Mr. Daniel Lanners
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7014

Arcadis of New York, Inc.
855 Route 146
Suite 210
Clifton Park
New York 12065
Tel 518 250 7300
Fax 518 250 7301
www.arcadis.com

Subject:

Emerging Contaminant Groundwater Sampling Results

Orange and Rockland Utilities, Inc.
Port Jervis Former MGP Site
City of Port Jervis, Orange County, New York
NYSDEC Site No. 336049

ENVIRONMENT

Date:
August 6, 2019

Contact:
Mark Flusche

Phone:
518.250.7322

Email:
Mark.flusche@arcadis.com

Our ref:

B0043021.0020

Dear Mr. Lanners:

On behalf of Orange and Rockland Utilities, Inc. (O&R), Arcadis of New York, Inc. (Arcadis) has prepared this letter to summarize the work performed and findings of a per- and polyfluoroalkyl substance (PFAS) and 1,4-dioxane (i.e., emerging contaminants) groundwater investigation at the O&R former manufactured gas plant (MGP) site located in the City of Port Jervis, Orange County, New York, (New York State Department of Environmental Conservation [NYSDEC] Site No. 336049). The groundwater investigation was performed in response to the NYSDEC's request in a May 30, 2018 letter.

As summarized herein, PFAS compounds were detected at low-level concentrations in groundwater samples collected from three monitoring wells. 1,4-dioxane was not detected in any of the groundwater samples. An overview of the groundwater sampling is presented below, followed by a summary of the groundwater investigation activities and the analytical results.

GROUNDWATER SAMPLING OVERVIEW

The following three monitoring wells, shown on the attached Figure 1, were selected for emerging contaminant sampling:

- MW-6 (upgradient monitoring well);
- MW-29 (monitoring well located in a central location of the site); and
- MW-24 (downgradient monitoring well).

The above-listed monitoring wells represent an upgradient well located closest to the upgradient site boundary (MW-6), a well located in the center of the dissolved-phase benzene, toluene, ethylbenzene, and xylene (BTEX) and polyaromatic hydrocarbon (PAH) plume (MW-29), and a downgradient well located closest to the downgradient site boundary and downgradient of the central well selected for sampling (MW-24). The three selected wells are all located near the axis of the dissolved-phase BTEX and PAH plume and do not contain MGP source material.

The emerging contaminant groundwater samples were collected on May 20, 2019 and analyzed in accordance with the following documents:

- The NYSDEC-approved July 6, 2018 *Emerging Contaminant Groundwater Sampling Work Plan* for Con Edison and O&R MGP Sites (i.e., Work Plan) prepared by GEI Consultants, Inc., (GEI).
- NYSDEC's *Groundwater Sampling for Emerging Contaminants* guidance document.
- Updated Emerging Contaminants Sampling Schedule submitted to NYSDEC on February 20, 2019.

GROUNDWATER SAMPLING ACTIVITIES

Arcadis collected groundwater samples for PFAS and 1,4-dioxane analysis from monitoring wells MW-6, MW-24, and MW-29 on May 20, 2019. Quality assurance/quality control (QA/QC) samples, consisting of a field duplicate, a matrix spike, matrix spike duplicate sample, and an equipment blank were also collected. The equipment blank was collected by pumping laboratory-supplied "PFAS-free" water through high-density polyethylene (HDPE) tubing using a peristaltic pump with silicone tubing. The matrix spike, matrix spike duplicate, and the duplicate samples were collected from MW-24.

Groundwater purging and sampling was performed using the low-flow techniques presented in the Work Plan. A peristaltic pump and HDPE tubing (separate disposable tubing for each well) were used to purge and sample groundwater from each monitoring well. Field parameters measured during purging and immediately prior to sampling are presented on the groundwater sampling logs included in Attachment A.

Each groundwater sample was placed in two laboratory-provided, pre-cleaned 250-ml HDPE bottles for PFAS analysis and two 1-liter amber glass bottles for 1,4-dioxane analysis. The PFAS samples were then placed in a dedicated PFAS cooler on ice and the 1,4-dioxane samples were placed in a separate dedicated 1,4-dioxane cooler on ice. The water level probe was decontaminated between each well using Alconox® and a "PFAS-free" water rinse. Arcadis submitted seven samples (including QA/QC samples) to Eurofins TestAmerica (TestAmerica) for laboratory analysis of the 21 PFAS compounds listed in NYSDEC's *Groundwater Sampling for Emerging Contaminants guidance document* by U.S. Environmental Protection Agency (EPA) Method 537 and 1,4-dioxane by EPA Method SIM 8270D.

Purge water and disposable sampling equipment were containerized into two separate 55-gallon drums for subsequent off-site disposal. The drums were picked up on July 9, 2019 by IWT Transport Inc. for non-hazardous waste disposal by Clean Earth of North Jersey, Inc. The waste manifest is included in Attachment B.

GROUNDWATER SAMPLING RESULTS

Arcadis validated the groundwater analytical results and found the results to be useable as reported. The laboratory analytical data report and data validation report are provided in Attachments C and D, respectively. As shown in the laboratory data package in Attachment C, PFAS compounds and 1,4-dioxane were not detected in the equipment blank and the duplicate result correlations were acceptable. The validated PFAS and 1,4-dioxane groundwater analytical results are presented in Table 1 and on Figure 1.

As shown in Table 1, 1,4-dioxane was not detected in the groundwater samples. PFAS compounds were detected at low-level concentrations in groundwater sampled from the three wells. The perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) analytical results are summarized by location below:

Well ID	NYSDOH Proposed Drinking Water Standard (ng/L)	PFOA Concentration (ng/L)	PFOS Concentration (ng/L)
MW-6	10	20	7.7
MW-24	10	11 [11]	9 U [14 J]
MW-29	10	21	18 J

Note:

1. ng/L: nanograms per liter
2. J: Estimated value.
3. U: Not detected. Reporting limit shown.
4. Concentration in brackets is from the analysis of a duplicate sample.

The state of New York does not currently have standards for PFAS compounds in drinking water or groundwater. However, the New York State Department of Health (NYSDOH) has proposed to set the drinking water standard for both PFOA and PFOS at 10 nanograms per liter (ng/L). The PFOA concentrations were slightly greater than the proposed drinking water standard at each of the three monitoring wells. PFOS was detected at estimated concentrations slightly greater than the proposed drinking water standard at two of the monitoring wells. There are currently no proposed standards in New York State for other PFAS compounds.

Due to the presence of PFOA and PFOS in groundwater collected from upgradient well MW-6, the PFAS compounds detected in groundwater collected from the site appear to be from an upgradient source or are representative of background concentrations.

Please do not hesitate to call me at 518-250-7322 or Maribeth McCormick of O&R at (914) 557-1361 if you have any questions or require additional information.

Sincerely,

Arcadis of New York, Inc.

Mark Flusche, P.G.

Senior Hydrogeologist

Copies:
Amen Omorogbe (NYSDEC)
Maribeth McCormick (O&R)

Enclosures:

