	5.06

3

HT

AN 10/12/22

Analyzed by: Harnden, Kelsey
 Printed: 10/1/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

4

Client ID NSE-B2114-FB01-080122

Battelle ID E4957-FS
 Sample Type SA
 Collection Date 08/01/2022
 Extraction Date 08/09/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.245
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.932	2.55	5.10
PFHpA	375-85-9	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.960	2.55	5.10
PFOA	335-67-1	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.03	2.55	5.10
PFNA	375-95-1	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.850	2.55	5.10
PFDA	335-76-2	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.800	2.55	5.10
PFUnA	2058-94-8	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.767	2.55	5.10
PFDoA	307-55-1	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.776	2.55	5.10
PFTTrDA	72629-94-8	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.757	2.55	5.10
PFTeDA	376-06-7	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.807	2.55	5.10
NMeFOSAA	2355-31-9	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.05	2.55	5.10
NEtFOSAA	2991-50-6	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.01	2.55	5.10
PFBS	375-73-5	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.884	2.55	5.10
PFHxS	355-46-4	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.02	2.55	5.10
PFOS	1763-23-1	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.09	2.55	5.10
HFPO-DA	13252-13-6	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.883	2.55	5.10
Adona	919005-14-4	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.887	2.55	5.10
9CI-PF3ONS	756426-58-1	2.55 UT	E4957-FS(0)	1.000	9/14/2022	1.05	2.55	5.10
11CI-PF3OUdS	763051-92-9	2.55 UT	E4957-FS(0)	1.000	9/14/2022	0.919	2.55	5.10

HT

AN10112122
 Analyzed by: Harnden, Kelsey
 Printed: 10/1/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1325
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NSE-B2114-SS03-0001	E4943-FS	Soil
2	NSE-B2114-SB02-1920	E4944-FS	Soil
3	NSE-B2114-SB01-0910	E4945-FS	Soil
3MS	NSE-B2114-SB01-0910MS	E4946-FSMS	Soil
3MSD	NSE-B2114-SB01-0910MSD	E4947-FSMSD	Soil
4	NSE-B2114-SS01-0001	E4948-FS	Soil
5	NSE-B2114-SS01P-0001	E4949-FS	Soil
6	NSE-B2114-SS02-0001	E4950-FS	Soil
7	NSE-B2114-SB03-1920	E4951-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for seven soil samples collected on July 26-28, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were reanalyzed for PFTeDA and PFHxS outside of the 28-day holding time. However, the extracts were stored per draft EPA Method 1633 which allows for 90 days. The laboratory (I) flags were removed, and no qualifications were required.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NSE-B2114-FB01-080122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
6	13C7-PFUnA	40%	J
	13C2-PFDoA	43%	J
	13C2-PFTeDA	40%	UJ
	d3-MeFOSAA	32%	UJ
	d5-EtFOSAA	35%	UJ
	13C8-PFOS	42%	J

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NSE-B2114-SS01-0001 ng/g	NSE-B2114-SS01P-0001 ng/g	RPD	Qualifier
PFHxA	0.501U	0.207	NC	None
PFHxS	2.77	2.15	25%	
PFOS	34.5	30.9	11%	

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SS03-0001

Battelle ID E4943-FS
 Sample Type SA
 Collection Date 07/27/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 5.20
 Matrix SO
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.160	0.500	1.00
PFTtDA	72629-94-8	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E4943-FS(0)	1.000	10/1/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E4943-FS(0)	1.000	10/1/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.399 J	E4943-FS(0)	1.000	9/2/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E4943-FS(0)	1.000	9/2/2022	0.150	0.500	2.00

W12/16/22
 Analyzed by: Harnden, Kelsey
 Printed: 10/7/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SB02-1920

Battelle ID E4944-FS
 Sample Type SA
 Collection Date 07/27/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 22.68
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.159	0.498	0.996
PFTnDA	72629-94-8	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U†	E4944-FS(0)	1.000	10/1/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U†	E4944-FS(0)	1.000	10/1/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.208 J	E4944-FS(0)	1.000	9/2/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.159	0.498	1.99
9CI-PF3ONS	756426-58-1	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.153	0.498	1.99
11CI-PF3OudS	763051-92-9	0.498 U	E4944-FS(0)	1.000	9/2/2022	0.149	0.498	1.99

NW 12/16/22

Analyzed by: Harnden, Kelsey
 Printed: 10/7/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SB01-0910

Battelle ID E4945-FS
 Sample Type SA
 Collection Date 07/27/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 16.37
 Matrix SO
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.160	0.500	1.00
PFTtDA	72629-94-8	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E4945-FS(0)	1.000	10/1/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E4945-FS(0)	1.000	10/1/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.636 J	E4945-FS(0)	1.000	9/2/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.154	0.500	2.00
11CI-PF3OudS	763051-92-9	0.500 U	E4945-FS(0)	1.000	9/2/2022	0.150	0.500	2.00

NW12116122

Analyzed by: Harnden, Kelsey
 Printed: 10/7/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SS01-0001

Battelle ID E4948-FS
 Sample Type SA
 Collection Date 07/26/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 20.23
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.160	0.501	1.00
PFTTrDA	72629-94-8	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E4948-FS(0)	1.000	10/1/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.171	0.501	1.00
PFHxS	355-46-4	2.77	E4948-FS(0)	1.000	10/1/2022	0.173	0.501	1.00
PFOS	1763-23-1	34.5	E4948-FS(0)	1.000	9/3/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.154	0.501	2.00
11CI-PF3OUdS	763051-92-9	0.501 U	E4948-FS(0)	1.000	9/3/2022	0.150	0.501	2.00

MW12116122
 Analyzed by: Harnden, Kelsey



5

Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SS01P-0001

Battelle ID E4949-FS
 Sample Type SA
 Collection Date 07/26/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 9.40
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.207 J	E4949-FS(0)	1.000	9/3/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.160	0.501	1.00
PFTDA	72629-94-8	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E4949-FS(0)	1.000	10/1/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.171	0.501	1.00
PFHxS	355-46-4	2.15 J	E4949-FS(0)	1.000	10/1/2022	0.173	0.501	1.00
PFOS	1763-23-1	30.9	E4949-FS(0)	1.000	9/3/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.154	0.501	2.00
11CI-PF3OUdS	763051-92-9	0.501 U	E4949-FS(0)	1.000	9/3/2022	0.150	0.501	2.00

NW1216122

Analyzed by: Harnden, Kelsey
 Printed: 10/7/2022



6

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SS02-0001

Battelle ID E4950-FS
 Sample Type SA
 Collection Date 07/26/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 9.39
 Matrix SO
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.436 J	E4950-FS(0)	1.000	9/3/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.308 J	E4950-FS(0)	1.000	9/3/2022	0.168	0.501	1.00
PFOA	335-67-1	0.350 J	E4950-FS(0)	1.000	9/3/2022	0.214	0.501	1.00
PFNA	375-95-1	0.240 J	E4950-FS(0)	1.000	9/3/2022	0.157	0.501	1.00
PFDA	335-76-2	0.593 J	E4950-FS(0)	1.000	9/3/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.267 J	E4950-FS(0)	1.000	9/3/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.478 J	E4950-FS(0)	1.000	9/3/2022	0.160	0.501	1.00
PFTTrDA	72629-94-8	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 J	E4950-FS(0)	1.000	10/1/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 J	E4950-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 J	E4950-FS(0)	1.000	9/3/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.982 J	E4950-FS(0)	1.000	10/1/2022	0.173	0.501	1.00
PFOS	1763-23-1	14.8 J	E4950-FS(0)	1.000	9/3/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.154	0.501	2.00
11CI-PF3OUDS	763051-92-9	0.501 U	E4950-FS(0)	1.000	9/3/2022	0.150	0.501	2.00

SSL
 SSL
 SSL
 ↓
 SSL

NW1216122
 Analyzed by: Harnden, Kelsey



6

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SS02-0001

Battelle ID E4950-FS
 Sample Type SA
 Collection Date 07/26/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	58	E4950-FS(0)	9/3/2022
13C4-PFHpA	58	E4950-FS(0)	9/3/2022
13C8-PFOA	52	E4950-FS(0)	9/3/2022
13C9-PFNA	51	E4950-FS(0)	9/3/2022
13C6-PFDA	53	E4950-FS(0)	9/3/2022
13C7-PFUnA	40	E4950-FS(0)	9/3/2022
13C2-PFDoA	43	E4950-FS(0)	9/3/2022
13C2-PFTeDA	40	E4950-FS(0)	10/1/2022
d3-MeFOSAA	32	E4950-FS(0)	9/3/2022
d5-EtFOSAA	35	E4950-FS(0)	9/3/2022
13C3-PFBS	57	E4950-FS(0)	9/3/2022
13C3-PFHxS	63	E4950-FS(0)	10/1/2022
13C8-PFOS	42	E4950-FS(0)	9/3/2022
13C3-HFPO-DA	63	E4950-FS(0)	9/3/2022



7

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-SB03-1920

Battelle ID E4951-FS
 Sample Type SA
 Collection Date 07/28/2022
 Extraction Date 08/08/2022
 Analytical Instrument Sciex 6500+ (AF) LC/MS/MS
 % Moisture 23.02
 Matrix SO
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.160	0.499	0.998
PFTrDA	72629-94-8	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E4951-FS(0)	1.000	10/1/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E4951-FS(0)	1.000	10/1/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.154	0.499	2.00
11CI-PF3OUdS	763051-92-9	0.499 U	E4951-FS(0)	1.000	9/3/2022	0.150	0.499	2.00

10/12/2022
 Analyzed by: Harnden, Kelsey
 Printed: 10/7/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1385
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRCPB-B106-SS01-0001	E5332-FS	Soil
2	NRCPB-B106-SS01P-0001	E5333-FS	Soil
3	NRCPB-B106-SS02-0001	E5334-FS	Soil
4	NRCPB-B106-SB01-1314	E5337-FS	Soil
4MS	NRCPB-B106-SB01-1314MS	E5338-FSMS	Soil
4MSD	NRCPB-B106-SB01-1314MSD	E5339-FSMSD	Soil
5	NRCPB-B106-SB02-0910	E5340-FS	Soil
6	NRCPB-B106-SS03-0001	E5343-FS	Soil
7	NRCPB-B106-SB03-0506	E5345-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for seven soil samples collected on August 3-8, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 28 days for soil samples and analyzed within 30 days except for the following.

EDS Sample	Date Extracted	Date Analyzed	# of Days	Qualifier
3	08/16/22	10/29/22	74	UJ - PFTeDA only
7	08/16/22	10/29/22	74	UJ - PFDaA only

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRCPB-B106-EB01-080322	None - ND	-	-	-
NRCPB-B106-EB01-080422	None - ND	-	-	-
NRCPB-B106-EB01-080922	None - ND	-	-	-
NRCPB-B106-FB01-080322	None - ND	-	-	-
NRCPB-B106-FB01-080822	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
2	d5-EtFOSAA	44%	UJ
6	13C2-PFTeDA	43%	UJ
7	d5-EtFOSAA	45%	UJ

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

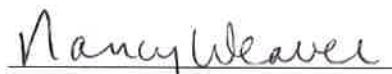
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRCPB-B106-SS01-0001 ng/g	NRCPB-B106-SS01P-0001 ug/g	RPD	Qualifier
PFOS	0.260	0.498U	NC	None

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SS01-0001

Battelle ID E5332-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 16.31
 Matrix SO
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.161	0.502	1.00
PFTrDA	72629-94-8	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.260 J	E5332-FS(0)	1.000	9/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.161	0.502	2.01
9Cl-PF3ONS	756426-58-1	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.155	0.502	2.01
11Cl-PFBOuS	763051-92-9	0.502 U	E5332-FS(0)	1.000	9/9/2022	0.151	0.502	2.01

M 12/16/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-S501P-0001

Battelle ID E5333-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 17.05
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.159	0.498	0.996
PFTeDA	72629-94-8	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.159	0.498	1.99
9Cl-PF3ONS	756426-58-1	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.153	0.498	1.99
11Cl-PF3OUDS	763051-92-9	0.498 U	E5333-FS(0)	1.000	9/9/2022	0.149	0.498	1.99

MM/21/6/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SS01P-0001

Battelle ID E5333-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	82	E5333-FS(0)	9/9/2022
13C4-PFHpA	89	E5333-FS(0)	9/9/2022
13C8-PFOA	91	E5333-FS(0)	9/9/2022
13C9-PFNA	74	E5333-FS(0)	9/9/2022
13C6-PFDA	68	E5333-FS(0)	9/9/2022
13C7-PFUnA	65	E5333-FS(0)	9/9/2022
13C2-PFDoA	57	E5333-FS(0)	9/9/2022
13C2-PFTeDA	64	E5333-FS(0)	9/9/2022
d3-MeFOSAA	59	E5333-FS(0)	9/9/2022
d5-EtFOSAA	44	E5333-FS(0)	9/9/2022
13C3-PFBS	74	E5333-FS(0)	9/9/2022
13C3-PFHxS	79	E5333-FS(0)	9/9/2022
13C8-PFOS	68	E5333-FS(0)	9/9/2022
13C3-HFPO-DA	73	E5333-FS(0)	9/9/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SS02-0001

Battelle ID E5334-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 14.68
 Matrix SO
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.161	0.502	1.00
PFTrDA	72629-94-8	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E5334-FS(0)	1.000	10/29/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.155	0.502	2.01
11CI-PF3OUdS	763051-92-9	0.502 U	E5334-FS(0)	1.000	9/9/2022	0.151	0.502	2.01

11/2/2022

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SB01-1314

Battelle ID E5337-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 10.10
 Matrix SO
 Sample Size 4.980
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.179	0.502	1.00
PFHpA	375-85-9	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.169	0.502	1.00
PFOA	335-67-1	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.215	0.502	1.00
PFNA	375-95-1	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.158	0.502	1.00
PFDA	335-76-2	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.159	0.502	1.00
PFUnA	2058-94-8	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.157	0.502	1.00
PFDoA	307-55-1	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.161	0.502	1.00
PFTeDA	72829-94-8	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.162	0.502	1.00
PFTeDA	376-06-7	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.163	0.502	2.01
NMeFOSAA	2355-31-9	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
NEtFOSAA	2991-50-6	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.166	0.502	2.01
PFBS	375-73-5	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.172	0.502	1.00
PFHxS	355-46-4	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.174	0.502	1.00
PFOS	1763-23-1	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.176	0.502	1.00
HFPO-DA	13252-13-6	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.160	0.502	2.01
Adona	919005-14-4	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.161	0.502	2.01
9CI-PF3ONS	756426-58-1	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.155	0.502	2.01
11CI-PF5OUDS	763051-92-9	0.502 U	E5337-FS(0)	1.000	9/9/2022	0.151	0.502	2.01

NW12116122

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SB02-0910

Battelle ID E5340-FS
 Sample Type SA
 Collection Date 08/04/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 21.33
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.159	0.498	0.996
PFTeDA	72629-94-8	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.159	0.498	1.99
9Cl-PF3ONS	756426-58-1	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.153	0.498	1.99
11Cl-PF3OUDS	763051-92-9	0.498 U	E5340-FS(0)	1.000	9/9/2022	0.149	0.498	1.99

NW12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SS03-0001

Battelle ID E5343-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 17.25
 Matrix SO
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.160	0.499	0.998
PFTrDA	72629-94-8	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.621 J	E5343-FS(0)	1.000	9/9/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.154	0.499	2.00
11Cl-PF3OUdS	763051-92-9	0.499 U	E5343-FS(0)	1.000	9/9/2022	0.150	0.499	2.00

11/2/16/22

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SS03-0001

Battelle ID E5343-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis
			Date
13C5-PFHxA	69	E5343-FS(0)	9/9/2022
13C4-PFHpA	77	E5343-FS(0)	9/9/2022
13C8-PFOA	81	E5343-FS(0)	9/9/2022
13C9-PFNA	66	E5343-FS(0)	9/9/2022
13C6-PFDA	69	E5343-FS(0)	9/9/2022
13C7-PFUnA	69	E5343-FS(0)	9/9/2022
13C2-PFDoA	68	E5343-FS(0)	9/9/2022
13C2-PFTeDA	43	E5343-FS(0)	9/9/2022
d3-MeFOSAA	79	E5343-FS(0)	9/9/2022
d5-EtFOSAA	72	E5343-FS(0)	9/9/2022
13C3-PFBS	98	E5343-FS(0)	9/9/2022
13C3-PFHxS	90	E5343-FS(0)	9/9/2022
13C8-PFOS	74	E5343-FS(0)	9/9/2022
13C3-HFPO-DA	66	E5343-FS(0)	9/9/2022

NW12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-SB03-0506

Battelle ID E5345-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 25.52
 Matrix SO
 Sample Size 5.020
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.177	0.498	0.996
PFHpA	375-85-9	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.167	0.498	0.996
PFOA	335-67-1	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.213	0.498	0.996
PFNA	375-95-1	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.156	0.498	0.996
PFDA	335-76-2	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.157	0.498	0.996
PFUnA	2058-94-8	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.155	0.498	0.996
PFDoA	307-55-1	0.498 U	E5345-FS(0)	1.000	10/29/2022	0.159	0.498	0.996
PFTeDA	72629-94-8	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.160	0.498	0.996
PFTeDA	376-06-7	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.161	0.498	1.99
NMeFOSAA	2355-31-9	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
NEtFOSAA	2991-50-6	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.164	0.498	1.99
PFBS	375-73-5	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.170	0.498	0.996
PFHxS	355-46-4	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.172	0.498	0.996
PFOS	1763-23-1	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.174	0.498	0.996
HFPO-DA	13252-13-6	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.158	0.498	1.99
Adona	919005-14-4	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.159	0.498	1.99
9CI-PF3ONS	756426-58-1	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.153	0.498	1.99
11CI-PFBOuS	763051-92-9	0.498 U	E5345-FS(0)	1.000	9/9/2022	0.149	0.498	1.99

HT

SSL

11/2/16/22



7

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-S803-0506

Battelle ID E5345-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	68	E5345-FS(0)	9/9/2022
13C4-PFHpA	72	E5345-FS(0)	9/9/2022
13C8-PFOA	74	E5345-FS(0)	9/9/2022
13C9-PFNA	59	E5345-FS(0)	9/9/2022
13C6-PFDA	57	E5345-FS(0)	9/9/2022
13C7-PFUnA	56	E5345-FS(0)	9/9/2022
13C2-PFDoA	55	E5345-FS(0)	10/29/2022
13C2-PFTeDA	53	E5345-FS(0)	9/9/2022
d3-MeFOSAA	54	E5345-FS(0)	9/9/2022
d5-EtFOSAA	45	E5345-FS(0)	9/9/2022
13C3-PFBS	63	E5345-FS(0)	9/9/2022
13C3-PFHtS	69	E5345-FS(0)	9/9/2022
13C8-PFOS	58	E5345-FS(0)	9/9/2022
13C3-HFPO-DA	60	E5345-FS(0)	9/9/2022

NW12116122

Analyzed by: Burkitt, Nathan
 Printed: 11/2/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1386
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRCPB-B106-EB01-080322	E5335-FS	Water
2	NRCPB-B106-FB01-080322	E5336-FS	Water
3	NRCPB-B106-EB01-080422	E5341-FS	Water
4	NRCPB-B106-FB01-080822	E5342-FS	Water
5	NRCPB-B106-EB01-080822	E5344-FS	Water
6	NRCPB-B106-EB01-080922	E5346-FS	Water
7	NRCPB-B106-EB02-080022	E5347-FS	Water
8	NRCPB-B106-GW01-0822	E5348-FS	Water
9	NRCPB-B106-GW01P-0822	E5349-FS	Water
10	NRCPB-B106-GW02-0822	E5350-FS	Water
11	NRCPB-B106-GW03-0822	E5351-FS	Water
11MS	NRCPB-B106-GW03-0822MS	E5352-FSMS	Water
11MSD	NRCPB-B106-GW03-0822MSD	E5353-FSMSD	Water
12	NRCPB-B106-EB01-081022	E5354-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples, six aqueous equipment blank samples, and two aqueous field blank samples collected on August 3-10, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were serious deficiencies of data. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

- PFTeDA was qualified (X) in one sample due to a severely low surrogate recovery.

The remaining data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRCPB-B106-EB01-080322	None - ND	-	-	-
NRCPB-B106-FB01-080322	None - ND	-	-	-
NRCPB-B106-EB01-080422	None - ND	-	-	-
NRCPB-B106-FB01-080822	None - ND	-	-	-
NRCPB-B106-EB01-080822	None - ND	-	-	-
NRCPB-B106-EB01-080922	None - ND	-	-	-
NRCPB-B106-EB02-080022	None - ND	-	-	-
NRCPB-B106-EB01-081022	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
8	13C2-PFTeDA	19%	UJ
9	13C2-PFTeDA	21%	UJ
10	13C2-PFTeDA	6%	X

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- EDS Sample 10 exhibited PFOS with an ion ratio outside of QC criteria and was flagged (Q) by the laboratory. The reviewer qualified this result as estimated (J).
- EDS Sample 10 was re-extracted in SDG 22-1979 outside of holding times to confirm surrogate recoveries. The original analysis results in this SDG should be used for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRCPB-B106-GW01-0822 ng/L	NRCPB-B106-GW01P-0822 ng/L	RPD	Qualifier
PFOA	3.61	3.42	5%	None
PFHxS	3.70	3.21	14%	
PFOS	2.90	2.55	13%	

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-EB01-080322

Battelle ID E5335-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.256
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.892	2.44	4.88
PFHpA	375-85-9	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.919	2.44	4.88
PFOA	335-67-1	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.986	2.44	4.88
PFNA	375-95-1	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.813	2.44	4.88
PFDA	335-76-2	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.766	2.44	4.88
PFUnA	2058-94-8	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.734	2.44	4.88
PFDoA	307-55-1	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.742	2.44	4.88
PFTrDA	72629-94-8	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.725	2.44	4.88
PFTeDA	376-06-7	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.772	2.44	4.88
NMeFOSAA	2355-31-9	2.44 U	E5335-FS(0)	1.000	9/9/2022	1.01	2.44	4.88
NEtFOSAA	2991-50-6	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.967	2.44	4.88
PFBS	375-73-5	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.846	2.44	4.88
PFHxS	355-46-4	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.974	2.44	4.88
PFOS	1763-23-1	2.44 U	E5335-FS(0)	1.000	9/9/2022	1.04	2.44	4.88
HFPO-DA	13252-13-6	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.845	2.44	4.88
Adona	919005-14-4	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.849	2.44	4.88
9Cl-PF3ONS	756426-58-1	2.44 U	E5335-FS(0)	1.000	9/9/2022	1.01	2.44	4.88
11Cl-PF3OUdS	763051-92-9	2.44 U	E5335-FS(0)	1.000	9/9/2022	0.880	2.44	4.88

NW12116122

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-FB01-080322

Battelle ID E5336-FS
 Sample Type SA
 Collection Date 08/03/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.242
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.943	2.58	5.17
PFHxA	375-85-9	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.972	2.58	5.17
PFOA	335-67-1	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.04	2.58	5.17
PFNA	375-95-1	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.861	2.58	5.17
PFDA	335-76-2	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.810	2.58	5.17
PFUnA	2058-94-8	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.777	2.58	5.17
PFDoA	307-55-1	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.785	2.58	5.17
PFTrDA	72629-94-8	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.767	2.58	5.17
PFTeDA	376-06-7	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.817	2.58	5.17
NMeFOSAA	2355-31-9	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.06	2.58	5.17
NEtFOSAA	2991-50-6	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.02	2.58	5.17
PFBS	375-73-5	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.895	2.58	5.17
PFHxS	355-46-4	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.03	2.58	5.17
PFOS	1763-23-1	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.11	2.58	5.17
HFPO-DA	13252-13-6	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.894	2.58	5.17
Adona	919005-14-4	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.898	2.58	5.17
9Cl-PF3ONS	756426-58-1	2.58 U	E5336-FS(0)	1.000	9/9/2022	1.06	2.58	5.17
11Cl-PF3OUds	763051-92-9	2.58 U	E5336-FS(0)	1.000	9/9/2022	0.931	2.58	5.17

NW 12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-EB01-080422

Battelle ID E5341-FS
 Sample Type SA
 Collection Date 08/04/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.277
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.824	2.26	4.51
PFHpA	375-95-9	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.849	2.26	4.51
PFOA	335-67-1	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.912	2.26	4.51
PFNA	375-95-1	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.752	2.26	4.51
PFDA	335-76-2	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.708	2.26	4.51
PFUnA	2058-94-8	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.679	2.26	4.51
PFDoA	307-55-1	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.686	2.26	4.51
PFTeDA	72629-94-8	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.870	2.26	4.51
PFTeDA	376-06-7	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.714	2.26	4.51
NMeFOSAA	2355-31-9	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.930	2.26	4.51
NEtFOSAA	2991-50-6	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.894	2.26	4.51
PFBS	375-73-5	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.782	2.26	4.51
PFHxS	355-46-4	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.900	2.26	4.51
PFOS	1763-23-1	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.966	2.26	4.51
HFPO-DA	13252-13-6	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.781	2.26	4.51
Adona	919005-14-4	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.784	2.26	4.51
9Cl-PF3ONS	756426-58-1	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.930	2.26	4.51
11Cl-PF3OUDs	763051-92-9	2.26 U	E5341-FS(0)	1.000	9/9/2022	0.813	2.26	4.51

MW12116122

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



4

Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-FB01-080822

Battelle ID E5342-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.235
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.971	2.66	5.32
PFHpA	375-85-9	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.00	2.66	5.32
PFOA	335-67-1	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.07	2.66	5.32
PFNA	375-95-1	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.886	2.66	5.32
PFDA	335-76-2	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.834	2.66	5.32
PFUnA	2058-94-8	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.800	2.66	5.32
PFDoA	307-55-1	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.809	2.66	5.32
PFTeDA	72629-94-8	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.789	2.66	5.32
PFTeDA	376-06-7	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.841	2.66	5.32
NMeFOSAA	2355-31-9	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.10	2.66	5.32
NEtFOSAA	2991-50-6	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.05	2.66	5.32
PFBS	375-73-5	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.921	2.66	5.32
PFHxS	355-46-4	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.06	2.66	5.32
PFOS	1763-23-1	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.14	2.66	5.32
HFPO-DA	13252-13-6	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.920	2.66	5.32
Adona	919005-14-4	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.924	2.66	5.32
9CI-PF3ONS	756426-58-1	2.66 U	E5342-FS(0)	1.000	9/9/2022	1.10	2.66	5.32
11CI-PF3OUdS	763051-92-9	2.66 U	E5342-FS(0)	1.000	9/9/2022	0.959	2.66	5.32

12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-EB01-080822

Battelle ID E5344-FS
 Sample Type SA
 Collection Date 08/08/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.231
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.988	2.71	5.41
PFHpA	375-85-9	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.02	2.71	5.41
PFOA	335-67-1	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.09	2.71	5.41
PFNA	375-95-1	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.902	2.71	5.41
PFDA	335-76-2	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.848	2.71	5.41
PFUnA	2058-94-8	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.814	2.71	5.41
PFDoA	307-55-1	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.823	2.71	5.41
PFTeDA	72629-94-8	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.809	2.71	5.41
PFTeDA	376-06-7	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.856	2.71	5.41
NMeFOSAA	2355-31-9	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.11	2.71	5.41
NEtFOSAA	2991-50-6	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.07	2.71	5.41
PFBS	375-73-5	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.937	2.71	5.41
PFHxS	355-46-4	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.08	2.71	5.41
PFOS	1763-23-1	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.16	2.71	5.41
HFPO-DA	13252-13-6	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.936	2.71	5.41
Adona	919005-14-4	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.940	2.71	5.41
9Cl-PF3ONS	756426-58-1	2.71 U	E5344-FS(0)	1.000	9/9/2022	1.11	2.71	5.41
11Cl-PF3OUds	763051-92-9	2.71 U	E5344-FS(0)	1.000	9/9/2022	0.975	2.71	5.41

NW12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



6

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1 XX.0026.000001

Client ID NRCPB-B106-EB01-080922

Battelle ID E5346-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.266
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.858	2.35	4.70
PFHpA	376-85-9	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.884	2.35	4.70
PFOA	335-67-1	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.949	2.35	4.70
PFNA	375-95-1	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.783	2.35	4.70
PFDA	335-76-2	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.737	2.35	4.70
PFUnA	2058-94-8	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.707	2.35	4.70
PFDoA	307-55-1	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.714	2.35	4.70
PFTrDA	72629-94-8	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.697	2.35	4.70
PFTeDA	376-06-7	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.743	2.35	4.70
NMeFOSAA	2355-31-9	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.968	2.35	4.70
NEtFOSAA	2991-50-6	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.930	2.35	4.70
PFBS	375-73-5	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.814	2.35	4.70
PFHxS	355-46-4	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.937	2.35	4.70
PFOS	1763-23-1	2.35 U	E5346-FS(0)	1.000	9/9/2022	1.01	2.35	4.70
HFPO-DA	13252-13-6	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.813	2.35	4.70
Adona	919005-14-4	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.817	2.35	4.70
9CI-PF3ONS	756426-58-1	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.968	2.35	4.70
11CI-PF3OUdS	763051-92-9	2.35 U	E5346-FS(0)	1.000	9/9/2022	0.847	2.35	4.70

MW12116122
 Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



7

Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-EB02-080922

Battelle ID E5347-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.278
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.821	2.25	4.50
PFHpA	375-85-9	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.846	2.25	4.50
PFOA	335-67-1	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.908	2.25	4.50
PFNA	375-95-1	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.749	2.25	4.50
PFDA	335-76-2	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.705	2.25	4.50
PFUnA	2058-94-8	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.676	2.25	4.50
PFDoA	307-55-1	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.683	2.25	4.50
PFTrDA	72629-94-8	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.687	2.25	4.50
PFTeDA	376-06-7	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.711	2.25	4.50
NMeFOSAA	2355-31-9	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.926	2.25	4.50
NEtFOSAA	2991-50-6	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.890	2.25	4.50
PFBS	375-73-5	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.779	2.25	4.50
PFHxS	355-46-4	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.897	2.25	4.50
PFOS	1763-23-1	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.962	2.25	4.50
HFPO-DA	13252-13-6	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.778	2.25	4.50
Adona	919005-14-4	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.781	2.25	4.50
9Cl-PF3ONS	756426-58-1	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.926	2.25	4.50
11Cl-PF3OUds	763051-92-9	2.25 U	E5347-FS(0)	1.000	9/9/2022	0.810	2.25	4.50

NW 12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



8

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW01-0822

Battelle ID E5348-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.231
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.988	2.71	5.41
PPHpA	375-85-9	2.71 U	E5348-FS(0)	1.000	9/9/2022	1.02	2.71	5.41
PFOA	335-67-1	3.61 J	E5348-FS(0)	1.000	9/9/2022	1.09	2.71	5.41
PFNA	375-95-1	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.902	2.71	5.41
PFDA	335-76-2	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.848	2.71	5.41
PFUnA	2058-94-8	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.814	2.71	5.41
PFDoA	307-55-1	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.823	2.71	5.41
PFTDA	72629-94-5	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.803	2.71	5.41
PFTeDA	376-06-7	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.856	2.71	5.41
NMeFOSAA	2355-31-9	2.71 U	E5348-FS(0)	1.000	9/9/2022	1.11	2.71	5.41
NEtFOSAA	2991-50-6	2.71 U	E5348-FS(0)	1.000	9/9/2022	1.07	2.71	5.41
PFBS	375-73-5	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.937	2.71	5.41
PFHxS	355-46-4	3.70 J	E5348-FS(0)	1.000	9/9/2022	1.08	2.71	5.41
PFOS	1763-23-1	2.90 J	E5348-FS(0)	1.000	9/9/2022	1.16	2.71	5.41
HFPO-DA	13252-13-6	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.936	2.71	5.41
Adona	919005-14-4	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.940	2.71	5.41
9CI-PF3ONS	756426-58-1	2.71 U	E5348-FS(0)	1.000	9/9/2022	1.11	2.71	5.41
11CI-PF3OUs	763051-92-9	2.71 U	E5348-FS(0)	1.000	9/9/2022	0.975	2.71	5.41

SSL

MW12116122
 Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



8

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW01-0822

Battelle ID E5348-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	113	E5348-FS(0)	9/9/2022
13C4-PFHpA	121	E5348-FS(0)	9/9/2022
13C8-PFOA	130	E5348-FS(0)	9/9/2022
13C9-PFNA	117	E5348-FS(0)	9/9/2022
13C6-PFDA	108	E5348-FS(0)	9/9/2022
13C7-PFUnA	98	E5348-FS(0)	9/9/2022
13C2-PFDoA	84	E5348-FS(0)	9/9/2022
13C2-PFTeDA	19	E5348-FS(0)	9/9/2022
d3-MeFOSAA	92	E5348-FS(0)	9/9/2022
d5-EtFOSAA	86	E5348-FS(0)	9/9/2022
13C3-PFBS	116	E5348-FS(0)	9/9/2022
13C3-PFHxS	119	E5348-FS(0)	9/9/2022
13C8-PFOS	103	E5348-FS(0)	9/9/2022
13C3-HFPO-DA	96	E5348-FS(0)	9/9/2022

NW1216102

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



9

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW01P-0822

Battelle ID E5349-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.245
 Size Unit Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.932	2.55	5.10
PFHpA	375-85-9	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.960	2.55	5.10
PFOA	335-67-1	3.42 J	E5349-FS(0)	1.000	9/9/2022	1.03	2.55	5.10
PFNA	375-95-1	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.850	2.55	5.10
PFDA	335-76-2	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.800	2.55	5.10
PFUnA	2058-94-8	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.767	2.55	5.10
PFDoA	307-55-1	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.776	2.55	5.10
PFTrDA	72629-94-8	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.757	2.55	5.10
PFTeDA	376-06-7	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.807	2.55	5.10
NMeFOSAA	2355-31-9	2.55 U	E5349-FS(0)	1.000	9/9/2022	1.05	2.55	5.10
NEtFOSAA	2991-50-6	2.55 U	E5349-FS(0)	1.000	9/9/2022	1.01	2.55	5.10
PFBS	375-73-5	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.884	2.55	5.10
PFHxS	355-46-4	3.21 J	E5349-FS(0)	1.000	9/9/2022	1.02	2.55	5.10
PFOS	1763-23-1	2.55 J	E5349-FS(0)	1.000	9/9/2022	1.09	2.55	5.10
HFPO-DA	13252-13-6	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.883	2.55	5.10
Adona	919005-14-4	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.887	2.55	5.10
9CI-PF3ONS	756426-58-1	2.55 U	E5349-FS(0)	1.000	9/9/2022	1.05	2.55	5.10
11CI-PF3OUdS	763051-92-9	2.55 U	E5349-FS(0)	1.000	9/9/2022	0.919	2.55	5.10

SSL

NW12116122

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



9

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW01P-0822

Battelle ID E5349-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	114	E5349-FS(0)	9/9/2022
13C4-PFHpA	120	E5349-FS(0)	9/9/2022
13C8-PFOA	129	E5349-FS(0)	9/9/2022
13C9-PFNA	116	E5349-FS(0)	9/9/2022
13C6-PFDA	107	E5349-FS(0)	9/9/2022
13C7-PFUnA	105	E5349-FS(0)	9/9/2022
13C2-PFDoA	89	E5349-FS(0)	9/9/2022
13C2-PFTeDA	21	E5349-FS(0)	9/9/2022
d3-MeFOSAA	91	E5349-FS(0)	9/9/2022
d5-EtFOSAA	80	E5349-FS(0)	9/9/2022
13C3-PFBS	115	E5349-FS(0)	9/9/2022
13C3-PFHxA	114	E5349-FS(0)	9/9/2022
13C8-PFOS	106	E5349-FS(0)	9/9/2022
13C3-HFPO-DA	101	E5349-FS(0)	9/9/2022

NW12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



10

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW02-0822

Battelle ID E5350-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.254
 Size Unit Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.05 J	E5350-FS(0)	1.000	9/9/2022	0.899	2.46	4.92
PFHpA	375-85-9	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.926	2.46	4.92
PFOA	335-67-1	2.08 J	E5350-FS(0)	1.000	9/9/2022	0.994	2.46	4.92
PFNA	375-95-1	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.820	2.46	4.92
PFDA	335-76-2	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.772	2.46	4.92
PFUnA	2058-94-8	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.740	2.46	4.92
PFDoA	307-55-1	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.748	2.46	4.92
PFTrDA	72629-94-8	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.730	2.46	4.92
PFTeDA	376-06-7	2.46 U X	E5350-FS(0)	1.000	9/9/2022	0.779	2.46	4.92
NMeFOSAA	2355-31-9	2.46 U	E5350-FS(0)	1.000	9/9/2022	1.01	2.46	4.92
NEtFOSAA	2991-50-6	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.974	2.46	4.92
PFBS	375-73-5	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.852	2.46	4.92
PFHxS	355-46-4	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.981	2.46	4.92
PFOS	1763-23-1	5.53 J	E5350-FS(0)	1.000	9/9/2022	1.05	2.46	4.92
HFPO-DA	13252-13-6	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.851	2.46	4.92
Adona	919005-14-4	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.855	2.46	4.92
9Cl-PF3ONS	756426-58-1	2.46 U	E5350-FS(0)	1.000	9/9/2022	1.01	2.46	4.92
11Cl-PF3OUDs	763051-92-9	2.46 U	E5350-FS(0)	1.000	9/9/2022	0.887	2.46	4.92

SSL

OT

NW12116122
 Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



10

Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW02-0822
 Battelle ID E5350-FS
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	99	E5350-FS(0)	9/9/2022
13C4-PFHpA	131	E5350-FS(0)	9/9/2022
13C8-PFOA	130	E5350-FS(0)	9/9/2022
13C9-PFNA	111	E5350-FS(0)	9/9/2022
13C6-PFDA	101	E5350-FS(0)	9/9/2022
13C7-PFUnA	94	E5350-FS(0)	9/9/2022
13C2-PFDoA	52	E5350-FS(0)	9/9/2022
13C2-PFTeDA	6	E5350-FS(0)	9/9/2022
d3-MeFOSAA	69	E5350-FS(0)	9/9/2022
d5-EtFOSAA	60	E5350-FS(0)	9/9/2022
13C3-PFBS	118	E5350-FS(0)	9/9/2022
13G3-PFHx5	119	E5350-FS(0)	9/9/2022
13C8-PFOS	100	E5350-FS(0)	9/9/2022
13C3-HFPO-DA	98	E5350-FS(0)	9/9/2022

MW1216122
 Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022



11

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW03-0822

Battelle ID E5351-FS
 Sample Type SA
 Collection Date 08/10/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.250
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.913	2.50	5.00
PFHpA	375-85-9	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.941	2.50	5.00
PFOA	335-67-1	2.50 U	E5351-FS(0)	1.000	9/9/2022	1.01	2.50	5.00
PFNA	375-95-1	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.833	2.50	5.00
PFDA	335-76-2	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.784	2.50	5.00
PFUnA	2058-94-8	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.752	2.50	5.00
PFDoA	307-55-1	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.760	2.50	5.00
PFTeDA	72629-94-6	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.742	2.50	5.00
PFTeDA	376-06-7	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.791	2.50	5.00
NMeFOSAA	2355-31-9	2.50 U	E5351-FS(0)	1.000	9/9/2022	1.03	2.50	5.00
NEtFOSAA	2991-50-6	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.990	2.50	5.00
PFBS	375-73-5	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.866	2.50	5.00
PFHxS	355-46-4	2.40 J	E5351-FS(0)	1.000	9/9/2022	0.997	2.50	5.00
PFOS	1763-23-1	14.1	E5351-FS(0)	1.000	9/9/2022	1.07	2.50	5.00
HFPO-DA	13252-13-6	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.865	2.50	5.00
Adona	919005-14-4	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.869	2.50	5.00
9CI-PF3ONS	756426-58-1	2.50 U	E5351-FS(0)	1.000	9/9/2022	1.03	2.50	5.00
11CI-PF3OUDs	763051-92-9	2.50 U	E5351-FS(0)	1.000	9/9/2022	0.901	2.50	5.00



12

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-EB01-081022

Battelle ID E5354-FS
 Sample Type SA
 Collection Date 08/10/2022
 Extraction Date 08/15/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.241
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.947	2.59	5.19
PFHpA	375-85-9	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.976	2.59	5.19
PFOA	335-67-1	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.05	2.59	5.19
PFNA	375-95-1	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.864	2.59	5.19
PFDA	335-76-2	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.813	2.59	5.19
PFUnA	2058-94-8	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.780	2.59	5.19
PFDoA	307-55-1	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.788	2.59	5.19
PFTrDA	72629-94-8	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.770	2.59	5.19
PFTeDA	376-06-7	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.821	2.59	5.19
NMeFOSAA	2355-31-9	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.07	2.59	5.19
NEtFOSAA	2991-50-6	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.03	2.59	5.19
PFBS	375-73-5	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.898	2.59	5.19
PFHxS	355-46-4	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.03	2.59	5.19
PFOS	1763-23-1	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.11	2.59	5.19
HFPO-DA	13252-13-6	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.897	2.59	5.19
Adona	919005-14-4	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.901	2.59	5.19
9Cl-PF3ONS	756426-58-1	2.59 U	E5354-FS(0)	1.000	9/9/2022	1.07	2.59	5.19
11Cl-PF3OUDs	763051-92-9	2.59 U	E5354-FS(0)	1.000	9/9/2022	0.935	2.59	5.19

NW12/16/22

Analyzed by: Burkitt, Nathan
 Printed: 10/27/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1394
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NSE-B2114-GW01-0822	E5390-FS	Water
2	NSE-B2114-GW01P-0822	E5391-FS	Water
3	NSE-B2114-GW02-0822	E5392-FS	Water
4	NSE-B2114-GW03-0822	E5393-FS	Water
4MS	NSE-B2114-GW03-0822MS	E5394-FSMS	Water
4MSD	NSE-B2114-GW03-0822MSD	E5395-FSMSD	Water
5	NSE-B2114-EB01-081122	E5396-FS	Water
6	NSE-B2114-FB01-081122	E5397-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for four water samples, one aqueous equipment blank sample, and one aqueous field blank sample collected on August 11, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All samples were extracted within 14 days for water samples and analyzed within 28 days.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NSE-B2114-EB01-081122	None - ND	-	-	-
NSE-B2114-FB01-081122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
1	13C2-PFTeDA	36%	UJ
2	13C2-PFTeDA	36%	UJ
3	13C2-PFTeDA	30%	UJ
4	13C2-PFTeDA	46%	UJ

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria except for the following.