Table

1 Emerging Contaminant Analytical Results

Figure

1 Monitoring Well Locations

Attachments

A Groundwater Sampling Logs

B Non-Hazardous Waste Manifest

C Laboratory Analytical Results

D Data Validation Report

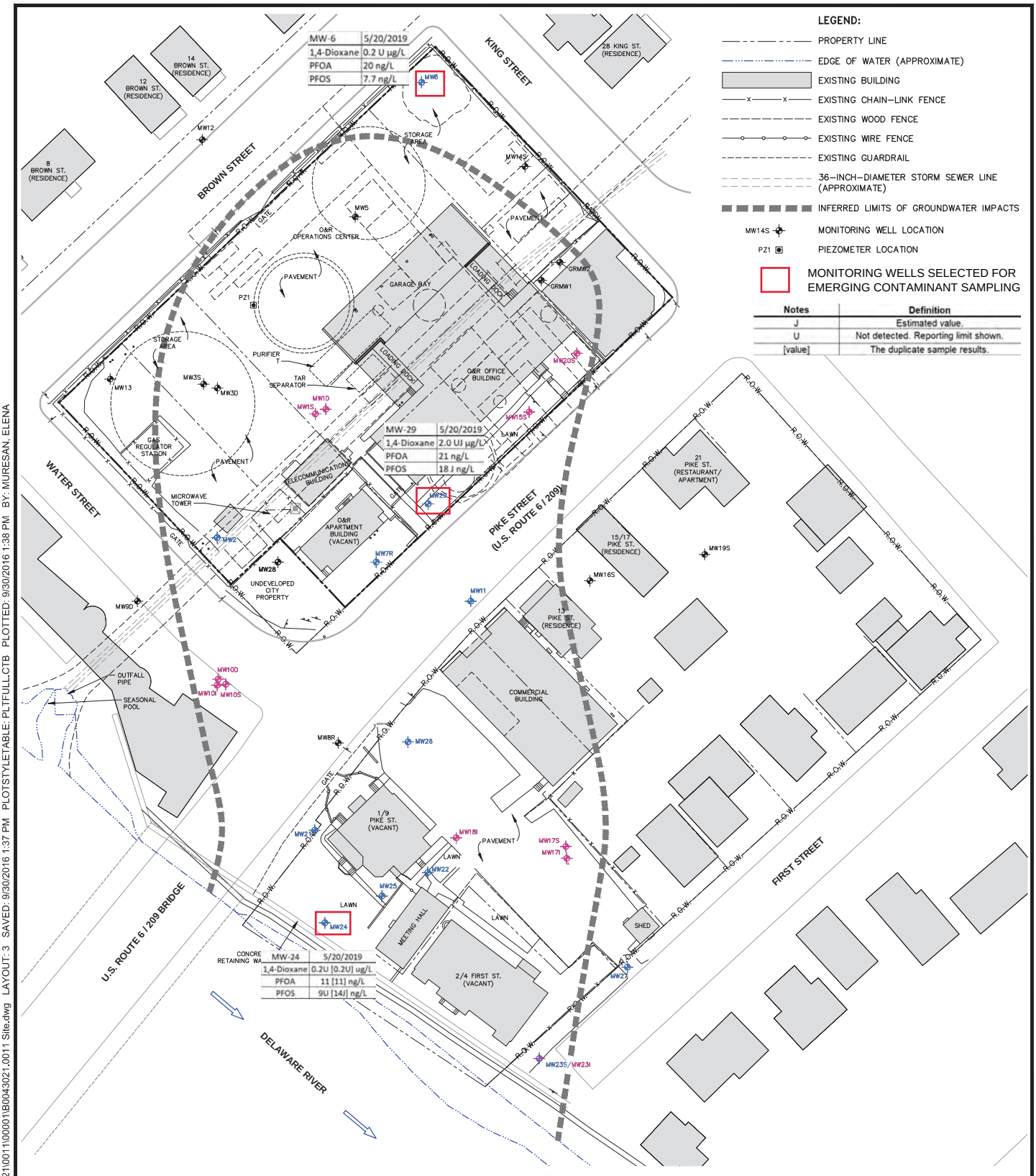
TABLES

Table 1
Emerging Contaminant Groundwater Analytical Results
Orange and Rockland Utilities Former MGP Site
Port Jervis, New York

Location ID: / Date Collected: / Sample Name:	Units	MW-6 05/20/19 MW-6-20190520	MW-24 05/20/19 MW-24-20190520	MW-29 05/20/19 MW-29-20190520
Semivolatile Organics				
1,4-Dioxane	ug/L	0.2 U	0.2 U [0.2 U]	2 UJ
PFAS compounds				
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ng/L	18 U	90 UJ [90 UJ]	85 U
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ng/L	18 U	90 UJ [90 UJ]	85 U
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ng/L	18 UJ	90 UJ [90 UJ]	85 U
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ng/L	18 UJ	90 UJ [90 UJ]	85 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	6.8	9.6 J [7.3 J]	24
Perfluorobutanoic acid (PFBA)	ng/L	24 J	37 J [24 J]	8.5 UJ
Perfluorodecanesulfonic acid (PFDS)	ng/L	1.8 U	9 U [9 U]	8.5 U
Perfluorodecanoic acid (PFDA)	ng/L	1.8 U	9 U [9 U]	8.5 U
Perfluorododecanoic acid (PFDoA)	ng/L	1.8 U	9 U [9 UJ]	8.5 U
Perfluoroheptanesulfonic Acid (PFHpS)	ng/L	1.8 U	9 U [9 U]	8.5 U
Perfluoroheptanoic acid (PFHpA)	ng/L	11	5.6 J [6.2 J]	5.6 J
Perfluorohexanesulfonic acid (PFHxS)	ng/L	4.3	9.1 J [9 J]	15 J
Perfluorohexanoic acid (PFHxA)	ng/L	93	13 [16]	15 J
Perfluorononanoic acid (PFNA)	ng/L	1.8 U	9 U [9 U]	8.5 U
Perfluorooctanesulfonamide (PFOSA)	ng/L	1.8 UJ	9 U [9 U]	8.5 U
Perfluorooctanesulfonic acid (PFOS)	ng/L	7.7	9 U [14 J]	18 J
Perfluorooctanoic acid (PFOA)	ng/L	20	11 [11]	21
Perfluoropentanoic acid (PFPeA)	ng/L	75 J	8 J [17 J]	8.5 UJ
Perfluorotetradecanoic acid (PFTeA)	ng/L	1.8 UJ	9 UJ [9 UJ]	8.5 U
Perfluorotridecanoic acid (PFTriA)	ng/L	1.8 U	9 U [9 U]	8.5 U
Perfluoroundecanoic acid (PFUnA)	ng/L	1.8 U	9 U [9 U]	8.5 U

Notes	Definition
J	Estimated value.
U	Not detected. Reporting limit shown.
[value]	The duplicate sample results.

FIGURES



ATTACHMENT A

Groundwater Sampling Logs

MONITORING WELL FIELD DATA SHEET - Low-Flow Sampling

Project Name: O&R - Port Jervis - Emerging Contaminant Sampling	Monitoring Well I.D.	Sample Identification
Project Location: Port Jervis, NY	MW-6	**MW-6-20190520**
Project Number: B0043021-0020		

Well Measurement Data

Date: 5/20/2019	Time: 10:48	Sampler(s): MM	Weather: Partly Sunny 95 Degrees Fahrenheit

	Depth (ft.)	+ Corr. Factor (ft.)	= True DTW (ft.)
Depth to LNAPL		+	=
Depth to Water	12.45	+	=
Depth to DNAPL		+	=
Depth to Bottom	23.65	+	=

Water Quality Brand/Model/Serial # _____

Turbidity Meter Brand/Model/Serial # _____

Water Level Meter Brand/Model/Serial # _____

LNAPL Thickness: _____ DNAPL Thickness: _____

Comments: Dog ears broken, missing bolts

Well Condition Inspection

General Condition: Good / Fair / Needs Repair

Outside

Steel Casing: (OK) / Bent / Damaged / None

Well Cap: (Good) / Broken / Rusted / None

Well I.D.: Visible / Illegible / (None)

Cement Collar: (OK) / Cracked / Heaved / None

Lock: Good / Broken / Rusted / (None)

Comments:

Inside

PVC Casing: (OK) / Damaged / None

Is PVC Plumb? (Yes) / No

H2O between PVC and Steel? (No) / Yes

Evidence of: (None) / Spiders / Rodents / Bees, Wasps

Ponding Around Well? No / (Yes)

Area Around Well Flagged? Yes / (No)

Purging & Stabilization

Pump Intake Depth (feet):

Purging/Sampling Device: Grundfos / Peristaltic / (Bladder) / Other _____

Time	Water Level (ft)	Pump Dial (Hz)	Pump Rate (mL/min)	Purge Volume (Liters)	Temp. (°C)	SC (uS/cm)	pH (SU)	ORP (mv)	DO (mg/L)	Turb. (NTU)
	max. 0.3' drawdown				3%	3%	0.1 SU	10mV	10%	10% (if>1)
10:50	12.73		200	0.5	16.41	0.106	7.87	12.0	9.42	11.47
10:55	12.71		200	1.0	15.4	0.196	7.62	18.1	8.73	11.47
11:00	12.72		200	1.5	14.85	0.286	7.49	21.0	6.95	3.93
11:05	12.72		200	2.0	14.65	0.387	7.41	18.5	5.19	2.67
11:10	12.73		200	2.5	14.61	0.464	7.38	15.4	4.21	1.59
11:15	12.73		200	3.0	14.07	0.517	7.36	10.7	3.21	0.97
11:20	12.73		200	3.5	13.99	0.607	7.35	8.2	2.02	0.6

Sample Data

Appearance: Color: (Clear) / Grey / Orange / Yellow / Brown / Black / Other _____

Odor: (None) / (Describe) _____

Turbidity: (Clear) / Silty (slightly / very) / Sandy (slightly / very) / Other _____

Sheen: (None) / (light / heavy) / (hydrocarbon / organic)

Comments: Sampled at 11:25

Container	Number	Pres.	Analysis
250 ml plastic	2	None	PFAS
1 L Amber	2	None	1,4-Dioxane

MONITORING WELL FIELD DATA SHEET - Low-Flow Sampling

Project Name: O&R - Port Jervis - Emerging Contaminant Sampling	Monitoring Well I.D.	Sample Identification
Project Location: Port Jervis, NY	MW-24	**MW-24-20190520**
Project Number: B0043021-0020		

Well Measurement Data

Date: 5/20/2019	Time: 12:50	Sampler(s): MM	Weather: Cloudy 95 Degrees Fahrenheit

	Depth (ft.)	+ Corr. Factor (ft.)	= True DTW (ft.)
Depth to LNAPL		+	=
Depth to Water	16.02	+	=
Depth to DNAPL		+	=
Depth to Bottom		+	=