EDS Sample	Surrogate	Area Count	Qualifier
3	13C4-PFOS	High	J - Associated Cmpd
4	13C4-PFOS	High	J - Associated Cmpd

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

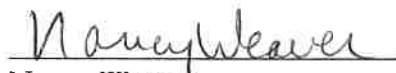
Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NSE-B2114-GW01-0822 ng/L	NSE-B2114-GW01P-0822 ng/L	RPD	Qualifier
PFHxA	13.9	15.4	10%	None
PFHpA	4.27	4.51	5%	
PFOA	8.90	9.47	6%	
PFNA	1.93	2.19	13%	
PFBS	10.1	10.6	5%	
PFHxS	223	224	0%	
PFOS	514	516	0%	

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:


Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW01-0822

Battelle ID E5390-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.237
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.9	E5390-FS(0)	1.000	8/18/2022	0.963	2.64	5.27
PFHpA	375-85-9	4.27 J	E5390-FS(0)	1.000	8/18/2022	0.993	2.64	5.27
PFOA	335-67-1	8.90	E5390-FS(0)	1.000	8/18/2022	1.07	2.64	5.27
PFNA	375-95-1	1.93 J	E5390-FS(0)	1.000	8/18/2022	0.879	2.64	5.27
PFDA	335-76-2	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.827	2.64	5.27
PFUnA	2058-94-8	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.793	2.64	5.27
PFDoA	307-55-1	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.802	2.64	5.27
PFTyDA	72629-94-8	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.783	2.64	5.27
PFTeDA	376-06-7	2.64	E5390-FS(0)	1.000	8/18/2022	0.834	2.64	5.27
NMeFOSAA	2355-31-9	2.64 U	E5390-FS(0)	1.000	8/18/2022	1.09	2.64	5.27
NEtFOSAA	2991-50-6	2.64 U	E5390-FS(0)	1.000	8/18/2022	1.04	2.64	5.27
PFBS	375-73-5	10.1	E5390-FS(0)	1.000	8/18/2022	0.914	2.64	5.27
PFHxS	355-46-4	223	E5390-FS(0)	1.000	8/18/2022	1.05	2.64	5.27
PFOS	1763-23-1	514	E5390-FS(0)	1.000	8/18/2022	1.13	2.64	5.27
HFPO-DA	13252-13-6	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.912	2.64	5.27
Adona	919005-14-4	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.917	2.64	5.27
9CI-PF3ONS	756426-58-1	2.64 U	E5390-FS(0)	1.000	8/18/2022	1.09	2.64	5.27
11CI-PF3OUdS	763051-92-9	2.64 U	E5390-FS(0)	1.000	8/18/2022	0.950	2.64	5.27

NW1216122

Analyzed by: Griffith, Lauren
 Printed: 8/18/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW01-0822

Battelle ID E5390-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	63	E5390-FS(0)	8/18/2022
13C4-PFHpA	73	E5390-FS(0)	8/18/2022
13C8-PFOA	71	E5390-FS(0)	8/18/2022
13C9-PFNA	62	E5390-FS(0)	8/18/2022
13C6-PFDA	67	E5390-FS(0)	8/18/2022
13C7-PFUnA	67	E5390-FS(0)	8/18/2022
13C2-PFDoA	59	E5390-FS(0)	8/18/2022
13C2-PFTeDA	36	E5390-FS(0)	8/18/2022
d3-MeFOSAA	72	E5390-FS(0)	8/18/2022
d5-EtFOSAA	63	E5390-FS(0)	8/18/2022
13C3-PFBS	72	E5390-FS(0)	8/18/2022
13C3-PFHxS	71	E5390-FS(0)	8/18/2022
13C8-PFOS	64	E5390-FS(0)	8/18/2022
13C3-HFPO-DA	62	E5390-FS(0)	8/18/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW01P-0822

Battelle ID E5391-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.249
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	15.4	E5391-FS(0)	1.000	8/18/2022	0.917	2.51	5.02
PFHpA	375-85-9	4.51 J	E5391-FS(0)	1.000	8/18/2022	0.945	2.51	5.02
PFOA	335-67-1	9.47	E5391-FS(0)	1.000	8/18/2022	1.01	2.51	5.02
PFNA	375-95-1	2.19 J	E5391-FS(0)	1.000	8/18/2022	0.836	2.51	5.02
PFDA	335-76-2	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.787	2.51	5.02
PFUnA	2058-94-8	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.755	2.51	5.02
PFDoA	307-55-1	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.763	2.51	5.02
PFTtDA	72629-94-8	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.745	2.51	5.02
PFTeDA	376-06-7	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.794	2.51	5.02
NMeFOSAA	2355-31-9	2.51 U	E5391-FS(0)	1.000	8/18/2022	1.03	2.51	5.02
NEtFOSAA	2991-50-6	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.994	2.51	5.02
PFBS	375-73-5	10.6	E5391-FS(0)	1.000	8/18/2022	0.869	2.51	5.02
PFHxS	355-46-4	224	E5391-FS(0)	1.000	8/18/2022	1.00	2.51	5.02
PFOS	1763-23-1	516	E5391-FS(0)	1.000	8/18/2022	1.07	2.51	5.02
HFPO-DA	13252-13-6	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.868	2.51	5.02
Adona	919005-14-4	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.872	2.51	5.02
9CI-PF3ONS	756426-58-1	2.51 U	E5391-FS(0)	1.000	8/18/2022	1.03	2.51	5.02
11CI-PF3OUdS	763051-92-9	2.51 U	E5391-FS(0)	1.000	8/18/2022	0.905	2.51	5.02

NW12/16/22
 Analyzed by: Griffith, Lauren
 Printed: 8/18/2022



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW01P-0822

Battelle ID E5391-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	64	E5391-FS(0)	8/18/2022
13C4-PFHpA	73	E5391-FS(0)	8/18/2022
13C8-PFOA	67	E5391-FS(0)	8/18/2022
13C9-PFNA	66	E5391-FS(0)	8/18/2022
13C6-PFDA	65	E5391-FS(0)	8/18/2022
13C7-PFUnA	61	E5391-FS(0)	8/18/2022
13C2-PFDoA	57	E5391-FS(0)	8/18/2022
13C2-PFTeDA	36	E5391-FS(0)	8/18/2022
d3-MeFOSAA	68	E5391-FS(0)	8/18/2022
d5-EtFOSAA	62	E5391-FS(0)	8/18/2022
13C3-PFBS	70	E5391-FS(0)	8/18/2022
13C3-PFHxS	72	E5391-FS(0)	8/18/2022
13C8-PFOS	65	E5391-FS(0)	8/18/2022
13C3-HFPO-DA	59	E5391-FS(0)	8/18/2022

NW12/16/22

Analyzed by: Griffith, Lauren
 Printed: 8/18/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW02-0822

Battelle ID E5392-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.244
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	13.3	E5392-FS(0)	1.000	8/18/2022	0.935	2.56	5.12
PFHpA	375-85-9	6.98	E5392-FS(0)	1.000	8/18/2022	0.964	2.56	5.12
PFOA	335-67-1	12.9	E5392-FS(0)	1.000	8/18/2022	1.03	2.56	5.12
PFNA	375-95-1	0.869 J	E5392-FS(0)	1.000	8/18/2022	0.853	2.56	5.12
PFDA	335-76-2	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.803	2.56	5.12
PFUnA	2058-94-8	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.770	2.56	5.12
PFDoA	307-55-1	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.779	2.56	5.12
PFTnDA	72629-94-8	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.760	2.56	5.12
PFTeDA	376-06-7	2.56 y u J	E5392-FS(0)	1.000	8/18/2022	0.810	2.56	5.12
NMeFOSAA	2355-31-9	2.56 U	E5392-FS(0)	1.000	8/18/2022	1.06	2.56	5.12
NEtFOSAA	2991-50-6	2.56 U	E5392-FS(0)	1.000	8/18/2022	1.01	2.56	5.12
PFBS	375-73-5	14.3	E5392-FS(0)	1.000	8/18/2022	0.887	2.56	5.12
PFHxS	355-46-4	59.6	E5392-FS(0)	1.000	8/18/2022	1.02	2.56	5.12
PFOS	1763-23-1	6.79 J	E5392-FS(0)	1.000	8/18/2022	1.10	2.56	5.12
HFPO-DA	13252-13-6	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.886	2.56	5.12
Adona	919005-14-4	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.890	2.56	5.12
9CI-PF3ONS	756426-58-1	2.56 U	E5392-FS(0)	1.000	8/18/2022	1.06	2.56	5.12
11CI-PF3OUDS	763051-92-9	2.56 U	E5392-FS(0)	1.000	8/18/2022	0.923	2.56	5.12

SSL

FSH

NW 12/14/22
 Analyzed by: Griffith, Lauren

Printed: 8/18/2022



Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW02-0822

Battelle ID E5392-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	68	E5392-FS(0)	8/18/2022
13C4-PFHpA	78	E5392-FS(0)	8/18/2022
13C8-PFOA	72	E5392-FS(0)	8/18/2022
13C9-PFNA	66	E5392-FS(0)	8/18/2022
13C6-PFDA	63	E5392-FS(0)	8/18/2022
13C7-PFUnA	67	E5392-FS(0)	8/18/2022
13C2-PFDoA	70	E5392-FS(0)	8/18/2022
13C2-PFTeDA	30	E5392-FS(0)	8/18/2022
d3-MeFOSAA	58	E5392-FS(0)	8/18/2022
d5-EtFOSAA	57	E5392-FS(0)	8/18/2022
13C3-PFBS	67	E5392-FS(0)	8/18/2022
13C3-PFHxS	72	E5392-FS(0)	8/18/2022
13C8-PFOS	61	E5392-FS(0)	8/18/2022
13C3-HFPO-DA	60	E5392-FS(0)	8/18/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW03-0822

Battelle ID E5393-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.259
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	8.63	E5393-FS(0)	1.000	8/18/2022	0.881	2.41	4.83
PFHpA	375-85-9	4.12 J	E5393-FS(0)	1.000	8/18/2022	0.908	2.41	4.83
PFOA	335-67-1	5.19	E5393-FS(0)	1.000	8/18/2022	0.975	2.41	4.83
PFNA	375-95-1	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.804	2.41	4.83
PFDA	335-76-2	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.757	2.41	4.83
PFUnA	2058-94-8	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.726	2.41	4.83
PFDoA	307-55-1	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.734	2.41	4.83
PFTDA	72629-94-8	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.716	2.41	4.83
PFTeDA	376-06-7	2.41	E5393-FS(0)	1.000	8/18/2022	0.764	2.41	4.83
NMeFOSAA	2355-31-9	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.994	2.41	4.83
NEtFOSAA	2991-50-6	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.956	2.41	4.83
PFBS	375-73-5	7.97	E5393-FS(0)	1.000	8/18/2022	0.836	2.41	4.83
PFHxS	355-46-4	4.29 J	E5393-FS(0)	1.000	8/18/2022	0.962	2.41	4.83
PFOS	1763-23-1	3.30 J	E5393-FS(0)	1.000	8/18/2022	1.03	2.41	4.83
HFPO-DA	13252-13-6	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.835	2.41	4.83
Adona	919005-14-4	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.839	2.41	4.83
9CI-PF3ONS	756426-58-1	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.994	2.41	4.83
11CI-PF3OUDS	763051-92-9	2.41 U	E5393-FS(0)	1.000	8/18/2022	0.870	2.41	4.83



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-GW03-0822

Battelle ID E5393-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	64	E5393-FS(0)	8/18/2022
13C4-PFHpA	71	E5393-FS(0)	8/18/2022
13C8-PFOA	71	E5393-FS(0)	8/18/2022
13C9-PFNA	62	E5393-FS(0)	8/18/2022
13C6-PFDA	68	E5393-FS(0)	8/18/2022
13C7-PFUnA	73	E5393-FS(0)	8/18/2022
13C2-PFDoA	65	E5393-FS(0)	8/18/2022
13C2-PFTeDA	46	E5393-FS(0)	8/18/2022
d3-MeFOSAA	70	E5393-FS(0)	8/18/2022
d5-EtFOSAA	66	E5393-FS(0)	8/18/2022
13C3-PFBS	73	E5393-FS(0)	8/18/2022
13C3-PFHxS	77	E5393-FS(0)	8/18/2022
13C8-PFOS	64	E5393-FS(0)	8/18/2022
13C3-HFPO-DA	63	E5393-FS(0)	8/18/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-EB01-081122

Battelle ID E5396-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.215
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.06	2.91	5.81
PFHpA	375-85-9	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.09	2.91	5.81
PFOA	335-67-1	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.17	2.91	5.81
PFNA	375-95-1	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.969	2.91	5.81
PFDA	335-76-2	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.912	2.91	5.81
PFUnA	2058-94-8	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.874	2.91	5.81
PFDoA	307-55-1	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.884	2.91	5.81
PFTtDA	72629-94-8	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.863	2.91	5.81
PFTeDA	376-06-7	2.91 U	E5396-FS(0)	1.000	8/18/2022	0.920	2.91	5.81
NMeFOSAA	2355-31-9	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.20	2.91	5.81
NEtFOSAA	2991-50-6	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.15	2.91	5.81
PFBS	375-73-5	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.01	2.91	5.81
PFHxS	355-46-4	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.16	2.91	5.81
PFOS	1763-23-1	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.24	2.91	5.81
HFPO-DA	13252-13-6	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.01	2.91	5.81
Adona	919005-14-4	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.01	2.91	5.81
9CI-PF3ONS	756426-58-1	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.20	2.91	5.81
11CI-PF3OudS	763051-92-9	2.91 U	E5396-FS(0)	1.000	8/18/2022	1.05	2.91	5.81

MW 12/16/22
 Analyzed by: Griffith, Lauren
 Printed: 8/18/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NSE-B2114-FB01-081122

Battelle ID E5397-FS
 Sample Type SA
 Collection Date 08/11/2022
 Extraction Date 08/16/2022
 Analytical Instrument Sciex 5500 (AC) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.253
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.902	2.47	4.94
PFHpA	375-85-9	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.930	2.47	4.94
PFOA	335-67-1	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.998	2.47	4.94
PFNA	375-95-1	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.823	2.47	4.94
PFDA	335-76-2	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.775	2.47	4.94
PFUnA	2058-94-8	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.743	2.47	4.94
PFDoA	307-55-1	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.751	2.47	4.94
PFTtDA	72629-94-8	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.733	2.47	4.94
PFTeDA	376-06-7	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.782	2.47	4.94
NMeFOSAA	2355-31-9	2.47 U	E5397-FS(0)	1.000	8/18/2022	1.02	2.47	4.94
NEtFOSAA	2991-50-6	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.978	2.47	4.94
PFBS	375-73-5	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.856	2.47	4.94
PFHxS	355-46-4	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.985	2.47	4.94
PFOS	1763-23-1	2.47 U	E5397-FS(0)	1.000	8/18/2022	1.06	2.47	4.94
HFPO-DA	13252-13-6	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.855	2.47	4.94
Adona	919005-14-4	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.859	2.47	4.94
9CI-PF3ONS	756426-58-1	2.47 U	E5397-FS(0)	1.000	8/18/2022	1.02	2.47	4.94
11CI-PF3OudS	763051-92-9	2.47 U	E5397-FS(0)	1.000	8/18/2022	0.890	2.47	4.94

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1785
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-FB01-100622	E8244-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample collected on October 6, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-FB01-100622	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not analyzed.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/3/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-FB01-100622

Battelle ID E8244-FS
 Sample Type SA
 Collection Date 10/06/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.257
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.888	2.43	4.86
PFHpA	375-85-9	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.915	2.43	4.86
PFOA	335-67-1	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.982	2.43	4.86
PFNA	375-95-1	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.810	2.43	4.86
PFDA	335-76-2	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.763	2.43	4.86
PFUnA	2058-94-8	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.732	2.43	4.86
PFDoA	307-55-1	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.739	2.43	4.86
PFTriDA	72629-94-8	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.722	2.43	4.86
PFTeDA	376-06-7	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.769	2.43	4.86
NMeFOSAA	2355-31-9	2.43 U	E8244-FS(0)	1.000	11/9/2022	1.00	2.43	4.86
NEtFOSAA	2991-50-6	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.963	2.43	4.86
PFBS	375-73-5	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.842	2.43	4.86
PFHxS	355-46-4	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.970	2.43	4.86
PFOS	1763-23-1	2.43 U	E8244-FS(0)	1.000	11/9/2022	1.04	2.43	4.86
HFPO-DA	13252-13-6	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.841	2.43	4.86
Adona	919005-14-4	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.845	2.43	4.86
9CI-PF3ONS	756426-58-1	2.43 U	E8244-FS(0)	1.000	11/9/2022	1.00	2.43	4.86
11CI-PF3OUDS	763051-92-9	2.43 U	E8244-FS(0)	1.000	11/9/2022	0.876	2.43	4.86

NW313/23

Analyzed by: Harnden, Kelsey
 Printed: 12/21/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1786
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-SB12-9697	E8240-FS	Soil
2	NRSJC-S7-SB12-145146	F8241-FS	Soil
3	NRSJC-S7-SB12-174175	E8242-FS	Soil
4	NRSJC-S7-SB12-210211	E8243-FS	Soil
5	NRSJC-S7-SB12-229230	E8245-FS	Soil
6	NRSJC-S7-SS12-000H	E8246-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for six soil samples collected on October 5-10, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-FB01-100622	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 3/3/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB12-9697

Battelle ID E8240-FS
 Sample Type SA
 Collection Date 10/05/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 6.20
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.160	0.500	1.00
PFTTrDA	72629-94-8	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E8240-FS(0)	1.000	11/11/2022	0.150	0.500	2.00

W 3/3/23



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026 000001

Client ID NRSJC-S7-SB12-145146

Battelle ID E8241-FS
 Sample Type SA
 Collection Date 10/05/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 4.50
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.160	0.500	1.00
PFTtDA	72629-94-8	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E8241-FS(0)	1.000	11/11/2022	0.150	0.500	2.00

NW 313123

Analyzed by: Harnden, Kelsey
 Printed: 12/28/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

3

Client ID NRSJC-S7-SB12-174175

Battelle ID E8242-FS
 Sample Type SA
 Collection Date 10/06/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 5.37
 Matrix SOIL
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.160	0.501	1.00
PFTTrDA	72629-94-8	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.154	0.501	2.00
11CI-PF3OUdS	763051-92-9	0.501 U	E8242-FS(0)	1.000	11/11/2022	0.150	0.501	2.00

12/31/23

Analyzed by: Harnden, Kelsey
 Printed: 12/28/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

4

Client ID NRSJC-S7-SB12-210211

Battelle ID E8243-FS
 Sample Type SA
 Collection Date 10/06/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 6.49
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.160	0.500	1.00
PFTDA	72629-94-8	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
NeFOSAA	2991-50-6	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E8243-FS(0)	1.000	11/11/2022	0.150	0.500	2.00

NW 313123

Analyzed by: Harnden, Kelsey
 Printed: 12/28/2022



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161 X1 XX 0026 000001

Client ID NRSJC-S7-SB12-229230

Battelle ID E8245-FS
 Sample Type SA
 Collection Date 10/10/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 1.17
 Matrix SOIL
 Sample Size 4.990
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.160	0.501	1.00
PFTDA	72629-94-8	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.160	0.501	2.00
9CI-PF3ONS	756426-58-1	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.154	0.501	2.00
11CI-PF3OUdS	763051-92-9	0.501 U	E8245-FS(0)	1.000	11/11/2022	0.150	0.501	2.00

NW 313123

Analyzed by: Harnden, Kelsey
 Printed: 12/28/2022



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

6

Client ID NRSJC-S7-SS12-000H

Battelle ID E8246-FS
 Sample Type SA
 Collection Date 10/07/2022
 Extraction Date 10/18/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 1.56
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.160	0.500	1.00
PFTtDA	72629-94-8	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E8246-FS(0)	1.000	11/11/2022	0.150	0.500	2.00

W313123

Analyzed by: Harnden, Kelsey
 Printed: 12/28/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1824
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-FB01-101322	E8448-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample collected on October 13, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries

- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-FB01-101322	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R) except for the following.

LCS Sample	Compound	%R	Qualifier	Affected Samples
DK597LCS-FS	PFUnA	152%	None	Sample ND
	NMeFOSAA	142%	None	

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

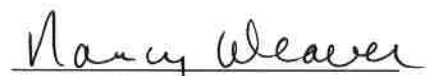
- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not analyzed.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:



Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-FB01-101322

Battelle ID E8448-FS
 Sample Type SA
 Collection Date 10/13/2022
 Extraction Date 10/26/2022
 Analytical Instrument Sciex 6500 (AD) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.275
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.830	2.27	4.55
PFHpA	375-85-9	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.855	2.27	4.55
PFOA	335-67-1	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.918	2.27	4.55
PFNA	375-95-1	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.757	2.27	4.55
PFDA	335-76-2	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.713	2.27	4.55
PFUnA	2058-94-8	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.684	2.27	4.55
PFDoA	307-55-1	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.691	2.27	4.55
PFTTrDA	72629-94-8	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.675	2.27	4.55
PFTeDA	376-06-7	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.719	2.27	4.55
NMeFOSAA	2355-31-9	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.936	2.27	4.55
NEtFOSAA	2991-50-6	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.900	2.27	4.55
PFBS	375-73-5	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.787	2.27	4.55
PFHxS	355-46-4	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.906	2.27	4.55
PFOS	1763-23-1	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.973	2.27	4.55
HFPO-DA	13252-13-6	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.786	2.27	4.55
Adona	919005-14-4	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.790	2.27	4.55
9Cl-PF3ONS	756426-58-1	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.936	2.27	4.55
11Cl-PF3OUdS	763051-92-9	2.27 U	E8448-FS(0)	1.000	11/17/2022	0.819	2.27	4.55

MW 31 31 23

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1825
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-SB13-3839	E8447-FS	Soil
2	NRSJC-S7-SB13-8485	E8449-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for two soil samples collected on October 13-14, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Data Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning

- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-FB01-101322	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R) except for the following.

LCS Sample	Compound	%R	Qualifier	Affected Samples
DK599LCS-FS	PFHxS	139%	None	Samples ND

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not analyzed.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13-3839

Battelle ID E8447-FS
 Sample Type SA
 Collection Date 10/13/2022
 Extraction Date 10/25/2022
 Analytical Instrument Sciex 6500 (AD) LC/MS/MS
 % Moisture 5.98
 Matrix SOIL
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.160	0.499	0.998
PFTeDA	72629-94-8	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.154	0.499	2.00
11CI-PF3OUdS	763051-92-9	0.499 U	E8447-FS(0)	1.000	11/19/2022	0.150	0.499	2.00

NW 313123

Analyzed by: Boger, Warren
 Printed: 1/10/2023



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13-8485

Battelle ID E8449-FS
 Sample Type SA
 Collection Date 10/14/2022
 Extraction Date 10/25/2022
 Analytical Instrument Sciex 6500 (AD) LC/MS/MS
 % Moisture 3.37
 Matrix SOIL
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.160	0.499	0.998
PFTeDA	72629-94-8	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.160	0.499	2.00
9Cl-PF3ONS	756426-58-1	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.154	0.499	2.00
11Cl-PF3OUdS	763051-92-9	0.499 U	E8449-FS(0)	1.000	11/19/2022	0.150	0.499	2.00

MW 313123

Analyzed by: Boger, Warren
 Printed: 1/10/2023

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1933
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-FB01-102622	E9320-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample collected on October 26, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries

- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S7-FB01-102622	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not analyzed.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-FB01-102622

Battelle ID E9320-FS
 Sample Type SA
 Collection Date 10/26/2022
 Extraction Date 11/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix WATER
 Sample Size 0.251
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.909	2.49	4.98
PFHpA	375-85-9	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.937	2.49	4.98
PFOA	335-67-1	2.49 U	E9320-FS(0)	1.000	12/1/2022	1.01	2.49	4.98
PFNA	375-95-1	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.830	2.49	4.98
PFDA	335-76-2	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.781	2.49	4.98
PFUnA	2058-94-8	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.749	2.49	4.98
PFDoA	307-55-1	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.757	2.49	4.98
PFTeDA	72629-94-8	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.739	2.49	4.98
PFTeDA	376-06-7	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.788	2.49	4.98
NMeFOSAA	2355-31-9	2.49 U	E9320-FS(0)	1.000	12/1/2022	1.03	2.49	4.98
NEtFOSAA	2991-50-6	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.986	2.49	4.98
PFBS	375-73-5	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.863	2.49	4.98
PFHxS	355-46-4	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.993	2.49	4.98
PFOS	1763-23-1	2.49 U	E9320-FS(0)	1.000	12/1/2022	1.07	2.49	4.98
HFPO-DA	13252-13-6	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.862	2.49	4.98
Adona	919005-14-4	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.866	2.49	4.98
9CI-PF3ONS	756426-58-1	2.49 U	E9320-FS(0)	1.000	12/1/2022	1.03	2.49	4.98
11CI-PF3OUDS	763051-92-9	2.49 U	E9320-FS(0)	1.000	12/1/2022	0.897	2.49	4.98

313123
 Analyzed by: Harnden, Kelsey
 Printed: 1/19/2023

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1934
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-SB13-177178	E9316-FS	Soil
2	NRSJC-S7-SB13-128129	E9317-FS	Soil
2MS	NRSJC-S7-SB13-128129MS	E9318-FSMS	Soil
2MSD	NRSJC-S7-SB13-128129MSD	E9319-FSMSD	Soil
3	NRSJC-S7-SB13-215216	E9321-FS	Soil
4	NRSJC-S7-SB13P-215216	E9322-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for four soil samples collected on October 25-27, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- The samples were analyzed outside of holding time and were flagged (T) by the laboratory. However, the extracts were stored per draft method EPA Method 1633 which allows for a 90-day holding time. The (T) flags were removed.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S7-FB01-102622	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S7-SB13-215216 ng/g	NRSJC-S7-SB13P-215216 ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed: Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13-177178

Battelle ID E9316-FS
 Sample Type SA
 Collection Date 10/25/2022
 Extraction Date 11/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 14.38
 Matrix SOIL
 Sample Size 5.010
 Size Unit Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.160	0.499	0.998
PFTeDA	72629-94-8	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.154	0.499	2.00
11CI-PF3OUDS	763051-92-9	0.499 U	E9316-FS(0)	1.000	12/4/2022	0.150	0.499	2.00

NW 12/20/22



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13-128129

Battelle ID E9317-FS
 Sample Type SA
 Collection Date 10/25/2022
 Extraction Date 11/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 13.24
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.160	0.500	1.00
PFTrDA	72629-94-8	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.175	0.500	1.00
HFPO DA	13252-13-6	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.160	0.500	2.00
9Cl-PF3ONS	756426-58-1	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.154	0.500	2.00
11Cl-PF3OUDS	763051-92-9	0.500 UT	E9317-FS(0)	1.000	12/4/2022	0.150	0.500	2.00

NW12120122

Analyzed by: Urso, Vincent

Printed: 12/5/2022



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13-215216

Battelle ID E9321-FS
 Sample Type SA
 Collection Date 10/27/2022
 Extraction Date 11/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 7.50
 Matrix SOIL
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.160	0.499	0.998
PFTeDA	72629-94-8	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.154	0.499	2.00
11CI-PF3OUdS	763051-92-9	0.499 UT	E9321-FS(0)	1.000	12/4/2022	0.150	0.499	2.00

12/12/2022

Analyzed by: Urso, Vincent

Printed: 12/5/2022



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB13P-215216

Battelle ID E9322-FS
 Sample Type SA
 Collection Date 10/27/2022
 Extraction Date 11/04/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 9.42
 Matrix SOIL
 Sample Size 5.000
 Size Unit Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.160	0.500	1.00
PFTTrDA	72629-94-8	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.159	0.500	2.00
NETFOSAA	2991-50-6	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.154	0.500	2.00
11CI-PF3OUDS	763051-92-9	0.500 UT	E9322-FS(0)	1.000	12/4/2022	0.150	0.500	2.00

12/2/2022

Analyzed by: Urso, Vincent
 Printed: 12/5/2022

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1979
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: December 16, 2022

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRCPB-B106-GW02-0822	E5350-FS1	Water

A Stage 2B/4 data validation was performed on the analytical data for one water sample collected on August 9, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries

- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were serious deficiencies of data. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

- PFTeDA was qualified (X) in one sample due to a severely low surrogate recovery.

The remaining data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- The sample was re-extracted outside of the 14-day holding time. All results were qualified as estimated (J/UJ) unless already qualified (X).

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRCPB-B106-EB02-080922	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
1	13C2-PFTeDA	9%	X

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- The sample was re-extracted outside of holding times to confirm surrogate recoveries. The original analysis results in SDG 22-1386 should be used for reporting purposes.

Field Duplicate Sample Precision

- Field duplicate samples were not collected.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver

Nancy Weaver
Senior Chemist

Dated: 12/16/22

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW02-0822

Battelle ID E5350-FS1
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 11/15/2022
 Analytical Instrument Sciex 6500 (AD) LC/MS/MS
 % Moisture NA
 Matrix GW
 Sample Size 0.242
 Size Unit-Basis L

Use
 22-1386
 results

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.17 JT	E5350-FS1(0)	1.000	11/16/2022	0.943	2.58	5.17
PFHpA	375-85-9	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.972	2.58	5.17
PFOA	335-67-1	2.95 JT	E5350-FS1(0)	1.000	11/16/2022	1.04	2.58	5.17
PFNA	375-95-1	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.861	2.58	5.17
PFDA	335-76-2	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.810	2.58	5.17
PFUnA	2058-94-8	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.777	2.58	5.17
PFDoA	307-55-1	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.785	2.58	5.17
PFTeDA	72629-94-8	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.767	2.58	5.17
PFTeDA	376-06-7	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.817	2.58	5.17
NMeFOSAA	2355-31-9	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	1.06	2.58	5.17
NEtFOSAA	2991-50-6	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	1.02	2.58	5.17
PFBS	375-73-5	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.895	2.58	5.17
PFHxS	355-46-4	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	1.03	2.58	5.17
PFOS	1763-23-1	4.20 JT	E5350-FS1(0)	1.000	11/16/2022	1.11	2.58	5.17
HFPO-DA	13252-13-6	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.894	2.58	5.17
Adona	919005-14-4	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.898	2.58	5.17
9CI-PF3ONS	756426-58-1	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	1.06	2.58	5.17
11CI-PF3OUdS	763051-92-9	2.58 UT	E5350-FS1(0)	1.000	11/16/2022	0.931	2.58	5.17

HT
 SSL
 HT

NW 12/16/22



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRCPB-B106-GW02-0822

Battelle ID E5350-FS1
 Sample Type SA
 Collection Date 08/09/2022
 Extraction Date 11/15/2022
 Analytical Instrument Sciex 6500 (AD) LC/MS/MS

*Use
22-1386
results*

Surrogate Recoveries (%)	Recovery	Extract ID	Analysis Date
13C5-PFHxA	111	E5350-FS1(0)	11/16/2022
13C4-PFHpA	122	E5350-FS1(0)	11/16/2022
13C8-PFOA	100	E5350-FS1(0)	11/16/2022
13C9-PFNA	116	E5350-FS1(0)	11/16/2022
13C6-PFDA	83	E5350-FS1(0)	11/16/2022
13C7-PFUnA	71	E5350-FS1(0)	11/16/2022
13C2-PFDoA	63	E5350-FS1(0)	11/16/2022
13C2-PFTeDA	9	E5350-FS1(0)	11/16/2022
d3-MeFOSAA	78	E5350-FS1(0)	11/16/2022
d5-EtFOSAA	82	E5350-FS1(0)	11/16/2022
13C3-PFBS	117	E5350-FS1(0)	11/16/2022
13C3-PFHxS	117	E5350-FS1(0)	11/16/2022
13C8-PFOS	104	E5350-FS1(0)	11/16/2022
13C3-HFPO-DA	107	E5350-FS1(0)	11/16/2022

NW 12/16/22

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1990
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-FB01-110122	E9617-FS	Water
2	NRSJC-S7-EB01-110122	E9618-FS	Water

A Stage 2B/4 data validation was performed on the analytical data for one aqueous field blank sample and one aqueous equipment blank sample collected on November 1, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times

- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S7-FB01-110122	None - ND	-	-	-
NRSJC-S7-EB01-110122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate samples were not analyzed.

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO 4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-F801-110122

Battelle ID E9617-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/08/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.249
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.917	2.51	5.02
PFHpA	375-85-9	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.945	2.51	5.02
PFOA	335-67-1	2.51 U	E9617-FS(0)	1.000	12/3/2022	1.01	2.51	5.02
PFNA	375-95-1	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.836	2.51	5.02
PFDA	335-76-2	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.787	2.51	5.02
PFUnA	2058-94-8	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.755	2.51	5.02
PFDoA	307-55-1	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.763	2.51	5.02
PFTrDA	72629-94-8	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.745	2.51	5.02
PFTeDA	376-06-7	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.794	2.51	5.02
NMeFOSAA	2355-31-9	2.51 U	E9617-FS(0)	1.000	12/3/2022	1.03	2.51	5.02
NEtFOSAA	2991-50-6	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.994	2.51	5.02
PFBS	375-73-5	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.869	2.51	5.02
PFHxS	355-46-4	2.51 U	E9617-FS(0)	1.000	12/3/2022	1.00	2.51	5.02
PFOS	1763-23-1	2.51 U	E9617-FS(0)	1.000	12/3/2022	1.07	2.51	5.02
HFPO-DA	13252-13-6	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.868	2.51	5.02
Adona	919005-14-4	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.872	2.51	5.02
9Cl-PF3ONS	756426-58-1	2.51 U	E9617-FS(0)	1.000	12/3/2022	1.03	2.51	5.02
11Cl-PF3OUds	763051-92-9	2.51 U	E9617-FS(0)	1.000	12/3/2022	0.905	2.51	5.02

NW 313123
 Analyzed by: Harnden, Kelsey
 Printed: 1/30/2023



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25151.X1.XX.0026.000001

Client ID NRSJC-S7-EB01-110122

Battelle ID E9618-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/08/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.238
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.959	2.63	5.25
PFHpA	375-85-9	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.988	2.63	5.25
PFOA	335-67-1	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.06	2.63	5.25
PFNA	375-95-1	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.875	2.63	5.25
PFDA	335-76-2	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.824	2.63	5.25
PFUnA	2058-94-8	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.790	2.63	5.25
PFDoA	307-55-1	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.798	2.63	5.25
PFTTrDA	72629-94-8	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.779	2.63	5.25
PFTeDA	376-06-7	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.831	2.63	5.25
NMeFOSAA	2355-31-9	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.08	2.63	5.25
NEtFOSAA	2991-50-6	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.04	2.63	5.25
PFBS	375-73-5	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.910	2.63	5.25
PFHxS	355-46-4	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.05	2.63	5.25
PFOS	1763-23-1	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.12	2.63	5.25
HFPO-DA	13252-13-6	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.909	2.63	5.25
Adona	919005-14-4	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.913	2.63	5.25
9CI-PF3ONS	756426-58-1	2.63 U	E9618-FS(0)	1.000	12/3/2022	1.08	2.63	5.25
11CI-PF3OUDS	763051-92-9	2.63 U	E9618-FS(0)	1.000	12/3/2022	0.946	2.63	5.25

mw 3/31/23
 Analyzed by: Harnden, Kelsey
 Printed: 1/30/2023

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-1991
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-SS11-000H	E9615-FS	Soil
2	NRSJC-S7-SS11P-000H	E9616-FS	Soil
3	NRSJC-S7-SB11-42H43H	E9619-FS	Soil
4	NRSJC-S7-SB11-9394	E9620-FS	Soil
5	NRSJC-S7-SB11-146147	E9621-FS	Soil
6	NRSJC-S7-SB11-191192	E9622-FS	Soil
7	NRSJC-S7-SB11-231232	E9623-FS	Soil

A Stage 2B/4 data validation was performed on the analytical data for seven soil samples collected on November 1-3, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes. There were no qualifications.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S7-FB01-110122	None - ND	-	-	-
NRSJC-S7-EB01-110122	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R).

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- MS/MSD samples were not analyzed.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S7-SS11-000H ng/g	NRSJC-S7-SS11P-000H ng/g	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SS11-000H

Battelle ID E9615-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 18.36
 Matrix SOIL
 Sample Size 4.990
 Size Unit Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.178	0.501	1.00
PFHpA	375-85-9	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.168	0.501	1.00
PFOA	335-67-1	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.214	0.501	1.00
PFNA	375-95-1	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.157	0.501	1.00
PFDA	335-76-2	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.158	0.501	1.00
PFUnA	2058-94-8	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.156	0.501	1.00
PFDoA	307-55-1	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.160	0.501	1.00
PFTrDA	72629-94-8	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.161	0.501	1.00
PFTeDA	376-06-7	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.162	0.501	2.00
NMeFOSAA	2355-31-9	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.159	0.501	2.00
NEtFOSAA	2991-50-6	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.165	0.501	2.00
PFBS	375-73-5	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.171	0.501	1.00
PFHxS	355-46-4	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.173	0.501	1.00
PFOS	1763-23-1	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.175	0.501	1.00
HFPO-DA	13252-13-6	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.159	0.501	2.00
Adona	919005-14-4	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.160	0.501	2.00
9Cl-PF3ONS	756426-58-1	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.154	0.501	2.00
11Cl-PF3OUdS	763051-92-9	0.501 U	E9615-FS(0)	1.000	12/7/2022	0.150	0.501	2.00

MW 313123
 Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SS11P-000H

Battelle ID E9616-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500-- (AE) LC/MS/MS
 % Moisture 15.41
 Matrix SOIL
 Sample Size 5.010
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.160	0.499	0.998
PFTTrDA	72629-94-8	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.154	0.499	2.00
11CI-PF3OUds	763051-92-9	0.499 U	E9616-FS(0)	1.000	12/7/2022	0.150	0.499	2.00

NW 31/31/23

Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB11-42H43H

Battelle ID E9619-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 7.66
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.160	0.500	1.00
PFTrDA	72629-94-8	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.160	0.500	2.00
9Cl-PF3ONS	756426-58-1	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.154	0.500	2.00
11Cl-PF3OUDs	763051-92-9	0.500 U	E9619-FS(0)	1.000	12/7/2022	0.150	0.500	2.00

mw 313123
 Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB11-9394

Battelle ID E9620-FS
 Sample Type SA
 Collection Date 11/01/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500- (AE) LC/MS/MS
 % Moisture 4.01
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.160	0.500	1.00
PFTtDA	72629-94-8	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.154	0.500	2.00
11CI-PF3OUdS	763051-92-9	0.500 U	E9620-FS(0)	1.000	12/7/2022	0.150	0.500	2.00

MW 3/31/23

Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB11-146147

Battelle ID E9621-FS
 Sample Type SA
 Collection Date 11/02/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 3.73
 Matrix SOIL
 Sample Size 5.000
 Size Unit Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.160	0.500	1.00
PFTTrDA	72629-94-8	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.160	0.500	2.00
9Cl-PF3ONS	756426-58-1	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.154	0.500	2.00
11Cl-PF3OUDS	763051-92-9	0.500 U	E9621-FS(0)	1.000	12/7/2022	0.150	0.500	2.00

nw 3/31/23
 Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



6

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB11-191192

Battelle ID E9622-FS
 Sample Type SA
 Collection Date 11/02/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 5.59
 Matrix SOIL
 Sample Size 5.010
 Size Unit Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.178	0.499	0.998
PFHpA	375-85-9	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.168	0.499	0.998
PFOA	335-67-1	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.214	0.499	0.998
PFNA	375-95-1	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.157	0.499	0.998
PFDA	335-76-2	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.158	0.499	0.998
PFUnA	2058-94-8	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.156	0.499	0.998
PFDoA	307-55-1	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.160	0.499	0.998
PFTTrDA	72629-94-8	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.161	0.499	0.998
PFTeDA	376-06-7	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.162	0.499	2.00
NMeFOSAA	2355-31-9	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.159	0.499	2.00
NEtFOSAA	2991-50-6	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.165	0.499	2.00
PFBS	375-73-5	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.171	0.499	0.998
PFHxS	355-46-4	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.173	0.499	0.998
PFOS	1763-23-1	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.175	0.499	0.998
HFPO-DA	13252-13-6	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.159	0.499	2.00
Adona	919005-14-4	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.160	0.499	2.00
9CI-PF3ONS	756426-58-1	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.154	0.499	2.00
11CI-PF3OUDS	763051-92-9	0.499 U	E9622-FS(0)	1.000	12/7/2022	0.150	0.499	2.00