Water Quality Brand/Model/Serial # _____

Turbidity Meter Brand/Model/Serial # _____

Water Level Meter Brand/Model/Serial # _____

LNAPL Thickness: _____ DNAPL Thickness: _____

Comments:

Well Condition Inspection

General Condition: Good / Fair / Needs Repair

Outside

Steel Casing: (OK) / Bent / Damaged / None

Well Cap: (Good) / Broken / Rusted / None

Well I.D.: (Visible) / Illegible / None

Cement Collar: (OK) / Cracked / Heaved / None

Lock: Good / Broken / Rusted / (None)

Comments:

Inside

PVC Casing: (OK) / Damaged / None

Is PVC Plumb? (Yes) / No

H2O between PVC and Steel? (No) / Yes

Evidence of: (None) / Spiders / Rodents / Bees, Wasps

Ponding Around Well? (No) / Yes

Area Around Well Flagged? (Yes) / No

Purging & Stabilization

Pump Intake Depth (feet):

Purging/Sampling Device: Grundfos / Peristaltic / (Bladder) / Other _____

Time	Water Level (ft)	Pump Dial (Hz)	Pump Rate (mL/min)	Purge Volume (Liters)	Temp. (°C)	SC (uS/cm)	pH (SU)	ORP (mv)	DO (mg/L)	Turb. (NTU)
	max. 0.3' drawdown				3%	3%	0.1 SU	10mV	10%	10% (if >1)
12:55			200	0.5	15.36	1.069	8.07	-45.5	0.51	39.5
13:00			200	1.0	15.46	1.090	8.02	-44.0	0.3	7.52
13:05			200	1.5	15.28	1.088	8.02	-45.7	0.27	6.95
13:10			200	2.0	15.3	1.055	7.99	-46.6	0.15	19.1
13:15			200	2.5	15.34	1.022	7.95	-46.1	0.14	14.5
13:20			200	3.0	15.78	1.000	7.89	-45.4	0.11	22.5

Sample Data

Appearance: Color: Clear / Grey / (Orange) / Yellow / Brown / Black / Other _____

Odor: (None) / (Describe) _____

Turbidity: Clear / Silty (slightly / (very)) / Sandy (slightly / very) / Other _____

Sheen: (None) / (light / heavy) / (hydrocarbon / organic)

Comments: 13:10 - Fe deposits, lifted tubing approximately 1-2 feet

Sampled at 13:20 Collected MS/MSD and Duplicate Sample

Container	Number	Pres.	Analysis
250 ml plastic	8	None	PFAS
1 L Amber	8	None	1,4-Dioxane

MONITORING WELL FIELD DATA SHEET - Low-Flow Sampling

Project Name: O&R - Port Jervis - Emerging Contaminant Sampling	Monitoring Well I.D.	Sample Identification
Project Location: Port Jervis, NY	MW-29	**MW-29-20190520**
Project Number: B0043021-0020		

Well Measurement Data

Date: 5/20/2019	Time: 14:15	Sampler(s): MM	Weather: Partly Cloudy 95 Degrees Fahrenheit

	Depth (ft.)	+ Corr. Factor (ft.)	= True DTW (ft.)
Depth to LNAPL		+	=
Depth to Water	15.23	+	=
Depth to DNAPL		+	=
Depth to Bottom		+	=

Water Quality Brand/Model/Serial # _____

Turbidity Meter Brand/Model/Serial # _____

Water Level Meter Brand/Model/Serial # _____

LNAPL Thickness: _____ DNAPL Thickness: _____

Comments:

Well Condition Inspection

General Condition: Good / Fair / Needs Repair

Outside

Steel Casing: (OK) / Bent / Damaged / None

Well Cap: (Good) / Broken / Rusted / None

Well I.D.: Visible / Illegible / (None)

Cement Collar: OK / Cracked / Heaved / None

Lock: Good / Broken / Rusted / (None)

Comments:

Inside

PVC Casing: (OK) / Damaged / None

Is PVC Plumb? (Yes) / No

H2O between PVC and Steel? (No) / Yes

Evidence of: (None) / Spiders / Rodents / Bees, Wasps

Ponding Around Well? (No) / Yes

Area Around Well Flagged? (Yes) / No

Purging & Stabilization

Pump Intake Depth (feet):

Purging/Sampling Device: Grundfos / Peristaltic / Bladder / Other_____

Time	Water Level (ft)	Pump Dial (Hz)	Pump Rate (mL/min)	Purge Volume (Liters)	Temp. (°C)	SC (uS/cm)	pH (SU)	ORP (mv)	DO (mg/L)	Turb. (NTU)
	max. 0.3' drawdown				3%	3%	0.1 SU	10mV	10%	10% (if>1)
14:20			200	0.5	16.02	1.186	8.03	-77.6	0.59	5.91
14:25			200	1.0	15.99	1.175	7.98	-78.9	0.27	6.30
14:30			200	1.5	16.03	1.163	7.96	-82.9	0.11	5.85
14:35			200	2.0	16.35	1.165	7.9	-82.6	0.09	4.97
14:40			200	2.5	15.93	1.158	7.93	-86.1	0.02	5.42

Sample Data

Appearance: Color: Clear / Grey / Orange / Yellow / Brown / Black / Other _____

Odor: None / (Describe) _____

Turbidity: Clear / Silty (slightly / very) / Sandy (slightly / very) / Other _____

Sheen: None / (light / heavy) / (hydrocarbon / organic)

Comments: Sampled at 14:45

Container	Number	Pres.	Analysis
250 ml plastic	2	None	PFAS
1 L Amber	2	None	1,4-Dioxane

ATTACHMENT B

Non-Hazardous Waste Manifest

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number

2. Page 1 of 1

3. Emergency Response Phone: 518-250-7322

4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address

Orange and Rockland Utilities, Inc.
3 Old Chester Road
Goshen, NY 10924

Generator's Phone: 845-294-1757

Generator's Site Address (if different than mailing address)

Orange and Rockland Utilities, Inc.
1-9 Pike Street
Port Jervis, NY 12771

6. Transporter 1 Company Name: IWT Transport Inc

U.S. EPA ID Number: NJR986628162

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address

Clean Earth of North Jersey, Inc.
105 Jacobus Ave.
Kearny NJ 07032

Facility's Phone: 9733444004

U.S. EPA ID Number: NJD991291105

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non-Hazardous Waste	1	DM	50	P	ID72
2.	Non-Hazardous Waste	1	DM	50	P	ID27
3.						
4.						

13. Special Handling Instructions and Additional Information

(1) 143083794 - Non hazardous liquid investigation derived waste (Purge Wtaer) (2) 143083795 - Non hazardous solid investigation derived waste (PPE and Plastic)

Order#: 277349 - Note:

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: MARIBETH McCORMICK

Signature: Maribeth McCormick

Month: 7 Day: 9 Year: 19

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: GREG JARROW

Signature:

Month: 7 Day: 9 Year: 19

Transporter 2 Printed/Typed Name

Signature

Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)

U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator)

Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name

Signature

Month Day Year

ATTACHMENT C

Laboratory Analytical Results

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

Laboratory Job ID: 480-153995-1
Client Project/Site: Orange & Rockland Utilities -Port Jervis

For:
ARCADIS U.S. Inc
855 Route 146
Suite 210
Clifton Park, New York 12065

Attn: Mark Flusche

Authorized for release by:
6/18/2019 6:04:37 PM
Rebecca Jones, Project Management Assistant I
rebecca.jones@testamericainc.com

Designee for

Melissa Deyo, Project Manager I
(716)504-9874
melissa.deyo@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
E	Result exceeded calibration range.

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-153995-1

Laboratory: Eurofins TestAmerica, Buffalo

Narrative

Job Narrative
480-153995-1

Receipt
The samples were received on 5/22/2019 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.3º C.

GC/MS Semi VOA
Method(s) 8270D SIM ID: The following sample was diluted due to the nature of the sample matrix: MW-29-20190520 (480-153995-3). Elevated reporting limits (RLs) are provided.

Method(s) 8270D SIM ID: Surrogate recovery for the following sample was outside acceptance limits: MW-29-20190520 (480-153995-3). Due to insufficient volume remaining for re-extraction, the results have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

LCMS
Method(s) 537 (modified): The continuing calibration verification (CCV) associated with batch 200-143837 recovered above the upper control limit for Perfluoropentanoic acid (PFPeA). The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate / sample duplicate (MS/MSD/DUP) precision for preparation batch 200-143529 and analytical batch 200-143837 was outside control limits for Perfluorobutanesulfonic acid (PFBS), Perfluorohexanesulfonic acid (PFHxS), Perfluoropentanoic acid (PFPeA), N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) and 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2). . Sample matrix interference and non-homogeneity are suspected.