3/31/23

Analyzed by: Harnden, Kelsey
 Printed: 1/31/2023



7

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-SB11-231232

Battelle ID E9623-FS
 Sample Type SA
 Collection Date 11/03/2022
 Extraction Date 11/11/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture 3.03
 Matrix SOIL
 Sample Size 5.000
 Size Unit-Basis g

Analyte	CAS No.	Result (ng/g_Dry)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.178	0.500	1.00
PFHpA	375-85-9	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.168	0.500	1.00
PFOA	335-67-1	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.214	0.500	1.00
PFNA	375-95-1	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.157	0.500	1.00
PFDA	335-76-2	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.158	0.500	1.00
PFUnA	2058-94-8	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.156	0.500	1.00
PFDoA	307-55-1	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.160	0.500	1.00
PFTTrDA	72629-94-8	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.161	0.500	1.00
PFTeDA	376-06-7	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.162	0.500	2.00
NMeFOSAA	2355-31-9	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
NEtFOSAA	2991-50-6	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.165	0.500	2.00
PFBS	375-73-5	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.171	0.500	1.00
PFHxS	355-46-4	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.173	0.500	1.00
PFOS	1763-23-1	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.175	0.500	1.00
HFPO-DA	13252-13-6	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.159	0.500	2.00
Adona	919005-14-4	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.160	0.500	2.00
9CI-PF3ONS	756426-58-1	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.154	0.500	2.00
11CI-PF3OUDS	763051-92-9	0.500 U	E9623-FS(0)	1.000	12/7/2022	0.150	0.500	2.00

rw 3/31/23
 Analyzed by: Harnden, Kelsey

**DATA VALIDATION SUMMARY REPORT
NAVAL STATION EVERETT, WASHINGTON**

Client: CH2M HILL, Inc., Corvallis, Oregon
SDG: 22-2042
Laboratory: Battelle Norwell Operations, Norwell, Massachusetts
Site: Northwest PFAS Investigation, Naval Station Everett, WA, CTO-4117
Date: March 3, 2023

PFAS			
EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	NRSJC-S7-FB01-110822	E9826-FS	Water
2	NRSJC-S7-GW11-1122	E9827-FS	Water
3	NRSJC-S7-GW11P-1122	E9828-FS	Water
4	NRSJC-S7-EB01-110922	E9829-FS	Water
5	NRSJC-S7-GW12A-1122	E9830-FS	Water
5MS	NRSJC-S7-GW12A-1122MS	E9831-FSMS	Water
5MSD	NRSJC-S7-GW12A-1122MSD	E9832-FSMSD	Water

A Stage 2B/4 data validation was performed on the analytical data for three water samples, one aqueous field blank samples, and one aqueous equipment blank sample collected on November 8-10, 2022 by CH2M HILL at the Naval Station Everett site in Washington. The samples were analyzed under the Analysis of Perfluoroalkyl Substances in Environmental Samples by Liquid Chromatography and Tandem Mass Spectrometry (LC-MS/MS).

Specific method references are as follows:

Analysis
PFAS

Method References
Battelle SOP 5-369-09

The data have been validated according to the protocols and quality control (QC) requirements of the analytical method, the Draft Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Washington, February 2022, the DoD Final General Data Validation Guidelines, November 2019, including the following Module:

- The Department of Defense (DoD) Data Validation Guidelines Module 3, Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories (QSM) Table B-15, May 2020;
- The Department of Defense (DoD) Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table, May 2021;
- and the reviewer's professional judgment.

The following data quality indicators were reviewed for this report:

PFAS

- Date Completeness, Case Narrative & Custody Documentation
- Holding times
- Liquid Chromatography/Mass Spectrometry (LC/MS) Tuning
- Initial and continuing calibration summaries
- Method blank and field QC blank contamination
- Surrogate Spike recoveries
- Laboratory Fortified Blank (LFB)
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries
- Internal standard area and retention time summary forms
- Target Compound Identification
- Compound Quantitation
- Field Duplicate sample precision

A Stage 2B/4 data validation was performed with this review including a recalculation of 10% of the detected results in the samples.

Data Usability Assessment

There were no serious deficiencies of data.

The data are acceptable for the intended purposes as qualified for the deficiencies detailed in this report.

Please note that any results qualified (U) due to blank contamination may be then qualified (J) due to another action. Therefore, the results may be qualified (UJ) due to the culmination of the blank contaminations and actions from other exceedances of QC criteria.

Polyfluoroalkyl Substances (PFAS)

Data Completeness, Case Narrative & Custody Documentation

- The case narrative and chain-of-custody documentation were included in the data package as required. All criteria were met.

Holding Times

- All holding time criteria were met.

LC/MS Tuning

- All criteria were met.

Initial Calibration

- All relative standard deviation (%RSD) and/or correlation coefficients criteria were met.

Continuing Calibration

- All percent recovery (%R) criteria were met.

Method Blank

- The method blanks were free of contamination.

Field QC Blank

- Field QC results are summarized below.

Blank ID	Compound	Conc. ng/L	Qualifier	Affected Samples
NRSJC-S7-FB01-110822	None - ND	-	-	-
NRSJC-S7-EB01-110922	None - ND	-	-	-

Surrogate Spike Recoveries

- All samples exhibited acceptable surrogate percent recoveries (%R) except for the following.

EDS Sample	Surrogate	%R	Qualifier
2	13C2-PFTeDA	40%	UJ
5	13C2-PFTeDA	12%	UJ

Laboratory Fortified Blank (LFB)

- The LFB samples exhibited acceptable percent recoveries (%R).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries

- The MS/MSD samples exhibited acceptable percent recoveries (%R) and RPD values.

Internal Standard (IS) Area Performance

- All internal standards met response and retention time (RT) criteria.

Target Compound Identification

- All mass spectra and quantitation criteria were met.

Compound Quantitation

- All criteria were met.

Field Duplicate Sample Precision

- Field duplicate results are summarized below. The precision was acceptable.

Compound	NRSJC-S7-GW11-1122 ng/L	NRSJC-S7-GW11P-1122 ng/L	RPD	Qualifier
None	ND	ND	-	-

Please contact the undersigned at (561) 475-2000 if you have any questions or need further information.

Signed:

Nancy Weaver
Nancy Weaver
Senior Chemist

Dated: 3/5/23

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been "tentatively identified" or "presumptively" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	<p>The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided.</p> <p>Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.</p>



Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-57-FB01-110822

Battelle ID E9826-FS
 Sample Type SA
 Collection Date 11/08/2022
 Extraction Date 11/22/2022
 Analytical Instrument Sciex 6500- (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.265
 Size Unit: Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.861	2.36	4.72
PFHpA	375-85-9	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.888	2.36	4.72
PFOA	335-67-1	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.953	2.36	4.72
PFNA	375-95-1	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.786	2.36	4.72
PFDA	335-76-2	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.740	2.36	4.72
PFUnA	2058-94-8	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.709	2.36	4.72
PFDoA	307-55-1	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.717	2.36	4.72
PFTTrDA	72629-94-8	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.700	2.36	4.72
PFTeDA	376-06-7	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.746	2.36	4.72
NMeFOSAA	2355-31-9	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.972	2.36	4.72
NEtFOSAA	2991-50-6	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.934	2.36	4.72
PFBS	375-73-5	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.817	2.36	4.72
PFHxS	355-46-4	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.941	2.36	4.72
PFOS	1763-23-1	2.36 U	E9826-FS(0)	1.000	12/18/2022	1.01	2.36	4.72
HFPO-DA	13252-13-6	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.816	2.36	4.72
Adona	919005-14-4	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.820	2.36	4.72
9CI-PF3ONS	756426-58-1	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.972	2.36	4.72
11CI-PF3OUdS	763051-92-9	2.36 U	E9826-FS(0)	1.000	12/18/2022	0.850	2.36	4.72

mw 3/31/23
 Analyzed by: Boger, Warren
 Printed: 2/8/2023



2

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-GW11-1122

Battelle ID E9827-FS
 Sample Type SA
 Collection Date 11/09/2022
 Extraction Date 11/22/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.270
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.845	2.31	4.63
PFHpA	375-85-9	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.871	2.31	4.63
PFOA	335-67-1	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.935	2.31	4.63
PFNA	375-95-1	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.771	2.31	4.63
PFDA	335-76-2	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.726	2.31	4.63
PFUnA	2058-94-8	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.696	2.31	4.63
PFDoA	307-55-1	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.704	2.31	4.63
PFTrDA	72629-94-8	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.687	2.31	4.63
PFTeDA	376-06-7	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.732	2.31	4.63
NMeFOSAA	2355-31-9	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.954	2.31	4.63
NEtFOSAA	2991-50-6	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.917	2.31	4.63
PFBS	375-73-5	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.802	2.31	4.63
PFHxS	355-46-4	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.923	2.31	4.63
PFOS	1763-23-1	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.991	2.31	4.63
HFPO-DA	13252-13-6	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.801	2.31	4.63
Adona	919005-14-4	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.805	2.31	4.63
9Cl-PF3ONS	756426-58-1	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.954	2.31	4.63
11Cl-PF3OUdS	763051-92-9	2.31 U	E9827-FS(0)	1.000	12/18/2022	0.834	2.31	4.63

NW 3/31/23

Analyzed by: Boger, Warren
 Printed: 2/8/2023



3

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-GW11P 1122

Battelle ID E9828-FS
 Sample Type SA
 Collection Date 11/09/2022
 Extraction Date 11/22/2022
 Analytical Instrument Sciex 6500+ (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.232
 Size Unit Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.984	2.69	5.39
PFHpA	375-85-9	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.01	2.69	5.39
PFOA	335-67-1	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.09	2.69	5.39
PFNA	375-95-1	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.898	2.69	5.39
PFDA	335-76-2	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.845	2.69	5.39
PFUnA	2058-94-8	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.810	2.69	5.39
PFDoA	307-55-1	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.819	2.69	5.39
PFTeDA	72629-94-8	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.800	2.69	5.39
PFTeDA	376-06-7	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.852	2.69	5.39
NMeFOSAA	2355-31-9	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.11	2.69	5.39
NEtFOSAA	2991-50-6	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.07	2.69	5.39
PFBS	375-73-5	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.933	2.69	5.39
PFHxS	355-46-4	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.07	2.69	5.39
PFOS	1763-23-1	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.15	2.69	5.39
HFPO-DA	13252-13-6	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.932	2.69	5.39
Adona	919005-14-4	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.936	2.69	5.39
9CI-PF3ONS	756426-58-1	2.69 U	E9828-FS(0)	1.000	12/18/2022	1.11	2.69	5.39
11CI-PF3OUDS	763051-92-9	2.69 U	E9828-FS(0)	1.000	12/18/2022	0.971	2.69	5.39

NW 3/3/23

Analyzed by: Boger, Warren
 Printed: 2/8/2023



4

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161 X1.XX.0026.000001

Client ID NRSJC-57-EB01-110922

Battelle ID E9829-FS
 Sample Type SA
 Collection Date 11/09/2022
 Extraction Date 11/22/2022
 Analytical Instrument Sciex 6500- (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.252
 Size Unit-Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.906	2.48	4.96
PFHpA	375-85-9	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.934	2.48	4.96
PFOA	335-67-1	2.48 U	E9829-FS(0)	1.000	12/18/2022	1.00	2.48	4.96
PFNA	375-95-1	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.826	2.48	4.96
PFDA	335-76-2	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.778	2.48	4.96
PFUnA	2058-94-8	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.746	2.48	4.96
PFDoA	307-55-1	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.754	2.48	4.96
PFTTrDA	72629-94-8	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.736	2.48	4.96
PFTeDA	376-06-7	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.785	2.48	4.96
NMeFOSAA	2355-31-9	2.48 U	E9829-FS(0)	1.000	12/18/2022	1.02	2.48	4.96
NEtFOSAA	2991-50-6	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.982	2.48	4.96
PFBS	375-73-5	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.859	2.48	4.96
PFHxS	355-46-4	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.989	2.48	4.96
PFOS	1763-23-1	2.48 U	E9829-FS(0)	1.000	12/18/2022	1.06	2.48	4.96
HFPO-DA	13252-13-6	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.858	2.48	4.96
Adona	919005-14-4	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.862	2.48	4.96
9CI-PF3ONS	756426-58-1	2.48 U	E9829-FS(0)	1.000	12/18/2022	1.02	2.48	4.96
11CI-PF3OUdS	763051-92-9	2.48 U	E9829-FS(0)	1.000	12/18/2022	0.894	2.48	4.96

NW 313123

Analyzed by: Boger, Warren
 Printed: 2/8/2023



5

Project Client: CH2M
 Project Name: CTO-4117: Northwest PFAS Investigation
 Project No.: G25161.X1.XX.0026.000001

Client ID NRSJC-S7-GW12A-1122

Battelle ID E9830-FS
 Sample Type SA
 Collection Date 11/10/2022
 Extraction Date 11/22/2022
 Analytical Instrument Sciex 6500- (AE) LC/MS/MS
 % Moisture NA
 Matrix AQ
 Sample Size 0.233
 Size Unit: Basis L

Analyte	CAS No.	Result (ng/L)	Extract ID	DF	Analysis Date	DL	LOD	LOQ
PFHxA	307-24-4	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.980	2.68	5.36
PFHpA	375-85-9	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.01	2.68	5.36
PFOA	335-67-1	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.08	2.68	5.36
PFNA	375-95-1	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.894	2.68	5.36
PFDA	335-76-2	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.841	2.68	5.36
PFUnA	2058-94-8	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.807	2.68	5.36
PFDoA	307-55-1	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.815	2.68	5.36
PFTeDA	72629-94-8	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.796	2.68	5.36
PFTeDA	376-06-7	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.849	2.68	5.36
NMeFOSAA	2355-31-9	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.11	2.68	5.36
NEtFOSAA	2991-50-6	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.06	2.68	5.36
PFBS	375-73-5	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.929	2.68	5.36
PFHxS	355-46-4	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.07	2.68	5.36
PFOS	1763-23-1	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.15	2.68	5.36
HFPO-DA	13252-13-6	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.928	2.68	5.36
Adona	919005-14-4	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.932	2.68	5.36
9Cl-PF3ONS	756426-58-1	2.68 U	E9830-FS(0)	1.000	12/18/2022	1.11	2.68	5.36
11Cl-PF3OUdS	763051-92-9	2.68 U	E9830-FS(0)	1.000	12/18/2022	0.967	2.68	5.36

SSL

mw 3/3/23
 Analyzed by: Boger, Warren

Printed: 2/8/2023

Appendix I

Data Quality Assessment Report

Data Quality Assessment, Per- and Polyfluoroalkyl Substances Naval Station Everett, Washington Naval Radio Station Jim Creek Arlington, Washington Naval Recreation Complex Pacific Beach Pacific Beach, Washington

DATE: April 2023

Introduction

The purpose of this technical memorandum is to present the results of the data validation process for the soil and water samples collected from June through November 2022.

Soil and water samples were submitted to Battelle Laboratories for per- and polyfluoroalkyl substances (PFAS) analysis by analytical method Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) compliant with Department of Defense (DoD) Quality Systems Manual (QSM) Version 5.3 Table B-15 (DoD, 2019).

The sample results were validated by Environmental Data Services, Inc. (EDS) for compliance with the guidance documents *DoD Final General Data Validation Guidelines* (DoD, 2019), *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories Table B-15* (DoD, 2020), the *Department of Defense Data Validation Guidelines Module 1, 2 and 4 Revised Blank Qualification Table* (DoD, 2022), the *Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Everett, Washington, Naval Radio Station Jim Creek, Arlington, Washington, Naval Recreation Complex Pacific Beach, Washington* (CH2M, 2022) and professional judgment.

The data validation findings for the following sample delivery groups were reviewed by Jacobs for this data quality assessment:

Sample Delivery Groups		
22-1049	22-1785	22-1934
22-1191	22-1786	22-1979
22-1325	22-1824	22-1990
22-1385	22-1825	22-1991
22-1386	22-1933	22-2042
22-1394		

During data validation, EDS assigned qualifying flags to sample results for associated quality assurance/quality control (QA/QC) results outside of acceptance criteria, as specified in the guidance documents. This qualification also included the use of secondary qualifier flags. The secondary qualifiers provide the reasoning behind the assignment of a qualifier to these data. The data quality assessment evaluated the data validation findings against precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) criteria as qualitative and quantitative indicators of data quality. The findings are documented within the appropriate criteria sections as follows.

The definitions of the primary qualifiers are presented as follows. The secondary qualifiers are listed in **Attachment 1**.

Validation Flag Definitions

The following primary qualifiers were used to qualify the data:

- [NULL] **Detected.** The analyte was analyzed for and detected at the concentration shown.
- [J] **Estimated.** The reported result was an estimated value with an unknown bias.
- [U] **Undetected.** The analyte was not detected and was reported as less than the limit of detection (LOD) or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
- [UJ] **Detection limit estimated.** The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
- [X] **Recommended for Rejection.** The data should be evaluated further by the project team, but are recommended for rejection due to serious QA/QC deficiencies.
- [Exclude] **Excluded.** Data were not used due to another value being more appropriate.

Quality Control Measures

The following list represents the QA/QC measures that were reviewed during the data quality evaluation procedure:

- **Holding Times:** The holding times are evaluated to verify that samples were extracted and analyzed within holding times.
- **Blank samples:** Method blank, equipment blank, and trip blank samples were provided for this project. Blank samples enable the reviewer to determine if an analyte may be attributed to sampling or laboratory procedures, rather than environmental contamination from site activities.
- **Lab Control Sample (LCS)/Lab Control Sample Duplicate (LCSD):** These samples are a "controlled matrix", laboratory reagent water, in which target compounds have been added prior to extraction/analysis. The recoveries serve as a monitor of the overall performance of each step during the analysis, including sample preparation.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples:** Spike recovery is used to evaluate potential matrix interferences, as well as accuracy. Precision information is also determined by calculating the reproducibility between the recoveries of each spiked parameter.
- **Field Duplicate/Triplicate Samples:** These samples are collected to determine the precision between a native and its duplicates. This information can only be determined when target compounds are detected.
- **Ion Ratio:** Ion ratios can be used to help determine if the matrix of the sample has resulted in a bias in the data. To determine if a bias has potentially occurred, the ion ratio is evaluated against the ion ratio of standards, which do not contain matrix interferences. Ion ratio failures could be caused by matrix interference and/or be the result of the presence of isomers in the sample at different ratios than the ratio of isomers present in the calibration standards.
- **Extracted Internal Standard (EIS) Recovery:** These recoveries are used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, chromatographic behavior, and mass spectrometry ionization efficiency.

- **Internal Standards:** These are compounds added to the sample extracts prior to analysis. Their retention times and response are evaluated for method compliance. The internal standards are used in the quantification of the target parameters and to monitor the instrument sensitivity and response for stability during analysis.
- **Initial Calibration:** The initial calibration ensures the instrument is capable of producing acceptable qualitative and quantitative data for the compounds of interest. Multiple standard solutions are analyzed to determine the response and linearity of the instrument over a varying concentration range.
- **Continuing Calibration:** The continuing calibration checks the satisfactory performance of the instrument and its predicted response to the target compounds by analysis of a standard solution(s) at known concentrations.

PARCCS Review

Evaluation of the PARCCS criteria for all samples is discussed as follows.

Precision

Precision is defined as the agreement between duplicate results and was calculated as relative percent difference (RPD) by comparing duplicate MS/MSD and LCS/LCSD recoveries and field duplicate sample results.

MS/MSD and LCS/LCSD

MS/MSD and LCS/LCSD RPDs met acceptance criteria with no results qualified for high RPD.

Field Duplicates

Field duplicate precision met acceptance criteria with no results qualified for high RPD.

Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. For organic analyses, each sample was spiked with EIS compounds. Additionally, an MS/MSD and LCS were spiked with a known parameter concentration before preparation. Internal standards also provide a measure of accuracy. EIS, MS/MSD, and internal standards provide a measure of the matrix effects on analytical accuracy. The LCS demonstrates the accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy is also assessed by calibration responses. Potential biases and trends were evaluated by first determining whether a QA/QC exceedance may indicate a potential bias or trend. If so, then the exceedance was examined to determine whether the bias or trend was significant enough to warrant the rejection of data.

MS, MSD, LCS, LCSD

MS/MSD and LCS/LCSD recoveries met acceptance criteria with no results qualified for percent recoveries outside of SAP specified criteria.

Extracted Internal Standards

EIS recoveries met acceptance criteria with the following exceptions:

- Perfluorotetradecanoic acid (PFTeDA) in sample NRCPB-B106-GW02-0822 exhibited a grossly low recovery (less than 10%) in the EIS. Based on the low recovery the result has been R-qualified and is unusable for evaluating project goals.
- Various compounds exhibited low EIS recoveries in groundwater samples NRSJC-S5-GW16-0722, NRCPB-B106-GW01-0822, NRCPB-B106-GW01P-0822, NSE-B2114-GW01-0822, NSE-B2114-GW01P-0822, NSE-B2114-GW02-0822, NSE-B2114-GW03-0822, NRSJC-S7-GW11-1122, and NRSJC-S7-GW12A-1122. All of the records

are for PFTeDA which does not have a screening level and the potential low bias does not impact the usability of the results.

- Various compounds exhibited low EIS recoveries in soil samples NSE-B2114-SS02-0001, NRCPB-B106-SS01P-0001, NRCPB-B106-SS03-0001, and NRCPB-B106-SB03-0506. None of the PFAS compounds qualified for low EIS have screening levels, with the exception of perfluorooctane sulfonate (PFOS) in sample NSE-B2114-SS02-0001. The result is significantly higher than the screening level and the potential high bias may impact the usability of the data as reported. The remaining compounds do not have screening levels and the potential high bias does not impact the usability of the results.

Affected data are summarized in **Attachment 2**.

Internal Standards

- Internal standards exhibited high responses for PFOS in samples NSE-B2114-GW02-0822 and NSE-B2114-GW03-0822. The result for sample NSE-B2114-GW03-0822 is lower than the screening level and the potential low bias may impact the usability of the data as reported. The result for sample NSE-B2114-GW02-0822 is significantly higher than the screening level and the potential low bias is not interpreted to impact the usability of the data as reported.

Affected data are summarized in **Attachment 2**.

Ion Ratios

- Sample NRCPB-B106-GW02-0822 did not meet the ion ratio criteria for PFOS. The result from this sample is significantly above the project screening level and the potential bias does not impact the usability of the result.

Affected data are summarized and qualified as OT (for Other) in **Attachment 2**.

Analytical and Laboratory Blanks

PFOS was detected in the laboratory method blank associated with samples NRSJC-S5-GW16-0722 and NRSJC-S5-GW16P-0722. However, because the concentration in the associated samples was less than the LOD no bias is assigned to the results. No target analytes were detected in the remaining analytical and laboratory blanks.

Calibration

All acceptance criteria were met.

Representativeness

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (for example, nature and extent of contamination).

Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness was assured because the sampling team followed approved standard operating procedures (SOPs) for sample collection and handling, and the laboratory followed approved SOPs for sample handling, preparation, and analysis.

Holding Times

All holding time requirements were met, except for samples NRCPB-B106-SS02-0001 and NRCPB-B106-SB03-0506. The holding times were less than two times the allowed holding time and usability is not impacted by the exceedance.

Affected data are summarized in **Attachment 2**.

Completeness

Completeness is defined as the percentage of measurements that are judged to be valid; validity being defined by the data quality objectives. Therefore, completeness is calculated as the number of analytically sound results that are available for use compared to the total number of measurements made. The National Functional Guidelines data validation guidance designates all results except those R-qualified as “rejected” to be available for use as analytically sound results. The R-qualifier is the only qualifier that negatively affects a data point’s availability. The data set is 100% complete and the completeness goal of 95% was exceeded.

Comparability

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved SOPs were used for sample collection and handling, common sample matrices were evaluated, and adherence to the DoD QSM Version 5.3 was followed, the data user may express confidence in the fact that this data set is comparable to others of acceptable data quality. Comparability is controlled by the other PARCCS parameters because data sets can be compared with confidence only when precision and accuracy are known. Precision and accuracy were demonstrated to be acceptable, and the data user may be confident that this data set is comparable to others of high data quality.

The recalculation of the laboratory quantitation was performed at a 10% frequency as per the statement of work with no anomalies found. The assumptions made about the PARCCS were proper and correct. No error in judgment was found during this review of the data validation reports, which are included in **Attachment 3**.

Sensitivity

Sensitivity is the ability of an analytical method or instrument to discriminate between measurement responses representing different concentrations. This capability is established during the planning phase to meet project-specific objectives. It is important to be able to detect the target analytes at the levels of interest. Sensitivity requirements include the establishment of various limits such as calibration requirements, instrument LODs, and limits of quantitation. Limits were not raised above the screening levels.

Conclusion

A review of the analytical data submitted regarding the Naval Station Everett sampling event from June through November 2022 has been completed. The validation review demonstrated that the analytical systems were generally in control and that all of the data results can be used in the project decision-making process.

References

Department of Defense (DoD). 2019. *DoD Final General Data Validation Guidelines*. November.

DoD. 2020. *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual for Environmental Laboratories Table B-15*. May.

DoD. 2022. *Data Validation Guidelines Modules 1,2, 3, and 4 Revised Table for Sample Qualification in the Presence of Blank Contamination*.

CH2M HILL, Inc. (CH2M).2022. *Final Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Everett, Washington, Naval Radio Station Jim Creek, Arlington, Washington, Naval Recreation Complex Pacific Beach, Washington*. May.

Attachment 1

Secondary Data Qualifier Codes

Attachment 1. Secondary Data Qualifier, or Validation Reason, Codes

Secondary Data Qualifier	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
GBL	Grinding Blank Contamination
GBSH	Ground Blank Spike/LCS – High Recovery
GBSL	Ground Blank Spike/LCS – Low Recovery
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation

Attachment 1. Secondary Data Qualifier, or Validation Reason, Codes

Secondary Data Qualifier	Description
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	EIS – High Recovery
SSL	EIS – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

Attachment 2

Assigned Qualifiers

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analyte	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
NRSJC-S5-GW16-0722	N	Perfluorotetradecanoic Acid (PFTeDA)	2.44	U	2.44	UJ	NG_L	SSL
NRSJC-S5-GW16-0722	N	Perfluorooctane Sulfonate (PFOS)	2.44	J	1.06	U	NG_L	MBL
NRSJC-S5-GW16P-0722	FD	Perfluorooctane Sulfonate (PFOS)	2.36	J	1.06	U	NG_L	MBL
NSE-B2114-SS02-0001	N	Perfluoroundecanoic Acid (PFUnA)	0.267	J	0.267	J	NG_G	SSL
NSE-B2114-SS02-0001	N	Perfluorododecanoic Acid (PFDoA)	0.478	J	0.478	J	NG_G	SSL
NSE-B2114-SS02-0001	N	Perfluorotetradecanoic Acid (PFTeDA)	0.501	UT	0.501	UJ	NG_G	SSL
NSE-B2114-SS02-0001	N	N-Methyl Perfluorooctanesulfonamidoacetic Acid (MeFOSAA)	0.501	U	0.501	UJ	NG_G	SSL
NSE-B2114-SS02-0001	N	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.501	U	0.501	UJ	NG_G	SSL
NSE-B2114-SS02-0001	N	Perfluorooctane Sulfonate (PFOS)	14.8		14.8	J	NG_G	SSL
NRCPB-B106-SS01P-0001	FD	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.498	U	0.498	UJ	NG_G	SSL
NRCPB-B106-SS02-0001	N	Perfluorotetradecanoic Acid (PFTeDA)	0.502	UT	0.502	UJ	NG_G	HT
NRCPB-B106-SS03-0001	N	Perfluorotetradecanoic Acid (PFTeDA)	0.499	U	0.499	UJ	NG_G	SSL
NRCPB-B106-SB03-0506	N	Perfluorododecanoic Acid (PFDoA)	0.498	UT	0.498	UJ	NG_G	HT
NRCPB-B106-SB03-0506	N	N-Ethyl Perfluorooctanesulfonamidoacetic Acid (EtFOSAA)	0.498	U	0.498	UJ	NG_G	SSL
NRCPB-B106-GW01-0822	N	Perfluorotetradecanoic Acid (PFTeDA)	2.71	U	2.71	UJ	NG_L	SSL
NRCPB-B106-GW01P-0822	FD	Perfluorotetradecanoic Acid (PFTeDA)	2.55	U	2.55	UJ	NG_L	SSL
NRCPB-B106-GW02-0822	N	Perfluorotetradecanoic Acid (PFTeDA)	2.46	U	2.46	R	NG_L	SSL
NRCPB-B106-GW02-0822	N	Perfluorooctane Sulfonate (PFOS)	5.53	Q	5.53	J	NG_L	OT
NSE-B2114-GW01-0822	N	Perfluorotetradecanoic Acid (PFTeDA)	2.64	U	2.64	UJ	NG_L	SSL
NSE-B2114-GW01P-0822	FD	Perfluorotetradecanoic Acid (PFTeDA)	2.51	U	2.51	UJ	NG_L	SSL
NSE-B2114-GW02-0822	N	Perfluorotetradecanoic Acid (PFTeDA)	2.56	U	2.56	UJ	NG_L	SSL

Attachment 2. Assigned Qualifiers.

Sample ID	Sample Type	Analyte	Lab Result	Lab Qual	Final Result	Primary Qualifier	Units	Secondary Qualifier
NSE-B2114-GW02-0822	N	Perfluorooctane Sulfonate (PFOS)	6.79		6.79	J	NG_L	ISH
NSE-B2114-GW03-0822	N	Perfluorotetradecanoic Acid (PFTeDA)	2.41	U	2.41	UJ	NG_L	SSL
NSE-B2114-GW03-0822	N	Perfluorooctane Sulfonate (PFOS)	3.3	J	3.3	J	NG_L	ISH
NRSJC-S7-GW11-1122	N	Perfluorotetradecanoic Acid (PFTeDA)	2.31	U	2.31	UJ	NG_L	SSL
NRSJC-S7-GW12A-1122	N	Perfluorotetradecanoic Acid (PFTeDA)	2.68	U	2.68	UJ	NG_L	SSL

Appendix J

Human Health Risk Screening

Human Health Risk Screening Evaluation

The Human Health Risk Screening (HHRS) evaluation was performed to assess potential human health risks associated with exposure to per- and polyfluoroalkyl substances (PFAS) in surface soil, subsurface soil, and groundwater at sites across Naval Station (NAVSTA) Everett in Everett, Washington and two associated facilities, Naval Radio Station (NRS) Jim Creek in Arlington, Washington, and Naval Recreation Complex (NRC) Pacific Beach in Pacific Beach, Washington.

NAVSTA Everett occupies approximately 117 acres in western Snohomish County adjacent to Port Gardner Bay, within the city of Everett, Washington. NAVSTA Everett was constructed in the early 1990s under Department of the Navy (Navy) Strategic Homeport Initiative and is currently the home port for six Navy destroyers and two United States Coast Guard vessels (Navy, 2018). The installation includes buildings and facilities that support ship operations and maintenance, and provide housing and support to homeported sailors.

NRS Jim Creek occupies approximately 3,854 acres in northern Snohomish County approximately 13 miles east of Arlington, Washington. NRS Jim Creek operates and maintains a communication system (Navy, 2018). The Navy acquired land at NRS Jim Creek in 1949 and constructed the communication system and associated support facilities between 1949 and 1953 (NEESA, 1990). In addition to communication system operations, the Navy currently uses NRS Jim Creek as an outdoor recreational facility for activities such as camping, fishing, boating, hiking, and biking. Current-day buildings include a communication system, outdoor recreational facilities such as cabins and campsites, and supporting facilities.

NRC Pacific Beach occupies approximately 53 acres in western Grays Harbor County adjacent to the Pacific Ocean approximately 36 miles northwest of Aberdeen, Washington. The installation was initially developed by the Navy at the start of World War II as a communications center and range for training purposes (NEESA, 1991). By 1956, the Navy moved training operations closer to Puget Sound and Seattle. Defense equipment and associated infrastructure such as gun mounts, ammunition magazines, and related buildings were demolished and replaced with more conventional structures (NEESA, 1991). By the late 1970s, military housing was no longer required, and the installation was converted into a recreational facility with single-family homes and dormitory-type buildings. In 1984, a 1-acre recreational vehicle and motor home park was built along the northern boundary of the installation and exists to this day. There are currently no active military operations at NRC Pacific Beach.

A Preliminary Assessment for PFAS at NAVSTA Everett and associated facilities, including NRS Jim Creek and NRC Pacific Beach (CH2M, 2021), was conducted to identify potential PFAS release areas. Of the 50 areas identified for evaluation (22 areas at NAVSTA Everett, 22 areas at NRS Jim Creek, and 6 areas at NRC Pacific Beach), 9 were classified as potential release areas. However, one of the nine areas, the Bio Pit Disposal Area at NRS Jim Creek, which received sludge from stormwater catch basins at the facility, did not have confirmation that aqueous film-forming foam or other PFAS-containing chemicals were released and was not recommended for further evaluation. A No Further Action recommendation for the Bio Pit Disposal Area was deferred until the Site Investigation (SI) pending PFAS sampling results at Building 6, where PFAS-containing chemicals could have migrated to a nearby catch basin and been released to the Bio Pit Disposal Area. Therefore, the following eight potential release areas were recommended for further investigation as part of an SI and are included in this HHRS:

- NAVSTA Everett (1 area)
 - Building 2114 (Fire Station)
- NRS Jim Creek (6 areas)
 - Building 6 (Former Fire Station)
 - Site 1 (Building 11 Landfill)
 - Site 6 (Blue Campground Landfill)
 - Site 7 (Pit Road Landfill)

- Site 4 (Metal Burial Pit)
- Site 5 (Mixed Waste Landfill)
- NRC Pacific Beach (1 area)
 - Building 106 (Former Fire Station)

Potential risks associated with exposure to six PFAS (perfluorobutanesulfonic acid [PFBS], perfluorooctanoic acid [PFOA], perfluorooctane sulfonic acid [PFOS], perfluorohexanesulfonic acid [PFHxS], perfluorononanoic acid [PFNA], and perfluoro-2-methyl-3-oxahexanoic acid [HFPO-DA]) were quantified in the HHRS. As discussed in the SI, the samples were also analyzed for additional PFAS by the laboratory; however, consistent with Assistant Secretary of Defense guidance (ASD, 2022) only PFBS, PFOA, PFOS, PFHxS, PFNA, and HFPO-DA were quantitatively evaluated in the HHRS. The Navy acknowledges that there are now RSLs for PFBA and PFHxA in the May 2023 RSL update (USEPA, 2023). While PFBA was not analyzed under the SI, it is unlikely to impact site management decisions based on results and concentrations at similar Navy sites. PFHxA was analyzed in the samples and is discussed in the HHRS for each potential PFAS release area.

Potential current receptors include workers and visitors/trespassers at NAVSTA Everett, and workers, visitors/trespassers, and recreational users at NRS Jim Creek and NRC Pacific Beach. These receptors could potentially be exposed to PFAS in soil through incidental ingestion of and dermal contact with surface soil or respiration of surface soil dust in the air. Potential future receptors at all three facilities include current receptors, and future construction workers and residents if the site is developed for future site use. Potential future exposure to combined surface and subsurface soil assumes that the subsurface soil will be excavated and mixed with the surface soil and placed on the ground surface. Future receptors could be exposed to combined surface and subsurface soil through incidental ingestion of and dermal contact with surface and subsurface soil or respiration of soil dust in the air.

Groundwater is not used as a public water supply source for the City of Everett or NAVSTA Everett, and no private drinking water wells have been definitively identified within 1 mile of NAVSTA Everett. Therefore, it is assumed that no aquifers potentially affected by PFAS are used as a drinking water source in this area, making the exposure pathway from water supply use incomplete. However, in areas where groundwater is within the potential depth of construction activities, construction workers could be exposed to PFAS in groundwater through dermal contact during excavation activities.

Based on data obtained from Washington State Department of Ecology (2018) and Department of Health, at least nine private drinking water wells (total depths ranging from 25 to 320 feet below ground surface [bgs]) are within 1 mile of NRS Jim Creek, northwest of NRS Jim Creek. Based on regional stratigraphy, vertical migration of PFAS constituents to the deeper regional aquifer is unlikely. Because the drinking water wells are upgradient of groundwater flowing into Jim Creek, exposure to PFAS in groundwater used as drinking water is unlikely.

Groundwater is used as a drinking water source near NRC Pacific Beach; however, all known active drinking water supply wells are screened much deeper than the shallow water-bearing unit. In addition, all known drinking water wells are upgradient of the potential PFAS source areas at NRC Pacific Beach. However, in areas where groundwater is within the potential depth of construction activities, construction workers could be exposed to PFAS in groundwater through dermal contact during excavation activities.

Although groundwater at NAVSTA Everett or the two associated facilities is not a current water supply and is unlikely to be a future potable water supply, human health risk-based levels for potable use were used for the screening evaluation for the groundwater because screening criteria for other exposure scenarios have not been developed.

The results of the HHRS provide a preliminary indication of potential risks to human receptors from exposure to PFAS at potential release areas and are used to help evaluate whether an area requires further evaluation (that is, potential unacceptable risks are identified for an area). Human health risk-based screening levels based on residential exposure and potable use of groundwater were used for the screening evaluation.

1 Data Evaluation

Surface soil, subsurface soil, and groundwater samples collected at the potential PFAS release areas within the three facilities (one area at NAVSTA Everett, six areas at NRS Jim Creek, and one area at NRC Pacific Beach) were evaluated in the HHRS. Potential human health risks were evaluated separately for each of the eight potential PFAS release areas. Table 1 in **Attachment 1** lists the available PFAS samples for the eight areas and identifies the samples that were included in the HHRS. All available data were included in the HHRS except subsurface soil samples collected from depths greater than 15 feet bgs; a receptor (that is, a construction worker) would not typically contact subsurface soil at depths greater than 15 feet bgs. Soil samples were collected in May, June, July, August, October, and November 2022, and groundwater samples were collected in June, July, August, and November 2022. The data are discussed in Section 4 of the SI Report.

The PFAS data evaluated in the HHRS were validated. Validation of the data identified the following criteria for data usability:

- Estimated values flagged with a J qualifier were treated as unqualified detected concentrations. The J qualifier indicates that the analyte is present, and the concentration is estimated because it is below the quantitation limit or because of an associated quality control exceedance and may be inaccurate or imprecise.
- Values flagged with a U qualifier indicate an analyte was not detected.
- For duplicate samples, the maximum concentration between the two samples was used as the sample concentration. If the analyte was only detected in one of the samples, the detected concentration was used as the sample concentration. If the analyte was not detected in either of the samples, the higher detection limit was used as the sample detection limit.

2 Human Health Risk Screening Methodology

The HHRS was conducted in two steps using a risk-ratio technique.

Step 1

Following current Assistant Secretary of Defense guidance (ASD, 2022), United States Environmental Protection Agency (USEPA) Regional screening levels (RSLs) based on a hazard quotient (HQ) of 0.1 were used to screen concentrations of six PFAS (PFBS, PFHxS, PFOS, PFOA, PFNA, and HFPO-DA) in site media. The Navy acknowledges that there are now RSLs for PFBA and PFHxA in the May 2023 RSL update (USEPA, 2023). While PFBA was not analyzed under the SI, it is unlikely to impact site management decisions based on results and concentrations at similar Navy sites. PFHxA was analyzed in the samples and is discussed in the HHRS for each potential PFAS release area. The detected concentrations of these six PFAS chemicals in the surface soil and subsurface soil samples were compared to USEPA residential soil RSLs from the November 2022 RSL Table (USEPA, 2022) and the detected concentrations of these PFAS in groundwater were compared to USEPA tap water RSLs (USEPA, 2022).

If the maximum detected concentration exceeded the RSL, the chemical was identified as a Step 1 chemical of potential concern (COPC) and was evaluated in Step 2.

Step 2

A risk level was calculated for each area and medium for COPCs identified in Step 1.

For potential carcinogenic analytes identified as COPCs in Step 1 (PFOA is the only potential carcinogen evaluated in the HHRS), the carcinogenic risk was calculated using the following equation:

$$\text{Carcinogenic risk} = \frac{\text{MDC} \times \text{target risk level of RSL}}{\text{RSL}}$$

Where:

MDC = maximum detected concentration (nanograms per gram[ng/g] or nanograms per liter [ng/L])

target risk level of RSL = 1×10^{-6} (unitless)

RSL = screening level based on carcinogenic risk of 1×10^{-6} (ng/g or ng/L)

For noncarcinogenic analytes identified as COPCs in Step 1, the noncarcinogenic HQ was calculated using the following equation:

$$\text{Noncarcinogenic HQ} = \frac{\text{MDC} \times \text{target HQ of RSL}}{\text{RSL}}$$

Where:

MDC = maximum detected concentration (ng/g or ng/L)

target HQ of RSL = 1 (unitless)

RSL = screening level based

The HQs for each medium in an area were summed to calculate the cumulative hazard index (HI). A cumulative HI was also calculated for each target organ/effect. The source of the target organs is the Agency for Toxic Substances Disease Registry (ATSDR) for PFOS, PFOA, and PFHxS (2023). If the cumulative HI for a target organ/effect was greater than 0.5, the analytes significantly contributing to the HI were identified as preliminary human health COPCs for further evaluation. Only one of the PFAS (PFOA) is a potential carcinogen and has a currently available cancer toxicity value. If the carcinogenic risk was greater than 5×10^{-5} , PFOA was identified as a preliminary human health COPC. A conservative benchmark (HI=0.5 and cancer risk = 5×10^{-5}) is being applied as the HHRS does not sum the HIs or risks across media and therefore, does not calculate a cumulative site risk from soil and groundwater, if both are present, and the HHRS only evaluates potential risks from exposure to six PFAS.