Method(s) 537 (modified): Results for samples MW-24-20190520 (480-153995-2), MW-24-20190520 (480-153995-2[MS]), MW-24-20190520 (480-153995-2[MSD]), MW-29-20190520 (480-153995-3) and DUP-20190520 (480-153995-4) were reported from the analysis of a diluted extract due to high concentration of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

Method(s) 537 (modified): 187O2 PFHxS, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample are below the method recommended limit: (LCS 200-143529/2-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): d3-NMeFOSAA Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: (MB 200-143529/1-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 13C3 PFBS, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample is below the method recommended limit: MW-24-20190520 (480-153995-2[MS]). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 13C3 PFBS, 13C2 PFDoA, 13C2 PFTeDA, d3-NMeFOSAA, d5-NEtFOSAA and 13C4 PFOS Isotope Dilution Analyte (IDA) recoveries associated with the following sample is below the method recommended limit: DUP-20190520 (480-153995-4). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 13C4 PFBA, 13C2 PFTeDA, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample is below the method recommended limit: MW-6-20190520 (480-153995-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Job ID: 480-153995-1 (Continued)

Laboratory: Eurofins TestAmerica, Buffalo (Continued)

Method(s) 537 (modified): 13C3 PFBS, 13C2 PFTeDA, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample is below the method recommended limit: MW-24-20190520 (480-153995-2). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 13C3 PFBS, 18O2 PFHxS, 13C2 PFDoA, 13C2 PFTeDA, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample are below the method recommended limit: MW-24-20190520 (480-153995-2[MSD]). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 13C4 PFBA, 13C2 PFHxA, 18O2 PFHxS and 13C4 PFOS Isotope Dilution Analyte (IDA) recoveries associated with the following sample are below the method recommended limit: MW-29-20190520 (480-153995-3). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): 18O2 PFHxS, 13C2 PFTeDA, d3-NMeFOSAA and d5-NEtFOSAA Isotope Dilution Analyte (IDA) recoveries associated with the following sample are below the method recommended limit: EB-020190520 (480-153995-5). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample(s). All detection limits are below the lower calibration.

Method(s) 537 (modified): The low level continuing calibration verification (CCVL) associated with batch 200-144054 recovered above the upper control limit for Perfluorobutanoic acid (PFBA) and Perfluorobutanesulfonic acid (PFBS). The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

Method(s) 537 (modified): The following samples were diluted due to the abundance of non-target analytes: MW-24-20190520 (480-153995-2) and MW-24-20190520 (480-153995-2[MS]). A more concentrated analysis was not possible.

Method(s) 537 (modified): Results for samples MW-24-20190520 (480-153995-2) and MW-24-20190520 (480-153995-2[MS]) were reported from the analysis of a diluted extract due to high concentration of target and/or non-target analytes in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Client Sample ID: MW-6-20190520 — Lab Sample ID: 480-153995-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	24		1.8	0.88	ng/L	1		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	75		1.8	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	93		1.8	0.67	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		1.8	0.80	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	20		1.8	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	6.8		1.8	0.43	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.3		1.8	0.71	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.7		1.8	0.54	ng/L	1		537 (modified)	Total/NA

Client Sample ID: MW-24-20190520 — Lab Sample ID: 480-153995-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	37		9.0	4.5	ng/L	5		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	8.0	J F2	9.0	2.8	ng/L	5		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	13		9.0	3.4	ng/L	5		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.6	J	9.0	4.1	ng/L	5		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11		9.0	2.8	ng/L	5		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	9.6	F2	9.0	2.2	ng/L	5		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.1	F2	9.0	3.6	ng/L	5		537 (modified)	Total/NA

Client Sample ID: MW-29-20190520 — Lab Sample ID: 480-153995-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	15		8.5	3.2	ng/L	5		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.6	J	8.5	3.9	ng/L	5		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	21		8.5	2.7	ng/L	5		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	24		8.5	2.1	ng/L	5		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	15		8.5	3.4	ng/L	5		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		8.5	2.6	ng/L	5		537 (modified)	Total/NA

Client Sample ID: DUP-20190520 — Lab Sample ID: 480-153995-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	24		9.0	4.5	ng/L	5		537 (modified)	Total/NA
Perfluoropentanoic acid (PFPeA)	17		9.0	2.8	ng/L	5		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	16		9.0	3.4	ng/L	5		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.2	J	9.0	4.1	ng/L	5		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11		9.0	2.8	ng/L	5		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	7.3	J	9.0	2.2	ng/L	5		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.0		9.0	3.6	ng/L	5		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14		9.0	2.7	ng/L	5		537 (modified)	Total/NA

Client Sample ID: EB-020190520 — Lab Sample ID: 480-153995-5

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-6-20190520
Lab Sample ID: 480-153995-1

Date Collected: 05/20/19 11:25
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 08:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*19*		*15 - 110*	*05/24/19 16:11*	*05/30/19 08:25*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**24**		1.8	0.88	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoropentanoic acid (PFPeA)	**75**		1.8	0.56	ng/L		05/29/19 11:37	06/13/19 18:08	1
Perfluorohexanoic acid (PFHxA)	**93**		1.8	0.67	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroheptanoic acid (PFHpA)	**11**		1.8	0.80	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanoic acid (PFOA)	**20**		1.8	0.56	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.68	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.47	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.52	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.53	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.8	0.81	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorobutanesulfonic acid (PFBS)	**6.8**		1.8	0.43	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorohexanesulfonic acid (PFHxS)	**4.3**		1.8	0.71	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.84	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanesulfonic acid (PFOS)	**7.7**		1.8	0.54	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.79	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanesulfonamide (PFOSA)	ND		1.8	0.56	ng/L		05/29/19 11:37	06/07/19 18:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		18	1.5	ng/L		05/29/19 11:37	06/07/19 18:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		18	1.3	ng/L		05/29/19 11:37	06/07/19 18:55	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		18	4.1	ng/L		05/29/19 11:37	06/07/19 18:55	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		18	2.6	ng/L		05/29/19 11:37	06/07/19 18:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFHpA	*67*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFOA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFOS	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C5 PFNA	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFBA	*22*	*	*25 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFHxA	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFDA	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFUnA	*53*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFDoA	*50*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C8 FOSA	*43*		*25 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C5 PFPeA	*45*		*25 - 150*	*05/29/19 11:37*	*06/13/19 18:08*	*1*
13C2 PFTeDA	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
d3-NMeFOSAA	*36*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
d5-NEtFOSAA	*40*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*

Client Sample ID: MW-6-20190520
Lab Sample ID: 480-153995-1
Date Collected: 05/20/19 11:25
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-6:2 FTS	103		25 - 150	05/29/19 11:37	06/07/19 18:55	1
M2-8:2 FTS	85		25 - 150	05/29/19 11:37	06/07/19 18:55	1
13C3 PFBS	53		50 - 150	05/29/19 11:37	06/07/19 18:55	1

Client Sample ID: MW-24-20190520
Lab Sample ID: 480-153995-2
Date Collected: 05/20/19 13:20
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 04:02	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	18		15 - 110	05/24/19 16:11	05/30/19 04:02	1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**37**		9.0	4.5	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoropentanoic acid (PFPeA)	**8.0**	**J F2**	9.0	2.8	ng/L		05/29/19 11:37	06/13/19 18:23	5
Perfluorohexanoic acid (PFHxA)	**13**		9.0	3.4	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroheptanoic acid (PFHpA)	**5.6**	**J**	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanoic acid (PFOA)	**11**		9.0	2.8	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorononanoic acid (PFNA)	ND		9.0	1.2	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorodecanoic acid (PFDA)	ND		9.0	3.5	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroundecanoic acid (PFUnA)	ND		9.0	2.4	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorododecanoic acid (PFDoA)	ND		9.0	2.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorotridecanoic acid (PFTriA)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorotetradecanoic acid (PFTeA)	ND		9.0	4.1	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorobutanesulfonic acid (PFBS)	**9.6**	**F2**	9.0	2.2	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorohexanesulfonic acid (PFHxS)	**9.1**	**F2**	9.0	3.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		9.0	4.3	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanesulfonic acid (PFOS)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorodecanesulfonic acid (PFDS)	ND		9.0	4.0	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanesulfonamide (PFOSA)	ND		9.0	2.9	ng/L		05/29/19 11:37	06/07/19 19:11	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	F2	90	7.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		90	6.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND	F2	90	21	ng/L		05/29/19 11:37	06/07/19 19:11	5
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		90	13	ng/L		05/29/19 11:37	06/07/19 19:11	5

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	50		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFHpA	81		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFOA	77		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFOS	57		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C5 PFNA	61		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFBA	41		25 - 150	05/29/19 11:37	06/07/19 19:11	5

Client Sample ID: MW-24-20190520
Lab Sample ID: 480-153995-2
Date Collected: 05/20/19 13:20
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*63*		*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C2 PFDA	*64*		*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C2 PFUnA	*56*		*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C2 PFDoA	*53*		*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C8 FOSA	*51*		*25 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C5 PFPeA	*53*		*25 - 150*	*05/29/19 11:37*	*06/13/19 18:23*	*5*
13C2 PFTeDA	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
d3-NMeFOSAA	*44*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
d5-NEtFOSAA	*46*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
M2-6:2 FTS	*103*		*25 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
M2-8:2 FTS	*81*		*25 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*
13C3 PFBS	*39*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 19:11*	*5*