2.1 Building 2114

Surface soil, subsurface soil, and groundwater samples were collected at Building 2114 and evaluated in this HHRS.

The risk-based screening and risk-ratio evaluation for surface soil is provided in Tables 2 and 2a in **Attachment 1**. The maximum detected concentration of PFOS exceeded its RSL, and PFOS was identified as a Step 1 COPC. Based on Step 2, the cumulative target organ HI was below 0.5 (developmental HI = 0.3), and PFOS was not identified as a COPC.

The one PFAS detected in subsurface soil with an RSL (PFOS) was detected at a concentration below the RSL (Table 3 [**Attachment 1**]).

The risk-based screening and risk-ratio evaluation for groundwater is provided in Tables 4 and 4a in **Attachment 1**. The maximum detected concentrations of PFOA, PFOS, and PFHxS exceeded their RSLs, and PFOA, PFOS, and PFHxS were identified as Step 1 COPCs. Based on Step 2, the cumulative target organ HIs were greater than 0.5 (developmental HI = 13 and endocrine HI = 0.6), and PFOS and PFHxS were identified as preliminary COPCs; they contributed to the target organ HIs. PFOA (HQ = 0.2, target organ developmental) was not considered a COPC since it does not significantly contribute to the cumulative target organ HI of 13.

The detected concentrations of PFHxA in soil and groundwater were evaluated against the May 2023 RSLs and there are no exceedances.

COPCs were not identified for surface soil or subsurface soil at Building 2114. PFOS and PFHxS were identified as preliminary COPCs for groundwater.

2.2 Building 6

Surface soil, subsurface soil, and groundwater samples were collected at Building 6 and evaluated in this HHRS.

The risk-based screening evaluations for surface soil and subsurface soil are provided in Tables 5 and 6 in **Attachment 1**, respectively. PFAS detected in surface soil and subsurface soil with RSLs were detected at concentrations below their RSLs.

The risk-based screening and risk-ratio evaluation for groundwater is provided in Tables 7 and 7a in **Attachment 1**. The maximum detected concentrations of PFOS and PFHxS exceeded their RSLs, and PFOS and PFHxS were identified as Step 1 COPCs. Based on Step 2, the target organ HI for PFHxS did not exceed the target organ HI of 0.5 (endocrine HI = 0.4), and PFHxS was not identified as a COPC. However, the target organ HI for PFOS exceeded the target organ HI (developmental HI = 2) and PFOS was retained as a preliminary COPC for further evaluation.

The detected concentrations of PFHxA in soil and groundwater were evaluated against the May 2023 RSLs and there are no exceedances.

COPCs were not identified for surface soil or subsurface soil at Building 6. PFOS was identified as a preliminary COPC for groundwater.

2.3 Site 1

Surface soil, subsurface soil, and groundwater samples were collected at Site 1 and evaluated in this HHRS. PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in subsurface soil; therefore, a screening table is not shown for subsurface soil.

The risk-based screening evaluations for surface soil and groundwater are provided in Tables 8 and 9 in **Attachment 1**, respectively. PFAS detected in surface soil and groundwater with RSLs were detected at concentrations below their RSLs.

PFHxA was not detected in soil or groundwater at Site 1.

COPCs were not identified for surface soil, subsurface soil, or groundwater at Site 1.

2.4 Site 6

Surface soil, subsurface soil, and groundwater samples were collected at Site 6 and evaluated in this HHRS. PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in subsurface soil; therefore, a screening table is not shown for subsurface soil.

The risk-based screening evaluations for surface soil and groundwater are provided in Tables 10 and 11 in **Attachment 1**, respectively. PFAS detected in surface soil and groundwater with RSLs were detected at concentrations below their RSLs.

PFHxA was not detected in soil or groundwater at Site 6.

COPCs were not identified for surface soil, subsurface soil, or groundwater at Site 6.

2.5 Site 7

Surface soil and groundwater samples were collected at Site 7 and evaluated in this HHRS. Although subsurface soil samples were collected at this site, the samples were collected from depths greater than would likely be contacted by human receptors (greater than 15 feet bgs) and were not evaluated in the HHRS.

PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in surface soil or groundwater; therefore, a screening table is not shown for subsurface soil.

PFHxA was not detected in soil or groundwater at Site 7.

COPCs were not identified for surface soil or groundwater at Site 7.

2.6 Site 4

Subsurface soil and groundwater samples were collected at Site 4 and evaluated in this HHRS. PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in subsurface soil or groundwater; therefore, screening tables are not shown for these media.

PFHxA was not detected in soil or groundwater at Site 4.

COPCs were not identified for subsurface soil or groundwater at Site 4.

2.7 Site 5

Surface soil, subsurface soil, and groundwater samples were collected at Site 5 and evaluated in this HHRS. PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in surface soil, subsurface soil, or groundwater; therefore, screening tables are not shown for these media.

PFHxA was not detected in soil or groundwater at Site 5.

COPCs were not identified for surface soil, subsurface soil, or groundwater at Site 5.

2.8 Building 106

Surface soil, subsurface soil, and groundwater samples were collected at Building 106 and evaluated in this HHRS. PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA were not detected in subsurface soil; therefore, a screening table is not shown for this media.

The risk-based screening evaluation for surface soil is provided in Table 12 in **Attachment 1**. The one PFAS detected in surface soil with an RSL was detected at a concentration below the RSL.

PFHxA was not detected in soil and the concentration detected in groundwater was below the May 2023 RSL.

The risk-based screening and risk-ratio evaluation for groundwater is provided in Tables 13 and 13a in **Attachment 1**. The maximum detected concentration of PFOS exceeded its RSLs, and PFOS was identified as a Step 1 COPC. Based on Step 2, the cumulative target organ HI was below 0.5 (developmental HI = 0.4), and PFOS was not identified as a COPC.

COPCs were not identified for surface soil, subsurface soil, or groundwater at Building 106.

2.9 Uncertainty Assessment

The objective of the SI is to determine whether PFAS are present in groundwater and soil at potential release areas at concentrations warranting further investigation. Only a limited number of samples, typically one to five samples, targeting the most likely areas with the highest concentrations, were collected from each potential release area and included in the HHRS. Therefore, there is some uncertainty associated with the data, including whether the most contaminated area was sampled. Additionally for areas where Step 2 was performed, the maximum detected concentration was used to calculate the risk.

Subsurface soil samples were collected from 1 foot to 232 feet bgs. As discussed in **Section 1**, subsurface soil samples collected from depths greater than 15 feet bgs were not evaluated in the HHRS because a receptor (such as a construction worker) would not typically contact subsurface soil at depths greater than 15 feet bgs.

3 Human Health Risk Screening Findings

Table 14 in **Attachment 1** lists the Step 1 and Step 2 COPCs for each area and medium in each facility included in the HHRS. The following is a summary of the HHRS results for each area:

3.1 NAVSTA Everett

- Building 2114
 - PFAS were not identified as COPCs for surface soil or subsurface soil.
 - PFOS and PFHxS were identified as preliminary COPCs for groundwater.

3.2 NRS Jim Creek

- Building 6
 - PFAS were not identified as COPCs for surface soil or subsurface soil.
 - PFOS was identified as a preliminary COPC for groundwater.
- Site 1
 - PFAS were not identified as COPCs for surface soil, subsurface soil, or groundwater.
- Site 6
 - PFAS were not identified as COPCs for surface soil, subsurface soil, or groundwater.
- Site 7
 - PFAS were not identified as COPCs for surface soil or groundwater.
- Site 4
 - PFAS were not identified as COPCs for subsurface soil or groundwater.
- Site 5
 - PFAS were not identified as COPCs for surface soil, subsurface soil, or groundwater.

3.3 NRS Pacific Beach

- Building 106
 - PFAS were not identified as COPCs for surface soil, subsurface soil, or groundwater.

The HHRS identified potential unacceptable risks associated with exposure to PFAS for groundwater at one site at NAVSTA Everett (Building 2114) and one site at NRS Jim Creek (Building 6). No unacceptable risks associated with exposure to PFAS were identified for surface soil or subsurface soil at either of these sites or for any media sampled at the other PFAS areas.

4 References

Assistant Secretary of Defense (ASD). 2022. *Memorandum for Assistant Secretary of the Army, Assistant Secretary of the Navy, Assistant Secretary of the Air Force, Director, National Guard Bureau, Director, Defense Logistics Agency, Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program*. July.

Agency for Toxic Substances Disease Registry (ATSDR). 2023. Minimum Risk Levels for Hazardous Substances. <https://wwwn.cdc.gov/TSP/MRLS/mrlsListing.aspx>. April.

CH2M HILL, Inc. (CH2M). 2021. *Preliminary Assessment for Per- and Polyfluoroalkyl Substances, Naval Station Everett and Associated Special Areas, Everett, Washington*. February.

CH2M. 2022. *Sampling and Analysis Plan Site Inspection for Per- and Polyfluoroalkyl Substances, Naval Station Everett, Everett, Washington, Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington*. May.

Department of the Navy (Navy). 2018. *CNIC Naval Station Everett*.

https://www.cnmc.navy.mil/regions/cnrnw/installations/ns_everett.html. Accessed November 5, 2018.

Naval Energy and Environmental Activity (NEESA). 1990. *Preliminary Assessment Report, Naval Radio Station Jim Creek, Oso, Washington*. Final. July.

NEESA. 1991. *Preliminary Assessment Report Naval Station Puget Sound Family Housing Annexes*. December 16.

Washington State Department of Ecology (DOE). 2018. *Washington State Well Report Viewer*.

<https://fortress.wa.gov/ecy/wellconstruction/map/WCLSWebMap/default.aspx>. Accessed September 21.

United States Environmental Protection Agency (USEPA). 2022. *Regional Screening Level Summary Table*. November.

USEPA. 2023. *Regional Screening Level Summary Table*. May.

Attachment 1

Human Health Risk Screening Tables

Table 1. Summary of Available Data

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

PFAS Area	Medium	Station ID	Sample ID	Date of Sample	Analysis	Depth of Soil Sample (ft bgs) ^b	Included in HHRS?
Building 2114	Surface Soil	NSE-B2114-MW01	NSE-B2114-SS01-0001	7/26/2022	PFAS	0-0.5	Yes
		NSE-B2114-MW01	NSE-B2114-SS01P-0001 ^a	7/26/2022	PFAS	0-0.5	Yes
		NSE-B2114-MW02	NSE-B2114-SS02-0001	7/26/2022	PFAS	0-0.5	Yes
		NSE-B2114-MW03	NSE-B2114-SS03-0001	7/27/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NSE-B2114-MW01	NSE-B2114-SB01-0910	7/27/2022	PFAS	9-10	Yes
		NSE-B2114-MW02	NSE-B2114-SB02-1920	7/27/2022	PFAS	19-20	No
		NSE-B2114-MW03	NSE-B2114-SB03-1920	7/28/2022	PFAS	19-20	No
	Groundwater	NSE-B2114-MW01	NSE-B2114-GW01-0822	8/11/2022	PFAS	--	Yes
		NSE-B2114-MW01	NSE-B2114-GW01P-0822 ^a	8/11/2022	PFAS	--	Yes
		NSE-B2114-MW02	NSE-B2114-GW02-0822	8/11/2022	PFAS	--	Yes
		NSE-B2114-MW03	NSE-B2114-GW03-0822	8/11/2022	PFAS	--	Yes
Building 6	Surface Soil	NRSJC-B6-MW02	NRSJC-B6-SS02-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-B6-MW03	NRSJC-B6-SS03-000H	6/6/2022	PFAS	0-0.5	Yes
		NRSJC-B6-MW03	NRSJC-B6-SS03P-000H ^a	6/6/2022	PFAS	0-0.5	Yes
		NRSJC-B6-MW04	NRSJC-B6-SS04-000H	6/8/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRSJC-B6-MW01	NRSJC-B6-SB01-0102	6/1/2022	PFAS	1-2	Yes
		NRSJC-B6-MW01	NRSJC-B6-SB01-2930	6/2/2022	PFAS	29-30	No
		NRSJC-B6-MW02	NRSJC-B6-SB02-3637	6/3/2022	PFAS	36-37	No
		NRSJC-B6-MW03	NRSJC-B6-SB03-2930	6/7/2022	PFAS	29-30	No
		NRSJC-B6-MW04	NRSJC-B6-SB04-2728	6/9/2022	PFAS	27-28	No
		NRSJC-B6-MW04	NRSJC-B6-SB04-2930	6/9/2022	PFAS	29-30	No
	Groundwater	NRSJC-B6-MW01	NRSJC-B6-GW01-0622	6/30/2022	PFAS	--	Yes
		NRSJC-B6-MW02	NRSJC-B6-GW02-0622	6/30/2022	PFAS	--	Yes
		NRSJC-B6-MW03	NRSJC-B6-GW03-0622	6/30/2022	PFAS	--	Yes
		NRSJC-B6-MW04	NRSJC-B6-GW04-0722	7/1/2022	PFAS	--	Yes
Site 1	Surface Soil	NRSJC-S1-MW05	NRSJC-S1-SS05-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-S1-MW06	NRSJC-S1-SS06-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-S1-MW07	NRSJC-S1-SS07-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-S1-SB20	NRSJC-S1-SS20-000H	5/24/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRSJC-S1-MW05	NRSJC-S1-SB05-3H4H	6/16/2022	PFAS	3.5-4.5	Yes
		NRSJC-S1-MW06	NRSJC-S1-SB06-0708	6/20/2022	PFAS	7-8	Yes
		NRSJC-S1-MW07	NRSJC-S1-SB07-0304	6/17/2022	PFAS	3-4	Yes
		NRSJC-S1-SB20	NRSJC-S1-SB20-0203	5/24/2022	PFAS	2-3	Yes
		NRSJC-S1-SB20	NRSJC-S1-SB20P-0203 ^a	5/24/2022	PFAS	2-3	Yes
		NRSJC-S1-MW06	NRSJC-S1-SB06-2526	6/21/2022	PFAS	25-26	No
	Groundwater	NRSJC-S1-MW05	NRSJC-S1-GW05-0722	7/11/2022	PFAS	--	Yes
		NRSJC-S1-MW06	NRSJC-S1-GW06-0722	7/11/2022	PFAS	--	Yes
		NRSJC-S1-MW07	NRSJC-S1-GW07-0722	7/12/2022	PFAS	--	Yes
		NRSJC-S1-MW07	NRSJC-S1-GW07P-0722 ^a	7/12/2022	PFAS	--	Yes
Site 6	Surface Soil	NRSJC-S6-MW08	NRSJC-S6-SS08-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-S6-MW09	NRSJC-S6-SS09-000H	5/24/2022	PFAS	0-0.5	Yes
		NRSJC-S6-MW10	NRSJC-S6-SS10-000H	5/24/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRSJC-S6-MW08	NRSJC-S6-SB08-3H04	6/15/2022	PFAS	3.5-4	Yes
		NRSJC-S6-MW09	NRSJC-S6-SB09-3H05	6/15/2022	PFAS	3.5-5	Yes
		NRSJC-S6-MW10	NRSJC-S6-SB10-1415	6/10/2022	PFAS	14-15	Yes
		NRSJC-S6-MW10	NRSJC-S6-SB10P-1415 ^a	6/10/2022	PFAS	14-15	Yes
	Groundwater	NRSJC-S6-MW08	NRSJC-S6-GW08-0722	7/13/2022	PFAS	--	Yes
		NRSJC-S6-MW09	NRSJC-S6-GW09-0722	7/12/2022	PFAS	--	Yes
		NRSJC-S6-MW09	NRSJC-S6-GW09P-0722 ^a	7/12/2022	PFAS	--	Yes
		NRSJC-S6-MW10	NRSJC-S6-GW10-0722	7/13/2022	PFAS	--	Yes

Table 1. Summary of Available Data

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

PFAS Area	Medium	Station ID	Sample ID	Date of Sample	Analysis	Depth of Soil Sample (ft bgs) ^b	Included in HHRS?
Site 7	Surface Soil	NRSJC-S7-MW11	NRSJC-S7-SS11-000H	11/1/2022	PFAS	0-0.5	Yes
		NRSJC-S7-MW11	NRSJC-S7-SS11P-000H ^a	11/1/2022	PFAS	0-0.5	Yes
		NRSJC-S7-MW12	NRSJC-S7-SS12-000H	10/7/2022	PFAS	0-0.5	Yes
		NRSJC-S7-MW13	NRSJC-S7-SS13-000H	5/24/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRSJC-S7-MW11	NRSJC-S7-SB11-42H43H	11/1/2022	PFAS	42.5-43.5	No
		NRSJC-S7-MW11	NRSJC-S7-SB11-9394	11/1/2022	PFAS	93-94	No
		NRSJC-S7-MW11	NRSJC-S7-SB11-146147	11/2/2022	PFAS	146-147	No
		NRSJC-S7-MW11	NRSJC-S7-SB11-191192	11/2/2022	PFAS	191-192	No
		NRSJC-S7-MW11	NRSJC-S7-SB11-231232	11/3/2022	PFAS	231-232	No
		NRSJC-S7-MW12	NRSJC-S7-SB12-145146	10/5/2022	PFAS	145-146	No
		NRSJC-S7-MW12	NRSJC-S7-SB12-174175	10/6/2022	PFAS	174-175	No
		NRSJC-S7-MW12	NRSJC-S7-SB12-210211	10/6/2022	PFAS	210-211	No
		NRSJC-S7-MW12	NRSJC-S7-SB12-229230	10/10/2022	PFAS	229-230	No
		NRSJC-S7-MW12	NRSJC-S7-SB12-9697	10/5/2022	PFAS	96-97	No
		NRSJC-S7-MW13	NRSJC-S7-SB13-128129	10/25/2022	PFAS	128-129	No
		NRSJC-S7-MW13	NRSJC-S7-SB13-177178	10/25/2022	PFAS	177-178	No
		NRSJC-S7-MW13	NRSJC-S7-SB13-215216	10/27/2022	PFAS	215-216	No
		NRSJC-S7-MW13	NRSJC-S7-SB13P-215216 ^a	10/27/2022	PFAS	215-216	No
		NRSJC-S7-MW13	NRSJC-S7-SB13-3839	10/13/2022	PFAS	38-39	No
		NRSJC-S7-MW13	NRSJC-S7-SB13-8485	10/14/2022	PFAS	84-85	No
	Groundwater	NRSJC-S7-MW11	NRSJC-S7-GW11-1122	11/9/2022	PFAS	--	Yes
		NRSJC-S7-MW11	NRSJC-S7-GW11P-1122 ^a	11/9/2022	PFAS	--	Yes
		NRSJC-S7-MW12	NRSJC-S7-GW12A-1122	11/10/2022	PFAS	--	Yes
Site 4	No surface soil samples						
	Subsurface Soil	NRSJC-S4-MW14	NRSJC-S4-SB14-0203	6/29/2022	PFAS	2-3	Yes
		NRSJC-S4-MW14	NRSJC-S4-SB14-1718	6/29/2022	PFAS	17-18	No
		NRSJC-S4-MW15	NRSJC-S4-SB15-1617	6/30/2022	PFAS	16-17	No
	Groundwater	NRSJC-S4-MW14	NRSJC-S4-GW14-0722	7/13/2022	PFAS	--	Yes
		NRSJC-S4-MW14	NRSJC-S4-GW14P-0722 ^a	7/13/2022	PFAS	--	Yes
		NRSJC-S4-MW15	NRSJC-S4-GW15-0722	7/13/2022	PFAS	--	Yes
Site 5	Surface Soil	NRSJC-S5-MW16	NRSJC-S5-SS16-000H	5/25/2022	PFAS	0-0.5	Yes
		NRSJC-S5-MW18	NRSJC-S5-SS18-000H	5/25/2022	PFAS	0-0.5	Yes
		NRSJC-S5-MW19	NRSJC-S5-SS19-000H	5/25/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRSJC-S5-MW18	NRSJC-S5-SB18-0708	6/22/2022	PFAS	7-8	Yes
		NRSJC-S5-MW19	NRSJC-S5-SB19-1011	6/23/2022	PFAS	10-11	Yes
		NRSJC-S5-MW16	NRSJC-S5-SB16-1314	6/27/2022	PFAS	13-14	Yes
		NRSJC-S5-MW18	NRSJC-S5-SB18-1415	6/22/2022	PFAS	14-15	Yes
		NRSJC-S5-MW18	NRSJC-S5-SB18P-1415 ^a	6/22/2022	PFAS	14-15	Yes
	Groundwater	NRSJC-S5-MW16	NRSJC-S5-GW16-0722	7/12/2022	PFAS	--	Yes
		NRSJC-S5-MW16	NRSJC-S5-GW16P-0722 ^a	7/12/2022	PFAS	--	Yes
		NRSJC-S5-MW18	NRSJC-S5-GW18-0722	7/13/2022	PFAS	--	Yes
		NRSJC-S5-MW19	NRSJC-S5-GW19-0722	7/12/2022	PFAS	--	Yes

Table 1. Summary of Available Data*Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington**Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington*

PFAS Area	Medium	Station ID	Sample ID	Date of Sample	Analysis	Depth of Soil Sample (ft bgs) ^b	Included in HHRS?
Building 106	Surface Soil	NRCPB-B106-MW01	NRCPB-B106-SS01-0001	8/3/2022	PFAS	0-0.5	Yes
		NRCPB-B106-MW01	NRCPB-B106-SS01P-0001 ^a	8/3/2022	PFAS	0-0.5	Yes
		NRCPB-B106-MW02	NRCPB-B106-SS02-0001	8/3/2022	PFAS	0-0.5	Yes
		NRCPB-B106-MW03	NRCPB-B106-SS03-0001	8/8/2022	PFAS	0-0.5	Yes
	Subsurface Soil	NRCPB-B106-MW02	NRCPB-B106-SB02-0910	8/4/2022	PFAS	9-10	Yes
		NRCPB-B106-MW03	NRCPB-B106-SB03-0506	8/8/2022	PFAS	5-6	Yes
		NRCPB-B106-MW01	NRCPB-B106-SB01-1314	8/3/2022	PFAS	13-14	Yes
	Groundwater	NRCPB-B106-MW01	NRCPB-B106-GW01-0822	8/9/2022	PFAS	--	Yes
		NRCPB-B106-MW01	NRCPB-B106-GW01P-0822 ^a	8/9/2022	PFAS	--	Yes
		NRCPB-B106-MW02	NRCPB-B106-GW02-0822	8/9/2022	PFAS	--	Yes
		NRCPB-B106-MW03	NRCPB-B106-GW03-0822	8/10/2022	PFAS	--	Yes

^a Duplicate of sample listed above^b Included subsurface soil samples up to 15 ft bgs in the HHRS.