Client Sample ID: MW-29-20190520
Lab Sample ID: 480-153995-3
Date Collected: 05/20/19 14:45
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		2.0	1.0	ug/L		05/24/19 16:11	05/30/19 08:49	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*12*	*	*15 - 110*	*05/24/19 16:11*	*05/30/19 08:49*	*10*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		8.5	4.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoropentanoic acid (PFPeA)	ND		8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorohexanoic acid (PFHxA)	**15**		8.5	3.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroheptanoic acid (PFHpA)	**5.6**	**J**	8.5	3.9	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanoic acid (PFOA)	**21**		8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorononanoic acid (PFNA)	ND		8.5	1.1	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorodecanoic acid (PFDA)	ND		8.5	3.3	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroundecanoic acid (PFUnA)	ND		8.5	2.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorododecanoic acid (PFDoA)	ND		8.5	2.5	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorotridecanoic acid (PFTriA)	ND		8.5	2.5	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorotetradecanoic acid (PFTeA)	ND		8.5	3.9	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorobutanesulfonic acid (PFBS)	**24**		8.5	2.1	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorohexanesulfonic acid (PFHxS)	**15**		8.5	3.4	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		8.5	4.0	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanesulfonic acid (PFOS)	**18**		8.5	2.6	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorodecanesulfonic acid (PFDS)	ND		8.5	3.8	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanesulfonamide (PFOSA)	ND		8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		85	7.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		85	6.3	ng/L		05/29/19 11:37	06/07/19 20:15	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		85	19	ng/L		05/29/19 11:37	06/07/19 20:15	5

Client Sample ID: MW-29-20190520
Lab Sample ID: 480-153995-3
Date Collected: 05/20/19 14:45
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		85	12	ng/L		05/29/19 11:37	06/07/19 20:15	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*36*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFHpA	*51*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFOA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFOS	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C5 PFNA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFBA	*21*	*	*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFHxA	*42*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFDA	*72*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFUnA	*76*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFDoA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C8 FOSA	*55*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C5 PFPeA	*27*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFTeDA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
d3-NMeFOSAA	*56*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
d5-NEtFOSAA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
M2-6:2 FTS	*108*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
M2-8:2 FTS	*91*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C3 PFBS	*73*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*

Client Sample ID: DUP-20190520
Lab Sample ID: 480-153995-4
Date Collected: 05/20/19 00:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 09:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*15*		*15 - 110*	*05/24/19 16:11*	*05/30/19 09:13*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**24**		9.0	4.5	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoropentanoic acid (PFPeA)	**17**		9.0	2.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorohexanoic acid (PFHxA)	**16**		9.0	3.4	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroheptanoic acid (PFHpA)	**6.2**	**J**	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorooctanoic acid (PFOA)	**11**		9.0	2.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorononanoic acid (PFNA)	ND		9.0	1.2	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorodecanoic acid (PFDA)	ND		9.0	3.5	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroundecanoic acid (PFUnA)	ND		9.0	2.4	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorododecanoic acid (PFDoA)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorotridecanoic acid (PFTriA)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorotetradecanoic acid (PFTeA)	ND		9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorobutanesulfonic acid (PFBS)	**7.3**	**J**	9.0	2.2	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorohexanesulfonic acid (PFHxS)	**9.0**		9.0	3.6	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		9.0	4.3	ng/L		05/29/19 11:37	06/07/19 20:31	5

Client Sample ID: DUP-20190520
Lab Sample ID: 480-153995-4
Date Collected: 05/20/19 00:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**14**		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorodecanesulfonic acid (PFDS)	ND		9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorooctanesulfonamide (PFOSA)	ND		9.0	2.9	ng/L		05/29/19 11:37	06/07/19 20:31	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		90	7.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		90	6.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		90	21	ng/L		05/29/19 11:37	06/07/19 20:31	5
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		90	13	ng/L		05/29/19 11:37	06/07/19 20:31	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFHpA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFOA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFOS	*33*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C5 PFNA	*57*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFBA	*39*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFHxA	*64*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFDA	*58*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFUnA	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFDoA	*45*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C8 FOSA	*56*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C5 PFPeA	*56*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFTeDA	*44*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
d3-NMeFOSAA	*39*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
d5-NEtFOSAA	*47*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
M2-6:2 FTS	*100*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
M2-8:2 FTS	*90*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C3 PFBS	*41*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5
Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 09:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*25*		*15 - 110*	*05/24/19 16:11*	*05/30/19 09:37*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		1.7	0.87	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoropentanoic acid (PFPeA)	ND		1.7	0.55	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.66	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.80	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.55	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.67	ng/L		05/29/19 11:37	06/07/19 20:46	1

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5
Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.46	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.52	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.52	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorotetradecanoic acid (PFTeA)	ND		1.7	0.80	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND		1.7	0.70	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.83	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.53	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.79	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanesulfonamide (PFOSA)	ND		1.7	0.56	ng/L		05/29/19 11:37	06/07/19 20:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		17	1.5	ng/L		05/29/19 11:37	06/07/19 20:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		17	1.3	ng/L		05/29/19 11:37	06/07/19 20:46	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		17	4.0	ng/L		05/29/19 11:37	06/07/19 20:46	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		17	2.5	ng/L		05/29/19 11:37	06/07/19 20:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*49*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFHpA	*71*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFOA	*66*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFOS	*53*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C5 PFNA	*63*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFBA	*39*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFHxA	*72*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFDA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFUnA	*62*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFDoA	*51*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C8 FOSA	*42*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C5 PFPeA	*62*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFTeDA	*45*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
d3-NMeFOSAA	*43*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
d5-NEtFOSAA	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
M2-6:2 FTS	*84*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
M2-8:2 FTS	*77*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C3 PFBS	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*

Isotope Dilution Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	DXE (15-110)							
480-153995-1	MW-6-20190520	19							
480-153995-2	MW-24-20190520	18							
480-153995-2 MS	MW-24-20190520	21							
480-153995-2 MSD	MW-24-20190520	17							
480-153995-3	MW-29-20190520	12 *							
480-153995-4	DUP-20190520	15							
480-153995-5	EB-020190520	25							
LCS 480-474688/2-A	Lab Control Sample	27							
MB 480-474688/1-A	Method Blank	27							

Surrogate Legend

DXE = 1,4-Dioxane-d8

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (50-150)	PFHpA (50-150)	PFOA (50-150)	PFOS (50-150)	PFNA (50-150)	PFBA (25-150)	PFHxA (50-150)	PFDA (50-150)
480-153995-1	MW-6-20190520	55	67	65	55	55	22 *	52	52
480-153995-1	MW-6-20190520								
480-153995-2	MW-24-20190520	50	81	77	57	61	41	63	64
480-153995-2	MW-24-20190520								
480-153995-2 MS	MW-24-20190520	50	75	64	51	57	45	64	64
480-153995-2 MS	MW-24-20190520								
480-153995-2 MSD	MW-24-20190520	39 *	68	70	53	53	39	54	54
480-153995-3	MW-29-20190520	36 *	51	74	48 *	65	21 *	42 *	72
480-153995-4	DUP-20190520	52	74	74	33 *	57	39	64	58
480-153995-5	EB-020190520	49 *	71	66	53	63	39	72	65
LCS 200-143529/2-A	Lab Control Sample	46 *	69	69	54	62	44	66	64
LCS 200-143529/2-A	Lab Control Sample								
MB 200-143529/1-A	Method Blank	54	75	67	59	63	43	71	71

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFUnA (50-150)	PFDoA (50-150)	PFOSA (25-150)	PFPeA (25-150)	PFTDA (50-150)	-NMeFOS/ (50-150)	-NEtFOS/ (50-150)	M262FTS (25-150)
480-153995-1	MW-6-20190520	53	50	43		48 *	36 *	40 *	103
480-153995-1	MW-6-20190520				45				
480-153995-2	MW-24-20190520	56	53	51		48 *	44 *	46 *	103
480-153995-2	MW-24-20190520				53				
480-153995-2 MS	MW-24-20190520	57	52	48	57	50	38 *	47 *	85
480-153995-2 MS	MW-24-20190520				57				
480-153995-2 MSD	MW-24-20190520	58	42 *	44	75	43 *	42 *	43 *	94
480-153995-3	MW-29-20190520	76	54	55	27	54	56	54	108
480-153995-4	DUP-20190520	55	45 *	56	56	44 *	39 *	47 *	100
480-153995-5	EB-020190520	62	51	42	62	45 *	43 *	48 *	84
LCS 200-143529/2-A	Lab Control Sample	68	59	45		56	48 *	48 *	86
LCS 200-143529/2-A	Lab Control Sample				68				
MB 200-143529/1-A	Method Blank	67	58	37	60	55	44 *	52	79