-- = Not applicable/Not available

ft bgs = feet below ground surface

HHRS = Human health risk screening

PFAS = Per- and polyfluoroalkyl substances

Table 2. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection [5]
Building 2114	335-67-1	Perfluorooctanoic acid (PFOA)	3.5E-01 J	3.5E-01 J	NG/G	NSE-B2114-SS02-0001	1/3	0.5 - 0.501	3.5E-01	N/A	1.9E+01 N	N/A	N/A	NO	BSL
	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	4.0E-01 J	3.5E+01	NG/G	NSE-B2114-SS01-0001	3/3	0.5 - 0.501	3.5E+01	N/A	1.3E+01 N	N/A	N/A	YES	ASL
	375-95-1	Perfluorononanoic acid (PFNA)	2.4E-01 J	2.4E-01 J	NG/G	NSE-B2114-SS02-0001	1/3	0.5 - 0.501	2.4E-01	N/A	1.9E+01 N	N/A	N/A	NO	BSL
	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	9.8E-01 J	2.8E+00	NG/G	NSE-B2114-SS01-0001	2/3	0.5 - 0.501	2.8E+00	N/A	1.3E+02 N	N/A	N/A	NO	BSL

[1]
[2]
[3]
[4]
[5]

Minimum/Maximum detected concentrations.
Maximum concentration is used for screening.
Background values not available.
Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil.
RSLs based on non-cancer (N) based on HQ = 0.1.
Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered
COPC = Chemical of Potential Concern
J = Estimated Value
N = Noncarcinogenic
NG/G = Nanograms per gram
N/A = Not available
RSL = Regional Screening Level

Table 2a. Risk Ratio Screening, Maximum Detected Concentration, Surface Soil - Building 2114

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Analyte	Detection Frequency	Maximum Detected Concentration (Qualifier) (NG/G)	Sample Location of Maximum Detected Concentration	Carcinogenic Residential Soil RSL (NG/G)	Target Risk Level of RSL	Cancer Risk ^a	Non-carcinogenic Residential Soil RSL (NG/G)	Target HQ of RSL	HQ ^b	Target Organ
Perfluorooctane Sulfonate (PFOS)	3 / 3	3.5E+01	NSE-B2114-SS01-0001	N/A	N/A	N/A	1.3E+02	1	0.27	Developmental
Cumulative Hazard Index ^c									0.3	
Cumulative Cancer Risk ^d						N/A				
Total Developmental HI =										0.3

Notes:

Chemical selected as COPC if it significantly contributes to a target organ HI greater than 0.5 or a cumulative cancer risk greater than 5E-05.

Chemicals selected as COPCs are indicated by bold and shading.

^a Cancer Risk equals maximum detected concentration divided by the RSL divided by the target risk level of RSL.

^b HQ equals maximum detected concentration divided by the RSL divided by the target HQ of RSL.

^c Cumulative Hazard Index equals sum of HQ for each chemical.

^d Cumulative Cancer Risk equals sum of Cancer Risks for each chemical.

COPC = Constituent of Potential Concern

N/A = Not available/not applicable

NG/G = Nanograms per gram

HI = Hazard Index

HQ = Hazard Quotient

RSL = Regional Screening Level

Table 3. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 2114	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	6.4E-01 J	6.4E-01 J	NG/G	NSE-B2114-SB01-0910	1/1	0.498 - 0.501	6.4E-01	N/A	1.3E+01 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 4. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection [5]
Building 2114	375-73-5	Perfluorobutanesulfonic acid (PFBS)	8.0E+00	1.4E+01	NG/L	NSE-B2114-GW02-0822	3/3	2.41 - 2.64	1.4E+01	N/A	6.0E+02 N	N/A	N/A	NO	BSL
	335-67-1	Perfluorooctanoic acid (PFOA)	5.2E+00	1.3E+01	NG/L	NSE-B2114-GW02-0822	3/3	2.41 - 2.64	1.3E+01	N/A	6.0E+00 N	N/A	N/A	YES	ASL
	1763-23-1	Perfluorooctane Sulfonate (PFOS)	3.3E+00 J	5.2E+02	NG/L	NSE-B2114-GW01P-0822	3/3	2.41 - 2.64	5.2E+02	N/A	4.0E+00 N	N/A	N/A	YES	ASL
	375-95-1	Perfluorononanoic acid (PFNA)	8.7E-01 J	2.2E+00 J	NG/L	NSE-B2114-GW01P-0822	2/3	2.41 - 2.64	2.2E+00	N/A	5.9E+00 N	N/A	N/A	NO	BSL
	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	4.3E+00 J	2.2E+02	NG/L	NSE-B2114-GW01P-0822	3/3	2.41 - 2.64	2.2E+02	N/A	3.9E+01 N	N/A	N/A	YES	ASL

[1]

Minimum/Maximum detected concentrations.

[2]

Maximum concentration is used for screening.

[3]

Background values not available.

[4]

Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5]

Rationale Codes

Selection Reason:

Above Screening Levels (ASL)

Deletion Reason:

Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/L = Nanograms per liter

RSL = Regional Screening Level

Table 4a. Risk Ratio Screening, Maximum Detected Concentration, Groundwater - Building 2114

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Chemical	Detection Frequency	Maximum Detected Concentration (Qualifier) (NG/L)	Sample Location of Maximum Detected Concentration	Carcinogenic Tap Water RSL (NG/L)	Target Risk Level of RSL	Cancer Risk ^a	Non-carcinogenic Tap Water RSL (NG/L)	Target HQ of RSL	HQ ^b	Critical Effect
Perfluorooctanoic acid (PFOA)	3 / 3	1.3E+01	NSE-B2114-GW02-0822	1.1E+03	1E-06	1.2E-08	6.0E+01	1	0.22	Developmental
Perfluorooctane Sulfonate (PFOS)	3 / 3	5.2E+02	NSE-B2114-GW01P-0822	N/A	N/A	N/A	4.0E+01	1	13	Developmental
Perfluorohexanesulfonic acid (PFHxS)	3 / 3	2.2E+02	NSE-B2114-GW01P-0822	N/A	N/A	N/A	3.9E+02	1	0.57	Endocrine
Cumulative Hazard Index ^c									14	
Cumulative Cancer Risk ^d						1E-08				
Total Developmental HI =										13
Total Endocrine HI =										0.6

Notes:

Chemical selected as COPC if it significantly contributes to a target organ HI greater than 0.5 or a cumulative cancer risk greater than 5E-05.

Chemicals selected as COPCs are indicated by bold and shading.

^a Cancer Risk equals maximum detected concentration divided by the RSL divided by the target risk level of RSL.

^b HQ equals maximum detected concentration divided by the RSL divided by the target HQ of RSL.

^c Cumulative Hazard Index equals sum of HQ for each chemical.

^d Cumulative Cancer Risk equals sum of Cancer Risks for each chemical.

COPC = Chemical of Potential Concern

HI = Hazard Index

HQ = Hazard Quotient

N/A = Not available/not applicable

NG/L = Nanograms per liter

RSL = Regional Screening Level

Table 5. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 6	375-73-5	Perfluorobutanesulfonic acid (PFBS)	3.6E-01 J	3.6E-01 J	NG/G	NRSJC-B6-SS04-000H	1/3	0.499 - 0.502	3.6E-01	N/A	1.9E+03 N	N/A	N/A	NO	BSL
	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	3.1E-01 J	3.6E-01 J	NG/G	NRSJC-B6-SS04-000H	2/3	0.499 - 0.502	3.6E-01	N/A	1.3E+01 N	N/A	N/A	NO	BSL
	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2.6E+00	2.6E+00	NG/G	NRSJC-B6-SS04-000H	1/3	0.499 - 0.502	2.6E+00	N/A	1.3E+02 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 6. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 6	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	7.5E-01 J	7.5E-01 J	NG/G	NRSJC-B6-SB01-0102	1/1	0.501 - 0.501	7.5E-01	N/A	1.3E+02 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil. RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason:

Deletion Reason:

Above Screening Levels (ASL)

Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 7. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 6	375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.0E+00 J	1.7E+01	NG/L	NRSJC-B6-GW03-0622	4/4	2.21 - 2.4	1.7E+01	N/A	6.0E+02 N	N/A	N/A	NO	BSL
	335-67-1	Perfluorooctanoic acid (PFOA)	1.3E+00 J	3.0E+00 J	NG/L	NRSJC-B6-GW03-0622	4/4	2.21 - 2.4	3.0E+00	N/A	6.0E+00 N	N/A	N/A	NO	BSL
	1763-23-1	Perfluorooctane Sulfonate (PFOS)	4.2E+00 J	6.1E+01	NG/L	NRSJC-B6-GW04-0722	4/4	2.21 - 2.4	6.1E+01	N/A	4.0E+00 N	N/A	N/A	YES	ASL
	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.5E+00 J	1.5E+02	NG/L	NRSJC-B6-GW03-0622	4/4	2.21 - 2.4	1.5E+02	N/A	3.9E+01 N	N/A	N/A	YES	ASL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/L = Nanograms per liter

RSL = Regional Screening Level

Table 7a. Risk Ratio Screening, Maximum Detected Concentration, Groundwater - Building 6

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Chemical	Detection Frequency	Maximum Detected Concentration (Qualifier) (NG/L)	Sample Location of Maximum Detected Concentration	Carcinogenic Tap Water RSL (NG/L)	Target Risk Level of RSL	Cancer Risk ^a	Non-carcinogenic Tap Water RSL (NG/L)	Target HQ of RSL	HQ ^b	Critical Effect
Perfluorooctane Sulfonate (PFOS)	4 / 4	6.1E+01	NRSJC-B6-GW04-0722	N/A	N/A	N/A	4.0E+01	1	1.5	Developmental
Perfluorohexanesulfonic acid (PFHxS)	4 / 4	1.5E+02	NRSJC-B6-GW03-0622	N/A	N/A	N/A	3.9E+02	1	0.39	Endocrine
Cumulative Hazard Index ^c									2	
Cumulative Cancer Risk ^d						0E+00				
Total Developmental HI =										2
Total Endocrine HI =										0.4

Notes:

Chemical selected as COPC if it significantly contributes to a target organ HI greater than 0.5 or a cumulative cancer risk greater than 5E-05.

Chemicals selected as COPCs are indicated by bold and shading.

^a Cancer Risk equals maximum detected concentration divided by the RSL divided by the target risk level of RSL.

^b HQ equals maximum detected concentration divided by the RSL divided by the target HQ of RSL.

^c Cumulative Hazard Index equals sum of HQ for each chemical.

^d Cumulative Cancer Risk equals sum of Cancer Risks for each chemical.

COPC = Chemical of Potential Concern

HI = Hazard Index

HQ = Hazard Quotient

N/A = Not available/not applicable

NG/L = Nanograms per liter

RSL = Regional Screening Level

Table 8. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Site 1	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	2.2E-01 J	2.2E-01 J	NG/G	NRSJC-S1-SS06-000H	1/4	0.499 - 0.513	2.2E-01	N/A	1.3E+01 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil. RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 9. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Site 1	375-73-5 335-67-1	Perfluorobutanesulfonic acid (PFBS)	1.3E+00 J	1.3E+00 J	NG/L	NRSJC-S1-GW05-0722	1/3	2.27 - 2.31	1.3E+00	N/A	6.0E+02 N	N/A	N/A	NO	BSL
		Perfluorooctanoic acid (PFOA)	1.1E+00 J	2.2E+00 J	NG/L	NRSJC-S1-GW05-0722	2/3	2.27 - 2.31	2.2E+00	N/A	6.0E+00 N	N/A	N/A	NO	BSL

- [1]

Minimum/Maximum detected concentrations.
- [2]

Maximum concentration is used for screening.
- [3]

Background values not available.
- [4]

Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water.
RSLs based on non-cancer (N) based on HQ = 0.1.
- [5]

Rationale Codes

Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered
COPC = Chemical of Potential Concern
J = Estimated Value
N = Noncarcinogenic
N/A = Not available
NG/G = Nanograms per gram
RSL = Regional Screening Level

Table 10. Occurrence, Distribution and Selection of Chemicals of Potential Concern

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Current

Medium: Soil

Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Site 6	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	2.8E-01 J	2.8E-01 J	NG/G	NRSJC-S6-SS09-000H	1/3	0.497 - 0.501	2.8E-01	N/A	1.3E+01 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 11. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Site 6	335-67-1	Perfluorooctanoic acid (PFOA)	1.2E+00 J	1.2E+00 J	NG/L	NRSJC-S6-GW09P-0722	1/3	2.16 - 2.43	1.2E+00	N/A	6.0E+00 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water. RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 12. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 106	1763-23-1	Perfluorooctane sulfonic acid (PFOS)	2.6E-01 J	6.2E-01 J	NG/G	NRCPB-B106-SS03-0001	2/3	0.498 - 0.502	6.2E-01	N/A	1.3E+01 N	N/A	N/A	NO	BSL

[1]

Minimum/Maximum detected concentrations.

[2]

Maximum concentration is used for screening.

[3]

Background values not available.

[4]

Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Resident Soil.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5]

Rationale Codes

Selection Reason:

Above Screening Levels (ASL)

Deletion Reason:

Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 13. Occurrence, Distribution and Selection of Chemicals of Potential Concern
Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington
Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	CAS Number	Chemical	Minimum [1] Concentration Qualifier	Maximum [1] Concentration Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
Building 106	335-67-1	Perfluorooctanoic acid (PFOA)	2.1E+00 J	3.6E+00 J	NG/L	NRCPB-B106-GW01-0822	2/3	2.46 - 2.71	3.6E+00	N/A	6.0E+00 N	N/A	N/A	NO	BSL
	1763-23-1	Perfluorooctane Sulfonate (PFOS)	2.9E+00 J	1.4E+01	NG/L	NRCPB-B106-GW03-0822	3/3	2.46 - 2.71	1.4E+01	N/A	4.0E+00 N	N/A	N/A	YES	ASL
	355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2.4E+00 J	3.7E+00 J	NG/L	NRCPB-B106-GW01-0822	2/3	2.46 - 2.71	3.7E+00	N/A	3.9E+01 N	N/A	N/A	NO	BSL

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Background values not available.

[4] Oak Ridge National Laboratory (ORNL). November, 2022. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Tap Water.
RSLs based on non-cancer (N) based on HQ = 0.1.

[5] Rationale Codes

Selection Reason:

Above Screening Levels (ASL)

Deletion Reason:

Below Screening Level (BSL)

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

COPC = Chemical of Potential Concern

J = Estimated Value

N = Noncarcinogenic

N/A = Not available

NG/G = Nanograms per gram

RSL = Regional Screening Level

Table 13a. Risk Ratio Screening, Maximum Detected Concentration, Groundwater - Building 106

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

Chemical	Detection Frequency	Maximum Detected Concentration (Qualifier) (NG/L)	Sample Location of Maximum Detected Concentration	Carcinogenic Tap Water RSL (NG/L)	Target Risk Level of RSL	Cancer Risk ^a	Non-carcinogenic Tap Water RSL (NG/L)	Target HQ of RSL	HQ ^b	Critical Effect
Perfluorooctane Sulfonate (PFOS)	3 / 3	1.4E+01	NRCPB-B106-GW03-0822	N/A	N/A	N/A	4.0E+01	1	0.35	Developmental
Cumulative Hazard Index ^c									0.4	
Cumulative Cancer Risk ^d						N/A				
Total Developmental HI =										0.4

Notes:

Chemical selected as COPC if it significantly contributes to a target organ HI greater than 0.5 or a cumulative cancer risk greater than 5E-05.

Chemicals selected as COPCs are indicated by bold and shading.

^a Cancer Risk equals maximum detected concentration divided by the RSL divided by the target risk level of RSL.

^b HQ equals maximum detected concentration divided by the RSL divided by the target HQ of RSL.

^c Cumulative Hazard Index equals sum of HQ for each chemical.

^d Cumulative Cancer Risk equals sum of Cancer Risks for each chemical.

COPC = Chemical of Potential Concern

HI = Hazard Index

HQ = Hazard Quotient

N/A = Not available/not applicable

NG/L = Nanograms per liter

RSL = Regional Screening Level

Table 14. Summary of Human Health Risk Screening Results

Site Inspection Report for Per- and Polyfluoroalkyl Substances at Naval Station Everett, Everett, Washington

Naval Radio Station Jim Creek, Arlington, Washington, and Naval Recreation Complex Pacific Beach, Pacific Beach, Washington

PFAS Area	Medium	Step 1 COPC	Step 2 COPC
Building 2114			
	Surface Soil	PFOS	None
	Subsurface Soil	None	--
	Groundwater	PFOA, PFOS, PFHxS	PFOS, PFHxS
Building 6			
	Surface Soil	None	--
	Subsurface Soil	None	--
	Groundwater	PFOS, PFHxS	PFOS
Site 1			
	Surface Soil	None	--
	Subsurface Soil	None (a)	--
	Groundwater	None	--
Site 6			
	Surface Soil	None	--
	Subsurface Soil	None (a)	--
	Groundwater	None	--
Site 7			
	Surface Soil	None (a)	--
	Subsurface Soil	NA (no subsurface soil samples collected below 12 feet bgs)	--
	Groundwater	None (a)	--
Site 4			
	Surface Soil	N/A (no surface soil samples collected from this area)	
	Subsurface Soil	None (a)	--
	Groundwater	None (a)	--
Site 5			
	Surface Soil	None (a)	--
	Subsurface Soil	None (a)	--
	Groundwater	None (a)	--
Building 106			
	Surface Soil	None	--
	Subsurface Soil	None (a)	--
	Groundwater	PFOS	None

Notes:

(a) = No detections of PFBS, PFOA, PFOS, PFNA, PFHxS, or HFPO-DA, therefore, no screening table is shown.

-- = The step was not performed because there were no COPCs in previous step.

bgs = below ground surface

COPC = Chemical of potential concern

N/A = Not applicable/not available

PFAS = Per- and polyfluoroalkyl substances

PFOS = Perfluorooctane sulfonate

PFOA = Perfluorooctanoic acid

PFBS = Perfluorobutane sulfonate

PFNA = Perfluorononanoic acid

PFHxS = Perfluorohexanesulfonic acid

HFPO-DA = Hexafluoropropylene oxide dimer acid