Isotope Dilution Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Matrix: Water
Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)									
		M282FTS	3C3-PFBS								
Lab Sample ID	Client Sample ID	(25-150)	(50-150)								
480-153995-1	MW-6-20190520	85	53								
480-153995-1	MW-6-20190520										
480-153995-2	MW-24-20190520	81	39 *								
480-153995-2	MW-24-20190520										
480-153995-2 MS	MW-24-20190520	67	46 *								
480-153995-2 MS	MW-24-20190520										
480-153995-2 MSD	MW-24-20190520	75	27 *								
480-153995-3	MW-29-20190520	91	73								
480-153995-4	DUP-20190520	90	41 *								
480-153995-5	EB-020190520	77	52								
LCS 200-143529/2-A	Lab Control Sample	103	59								
LCS 200-143529/2-A	Lab Control Sample										
MB 200-143529/1-A	Method Blank	96	63								

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4 PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA
PFBA = 13C4 PFBA
PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA
PFUnA = 13C2 PFUnA
PFDoA = 13C2 PFDoA
PFOSA = 13C8 FOSA
PFPeA = 13C5 PFPeA
PFTDA = 13C2 PFTeDA
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
13C3-PFBS = 13C3 PFBS

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Lab Sample ID: MB 480-474688/1-A
Matrix: Water
Analysis Batch: 475144

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 474688

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 02:27	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*27*		*15 - 110*	*05/24/19 16:11*	*05/30/19 02:27*	*1*

Lab Sample ID: LCS 480-474688/2-A
Matrix: Water
Analysis Batch: 475144

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 474688

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,4-Dioxane			1.00	1.16		ug/L		116	40 - 140		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,4-Dioxane-d8	*27*		*15 - 110*

Lab Sample ID: 480-153995-2 MS
Matrix: Water
Analysis Batch: 475144

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 474688

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,4-Dioxane	ND		1.00	1.22	E	ug/L		122	40 - 140		

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
1,4-Dioxane-d8	*21*		*15 - 110*

Lab Sample ID: 480-153995-2 MSD
Matrix: Water
Analysis Batch: 475144

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 474688

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,4-Dioxane	ND		1.00	1.36	E	ug/L		136	40 - 140	11	20

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,4-Dioxane-d8	*17*		*15 - 110*

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 200-143529/1-A
Matrix: Water
Analysis Batch: 143837

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 143529

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND		2.0	1.0	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluoropentanoic acid (PFPeA)	ND		2.0	0.63	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorohexanoic acid (PFHxA)	ND		2.0	0.76	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluoroheptanoic acid (PFHpA)	ND		2.0	0.91	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorooctanoic acid (PFOA)	ND		2.0	0.63	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorononanoic acid (PFNA)	ND		2.0	0.27	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorodecanoic acid (PFDA)	ND		2.0	0.77	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluoroundecanoic acid (PFUnA)	ND		2.0	0.53	ng/L		05/29/19 11:37	06/07/19 16:32	1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 200-143529/1-A
Matrix: Water
Analysis Batch: 143837

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 143529

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorododecanoic acid (PFDoA)	ND		2.0	0.59	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorotridecanoic acid (PFTriA)	ND		2.0	0.60	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorotetradecanoic acid (PFTeA)	ND		2.0	0.92	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorobutanesulfonic acid (PFBS)	ND		2.0	0.49	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorohexanesulfonic acid (PFHxS)	ND		2.0	0.80	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		2.0	0.95	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorooctanesulfonic acid (PFOS)	ND		2.0	0.61	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorodecanesulfonic acid (PFDS)	ND		2.0	0.90	ng/L		05/29/19 11:37	06/07/19 16:32	1
Perfluorooctanesulfonamide (PFOSA)	ND		2.0	0.64	ng/L		05/29/19 11:37	06/07/19 16:32	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		20	1.7	ng/L		05/29/19 11:37	06/07/19 16:32	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		20	1.5	ng/L		05/29/19 11:37	06/07/19 16:32	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		20	4.6	ng/L		05/29/19 11:37	06/07/19 16:32	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		20	2.9	ng/L		05/29/19 11:37	06/07/19 16:32	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C4 PFHpA	*75*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C4 PFOA	*67*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C4 PFOS	*59*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C5 PFNA	*63*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C4 PFBA	*43*		*25 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C2 PFHxA	*71*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C2 PFDA	*71*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C2 PFUnA	*67*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C2 PFDoA	*58*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C8 FOSA	*37*		*25 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C5 PFPeA	*60*		*25 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C2 PFTeDA	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
d3-NMeFOSAA	*44*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
d5-NEtFOSAA	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
M2-6:2 FTS	*79*		*25 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
M2-8:2 FTS	*96*		*25 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*
13C3 PFBS	*63*		*50 - 150*	*05/29/19 11:37*	*06/07/19 16:32*	*1*

Lab Sample ID: LCS 200-143529/2-A
Matrix: Water
Analysis Batch: 143837

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 143529

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanoic acid (PFBA)	40.0	54.3		ng/L		136	50 - 150
Perfluorohexanoic acid (PFHxA)	40.0	41.4		ng/L		103	70 - 130
Perfluoroheptanoic acid (PFHpA)	40.0	41.1		ng/L		103	70 - 130
Perfluorooctanoic acid (PFOA)	40.0	38.8		ng/L		97	70 - 130
Perfluorononanoic acid (PFNA)	40.0	38.4		ng/L		96	70 - 130
Perfluorodecanoic acid (PFDA)	40.0	40.7		ng/L		102	70 - 130

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 200-143529/2-A
Matrix: Water
Analysis Batch: 143837

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 143529

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroundecanoic acid (PFUnA)	40.0	42.7		ng/L		107	70 - 130
Perfluorododecanoic acid (PFDoA)	40.0	36.7		ng/L		92	70 - 130
Perfluorotridecanoic acid (PFTriA)	40.0	37.4		ng/L		94	70 - 130
Perfluorotetradecanoic acid (PFTeA)	40.0	39.2		ng/L		98	70 - 130
Perfluorobutanesulfonic acid (PFBS)	35.4	31.9		ng/L		90	70 - 130
Perfluorohexanesulfonic acid (PFHxS)	36.4	38.2		ng/L		105	70 - 130
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	42.2		ng/L		111	50 - 150
Perfluorooctanesulfonic acid (PFOS)	37.1	40.9		ng/L		110	70 - 130
Perfluorodecanesulfonic acid (PFDS)	38.6	36.6		ng/L		95	50 - 150
Perfluorooctanesulfonamide (PFOSA)	40.0	40.2		ng/L		101	50 - 150
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	43.1		ng/L		108	70 - 130
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	44.5		ng/L		111	70 - 130
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	37.9	39.0		ng/L		103	50 - 150
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	38.3	39.9		ng/L		104	50 - 150

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*46*	*	*50 - 150*
13C4 PFHpA	*69*		*50 - 150*
13C4 PFOA	*69*		*50 - 150*
13C4 PFOS	*54*		*50 - 150*
13C5 PFNA	*62*		*50 - 150*
13C4 PFBA	*44*		*25 - 150*
13C2 PFHxA	*66*		*50 - 150*
13C2 PFDA	*64*		*50 - 150*
13C2 PFUnA	*68*		*50 - 150*
13C2 PFDoA	*59*		*50 - 150*
13C8 FOSA	*45*		*25 - 150*
13C2 PFTeDA	*56*		*50 - 150*
d3-NMeFOSAA	*48*	*	*50 - 150*
d5-NEtFOSAA	*48*	*	*50 - 150*
M2-6:2 FTS	*86*		*25 - 150*
M2-8:2 FTS	*103*		*25 - 150*
13C3 PFBS	*59*		*50 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 200-143529/2-A
Matrix: Water
Analysis Batch: 144054

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 143529

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluoropentanoic acid (PFPeA)			40.0	45.8		ng/L		114	50 - 150		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C5 PFPeA	*68*		*25 - 150*

Lab Sample ID: 480-153995-2 MS
Matrix: Water
Analysis Batch: 143837

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 143529

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorobutanoic acid (PFBA)	37		36.2	63.8		ng/L		73	40 - 160		
Perfluorohexanoic acid (PFHxA)	13		36.2	49.5		ng/L		100	40 - 160		
Perfluoroheptanoic acid (PFHpA)	5.6	J	36.2	39.8		ng/L		95	40 - 160		
Perfluorooctanoic acid (PFOA)	11		36.2	47.0		ng/L		101	40 - 160		
Perfluorononanoic acid (PFNA)	ND		36.2	40.1		ng/L		111	40 - 160		
Perfluorodecanoic acid (PFDA)	ND		36.2	32.4		ng/L		90	40 - 160		
Perfluoroundecanoic acid (PFUnA)	ND		36.2	35.6		ng/L		98	40 - 160		
Perfluorododecanoic acid (PFDoA)	ND		36.2	32.5		ng/L		90	40 - 160		
Perfluorotridecanoic acid (PFTriA)	ND		36.2	31.9		ng/L		88	40 - 160		
Perfluorotetradecanoic acid (PFTeA)	ND		36.2	33.0		ng/L		91	40 - 160		
Perfluorobutanesulfonic acid (PFBS)	9.6	F2	32.0	42.2		ng/L		102	40 - 160		
Perfluorohexanesulfonic acid (PFHxS)	9.1	F2	32.9	32.1		ng/L		70	40 - 160		
Perfluoroheptanesulfonic Acid (PFHpS)	ND		34.4	39.9		ng/L		116	40 - 160		
Perfluorooctanesulfonic acid (PFOS)	ND		33.6	47.4		ng/L		141	40 - 160		
Perfluorodecanesulfonic acid (PFDS)	ND		34.9	27.2		ng/L		78	40 - 160		
Perfluorooctanesulfonamide (PFOSA)	ND		36.2	29.0		ng/L		80	40 - 160		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	F2	36.2	21.9	J	ng/L		61	40 - 160		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		36.2	33.5	J	ng/L		93	40 - 160		
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND	F2	34.3	43.5	J	ng/L		127	40 - 160		
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		34.6	33.7	J	ng/L		97	40 - 160		

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
18O2 PFHxS	*50*		*50 - 150*
13C4 PFHpA	*75*		*50 - 150*
13C4 PFOA	*64*		*50 - 150*
13C4 PFOS	*51*		*50 - 150*
13C5 PFNA	*57*		*50 - 150*
13C4 PFBA	*45*		*25 - 150*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 480-153995-2 MS
Matrix: Water
Analysis Batch: 143837

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 143529

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
13C2 PFHxA	64		50 - 150
13C2 PFDA	64		50 - 150
13C2 PFUnA	57		50 - 150
13C2 PFDoA	52		50 - 150
13C8 FOSA	48		25 - 150
13C5 PFPeA	57		25 - 150
13C2 PFTeDA	50		50 - 150
d3-NMeFOSAA	38	*	50 - 150
d5-NEtFOSAA	47	*	50 - 150
M2-6:2 FTS	85		25 - 150
M2-8:2 FTS	67		25 - 150
13C3 PFBS	46	*	50 - 150

Lab Sample ID: 480-153995-2 MS
Matrix: Water
Analysis Batch: 144054

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 143529

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoropentanoic acid (PFPeA)	8.0	J F2	36.2	56.7		ng/L		135	40 - 160

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
13C5 PFPeA	57		25 - 150

Lab Sample ID: 480-153995-2 MSD
Matrix: Water
Analysis Batch: 143837

Client Sample ID: MW-24-20190520
Prep Type: Total/NA
Prep Batch: 143529

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanoic acid (PFBA)	68	F1	35.4	63.1	F1 F2	ng/L		-15	40 - 160	68	30
Perfluoropentanoic acid (PFPeA)	8.0	J F2	35.4	31.1	F2	ng/L		65	40 - 160	58	30
Perfluorohexanoic acid (PFHxA)	ND	F1	35.4	56.0		ng/L		158	40 - 160	19	20
Perfluoroheptanoic acid (PFHpA)	ND		35.4	43.8		ng/L		124	40 - 160	14	20
Perfluorooctanoic acid (PFOA)	9.9		35.4	45.4		ng/L		101	40 - 160	3	20
Perfluorononanoic acid (PFNA)	ND		35.4	40.0		ng/L		113	40 - 160	3	20
Perfluorodecanoic acid (PFDA)	ND		35.4	36.3		ng/L		103	40 - 160	3	20
Perfluoroundecanoic acid (PFUnA)	ND	I	35.4	36.9		ng/L		104	40 - 160	8	20
Perfluorododecanoic acid (PFDoA)	ND		35.4	37.4		ng/L		106	40 - 160	3	20
Perfluorotridecanoic acid (PFTriA)	ND		35.4	36.8		ng/L		104	40 - 160	17	20
Perfluorotetradecanoic acid (PFTeA)	ND		35.4	36.1		ng/L		102	40 - 160	1	20
Perfluorobutanesulfonic acid (PFBS)	ND	F2 I	31.3	53.1	F1 F2	ng/L		170	40 - 160	41	20
Perfluorohexanesulfonic acid (PFHxS)	ND	F2	32.2	47.3		ng/L		147	40 - 160	9	20
Perfluoroheptanesulfonic Acid (PFHpS)	ND		33.7	32.0		ng/L		95	40 - 160	6	30
Perfluorooctanesulfonic acid (PFOS)	ND	* F1	32.8	39.5		ng/L		120	40 - 160	NC	20

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 480-153995-2 MSD
Client Sample ID: MW-24-20190520
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 143837
Prep Batch: 143529

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorodecanesulfonic acid (PFDS)	ND		34.1	27.1		ng/L		79	40 - 160	24	30
Perfluorooctanesulfonamide (PFOSA)	ND		35.4	34.0		ng/L		96	40 - 160	4	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	F2	35.4	34.4	J	ng/L		97	40 - 160	13	20
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	*	35.4	36.8	J	ng/L		104	40 - 160	1	20
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND	F2 F1	33.5	26.8	J	ng/L		80	40 - 160	NC	30
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		33.9	30.4	J F2	ng/L		90	40 - 160	56	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
18O2 PFHxS	*39*	*	*50 - 150*
13C4 PFHpA	*68*		*50 - 150*
13C4 PFOA	*70*		*50 - 150*
13C4 PFOS	*53*		*50 - 150*
13C5 PFNA	*53*		*50 - 150*
13C4 PFBA	*39*		*25 - 150*
13C2 PFHxA	*54*		*50 - 150*
13C2 PFDA	*54*		*50 - 150*
13C2 PFUnA	*58*		*50 - 150*
13C2 PFDoA	*42*	*	*50 - 150*
13C8 FOSA	*44*		*25 - 150*
13C5 PFPeA	*75*		*25 - 150*
13C2 PFTeDA	*43*	*	*50 - 150*
d3-NMeFOSAA	*42*	*	*50 - 150*
d5-NEtFOSAA	*43*	*	*50 - 150*
M2-6:2 FTS	*94*		*25 - 150*
M2-8:2 FTS	*75*		*25 - 150*
13C3 PFBS	*27*	*	*50 - 150*

GC/MS Semi VOA

Prep Batch: 474688

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-1	MW-6-20190520	Total/NA	Water	3510C	
480-153995-2	MW-24-20190520	Total/NA	Water	3510C	
480-153995-3	MW-29-20190520	Total/NA	Water	3510C	
480-153995-4	DUP-20190520	Total/NA	Water	3510C	
480-153995-5	EB-020190520	Total/NA	Water	3510C	
MB 480-474688/1-A	Method Blank	Total/NA	Water	3510C	
LCS 480-474688/2-A	Lab Control Sample	Total/NA	Water	3510C	
480-153995-2 MS	MW-24-20190520	Total/NA	Water	3510C	
480-153995-2 MSD	MW-24-20190520	Total/NA	Water	3510C	

Analysis Batch: 475144

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-1	MW-6-20190520	Total/NA	Water	8270D SIM ID	474688
480-153995-2	MW-24-20190520	Total/NA	Water	8270D SIM ID	474688
480-153995-3	MW-29-20190520	Total/NA	Water	8270D SIM ID	474688
480-153995-4	DUP-20190520	Total/NA	Water	8270D SIM ID	474688
480-153995-5	EB-020190520	Total/NA	Water	8270D SIM ID	474688
MB 480-474688/1-A	Method Blank	Total/NA	Water	8270D SIM ID	474688
LCS 480-474688/2-A	Lab Control Sample	Total/NA	Water	8270D SIM ID	474688
480-153995-2 MS	MW-24-20190520	Total/NA	Water	8270D SIM ID	474688
480-153995-2 MSD	MW-24-20190520	Total/NA	Water	8270D SIM ID	474688

LCMS

Prep Batch: 143529

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-1	MW-6-20190520	Total/NA	Water	3535	
480-153995-2	MW-24-20190520	Total/NA	Water	3535	
480-153995-3	MW-29-20190520	Total/NA	Water	3535	
480-153995-4	DUP-20190520	Total/NA	Water	3535	
480-153995-5	EB-020190520	Total/NA	Water	3535	
MB 200-143529/1-A	Method Blank	Total/NA	Water	3535	
LCS 200-143529/2-A	Lab Control Sample	Total/NA	Water	3535	
480-153995-2 MS	MW-24-20190520	Total/NA	Water	3535	
480-153995-2 MSD	MW-24-20190520	Total/NA	Water	3535	

Analysis Batch: 143837

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-1	MW-6-20190520	Total/NA	Water	537 (modified)	143529
480-153995-2	MW-24-20190520	Total/NA	Water	537 (modified)	143529
480-153995-3	MW-29-20190520	Total/NA	Water	537 (modified)	143529
480-153995-4	DUP-20190520	Total/NA	Water	537 (modified)	143529
480-153995-5	EB-020190520	Total/NA	Water	537 (modified)	143529
MB 200-143529/1-A	Method Blank	Total/NA	Water	537 (modified)	143529
LCS 200-143529/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	143529
480-153995-2 MS	MW-24-20190520	Total/NA	Water	537 (modified)	143529
480-153995-2 MSD	MW-24-20190520	Total/NA	Water	537 (modified)	143529

Analysis Batch: 144054

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-1	MW-6-20190520	Total/NA	Water	537 (modified)	143529

LCMS (Continued)

Analysis Batch: 144054 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-153995-2	MW-24-20190520	Total/NA	Water	537 (modified)	143529
LCS 200-143529/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	143529
480-153995-2 MS	MW-24-20190520	Total/NA	Water	537 (modified)	143529

Lab Chronicle

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Client Sample ID: MW-6-20190520
Lab Sample ID: 480-153995-1
Date Collected: 05/20/19 11:25
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			474688	05/24/19 16:11	AAP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	475144	05/30/19 08:25	RJS	TAL BUF
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		1	143837	06/07/19 18:55	JM1	TAL BUR
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		1	144054	06/13/19 18:08	JM1	TAL BUR

Client Sample ID: MW-24-20190520
Lab Sample ID: 480-153995-2
Date Collected: 05/20/19 13:20
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			474688	05/24/19 16:11	AAP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	475144	05/30/19 04:02	RJS	TAL BUF
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		5	143837	06/07/19 19:11	JM1	TAL BUR
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		5	144054	06/13/19 18:23	JM1	TAL BUR

Client Sample ID: MW-29-20190520
Lab Sample ID: 480-153995-3
Date Collected: 05/20/19 14:45
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			474688	05/24/19 16:11	AAP	TAL BUF
Total/NA	Analysis	8270D SIM ID		10	475144	05/30/19 08:49	RJS	TAL BUF
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		5	143837	06/07/19 20:15	JM1	TAL BUR

Client Sample ID: DUP-20190520
Lab Sample ID: 480-153995-4
Date Collected: 05/20/19 00:00
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			474688	05/24/19 16:11	AAP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	475144	05/30/19 09:13	RJS	TAL BUF
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		5	143837	06/07/19 20:31	JM1	TAL BUR

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5
Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			474688	05/24/19 16:11	AAP	TAL BUF
Total/NA	Analysis	8270D SIM ID		1	475144	05/30/19 09:37	RJS	TAL BUF

Lab Chronicle

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5

Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			143529	05/29/19 11:37	TPB	TAL BUR
Total/NA	Analysis	537 (modified)		1	143837	06/07/19 20:46	JM1	TAL BUR

Laboratory References:

TAL BUF = Eurofins TestAmerica, Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL BUR = Eurofins TestAmerica, Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Accreditation/Certification Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Laboratory: Eurofins TestAmerica, Buffalo

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	10026	03-31-20

Laboratory: Eurofins TestAmerica, Burlington

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
New York	NELAP	2	10391	04-01-20

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 (modified)	3535	Water	1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)
537 (modified)	3535	Water	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)
537 (modified)	3535	Water	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)
537 (modified)	3535	Water	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)
537 (modified)	3535	Water	Perfluorobutanesulfonic acid (PFBS)
537 (modified)	3535	Water	Perfluorobutanoic acid (PFBA)
537 (modified)	3535	Water	Perfluorodecanesulfonic acid (PFDS)
537 (modified)	3535	Water	Perfluorodecanoic acid (PFDA)
537 (modified)	3535	Water	Perfluorododecanoic acid (PFDoA)
537 (modified)	3535	Water	Perfluoroheptanesulfonic Acid (PFHpS)
537 (modified)	3535	Water	Perfluoroheptanoic acid (PFHpA)
537 (modified)	3535	Water	Perfluorohexanesulfonic acid (PFHxS)
537 (modified)	3535	Water	Perfluorohexanoic acid (PFHxA)
537 (modified)	3535	Water	Perfluorononanoic acid (PFNA)
537 (modified)	3535	Water	Perfluorooctanesulfonamide (PFOSA)
537 (modified)	3535	Water	Perfluorooctanesulfonic acid (PFOS)
537 (modified)	3535	Water	Perfluorooctanoic acid (PFOA)
537 (modified)	3535	Water	Perfluoropentanoic acid (PFPeA)
537 (modified)	3535	Water	Perfluorotetradecanoic acid (PFTeA)
537 (modified)	3535	Water	Perfluorotridecanoic acid (PFTriA)
537 (modified)	3535	Water	Perfluoroundecanoic acid (PFUnA)

Method Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Method	Method Description	Protocol	Laboratory
8270D SIM ID	Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)	SW846	TAL BUF
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL BUR
3510C	Liquid-Liquid Extraction (Separatory Funnel)	SW846	TAL BUF
3535	Solid-Phase Extraction (SPE)	SW846	TAL BUR

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = Eurofins TestAmerica, Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL BUR = Eurofins TestAmerica, Burlington, 30 Community Drive, Suite 11, South Burlington, VT 05403, TEL (802)660-1990

Sample Summary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
480-153995-1	MW-6-20190520	Water	05/20/19 11:25	05/22/19 09:15	
480-153995-2	MW-24-20190520	Water	05/20/19 13:20	05/22/19 09:15	
480-153995-3	MW-29-20190520	Water	05/20/19 14:45	05/22/19 09:15	
480-153995-4	DUP-20190520	Water	05/20/19 00:00	05/22/19 09:15	
480-153995-5	EB-020190520	Water	05/20/19 12:00	05/22/19 09:15	

Eurofins TestAmerica, Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

220-Shelton

Chain of Custody Record

220-Shelton

eurofins | Environment Testing TestAmerica

Client Information	Sampler: M. MacKenzie	Lab PM: Deyo, Melissa L	Carrier Tracking No(s):	COC No: 480-130246-29388.1
Client Contact: Mark Flusche	Phone: 860.471.6180	E-Mail: melissa.deyo@testamericainc.com		Page: Page 1 of 1
Company: ARCADIS U.S. Inc				Job #:
Address: 855 Route 146 Suite 210	Due Date Requested:			Preservation Codes:
City: Clifton Park	TAT Requested (days):			
State, Zip: NY, 12065				
Phone: 518-250-7322(Tel)	PO #: B0043021.0020			
Email: mark.flusche@arcadis-us.com	WO #:			
Project Name: Port Jervis, NY - Groundwater Project	Project #: 48020198			
Site:	SSOW#:			

480-153995 Chain of Custody

J - DI Water; K - EDTA; L - EDA; V - MCAA; W - pH 4-5; Z - other (specify); Other:

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 analytes)	8270D_SIM_MS_ID - 1,4 Dioxane	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N		
MW-6 - 20190520	5/20/19	1125	G	Water			X	X	4	
MW-24 - 20190520 (MS/MSD)	5/20/19	1320	G	Water		Y	X	X	12	
MW-29 - 20190520	5/20/19	1445	G	Water			X	X	4	
DUP-20190520	5/20/19		G	Water			X	X	4	
EB-20190520	5/20/19	1200	G	Water			X	X	4	
				Water						
				Water						

Buffalo login

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Marcia L MacKenzie	5/21/19 11:40 am		Dale Gray	5/21/19 11:40am	Test Am
Relinquished by: Dale Gray	Date/Time: 5/21/19 5:00 pm	Company Test Am	Received by:	Date/Time: 5/22/19 7:15	Company TMB
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 3.3 #1

Ver: 01/16/2019

Eurofins TestAmerica, Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

220-Shelton

Chain of Custody Record

220-Shelton

eurofins | Environment Testing TestAmerica

Client Information	Sampler: M. MacKenzie	Lab PM: Deyo, Melissa L	Carrier Tracking No(s):	COC No: 480-130246-29388.1
Client Contact: Mark Flusche	Phone: 860.471.6180	E-Mail: melissa.deyo@testamericainc.com		Page: Page 1 of 1
Company: ARCADIS U.S. Inc				Job #:
Address: 855 Route 146 Suite 210	Due Date Requested:	Analysis Requested		
City: Clifton Park	TAT Requested (days):			
State, Zip: NY, 12065				
Phone: 518-250-7322(Tel)	PO #: B0043021.0020			
Email: mark.flusche@arcadis-us.com	WO #:			
Project Name: Port Jervis, NY - Groundwater Project	Project #: 48020198			
Site:	SSOW#:			

Preservation Codes:

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

Other:

Special Instructions/Note: Buffalo login #

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 analytes)	8270D_SIM_MS_ID - 1,4 Dioxane	Total Number of containers
			Preservation Code:				N	N	
MW-6 - 20190520	5/20/19	1125	G	Water			X	X	4
MW-24 - 20190520 (MS/MSD)	5/20/19	1320	G	Water		Y	X	X	12
MW-29 - 20190520	5/20/19	1445	G	Water			X	X	4
DUP-20190520	5/20/19		G	Water			X	X	4
EB-20190520	5/20/19	1200	G	Water			X	X	4
				Water					
				Water					

480-153995 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Marcia J. MacKenzie	5/21/19 11:40 am		Dale Bray	5/21/19 11:40	Test Am
2	Dale Bray	5/21/19 5:00 PM	Test Am		5/22/19 10:30	TestAm
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 0.1

Ver: 01/16/2019

ORIGIN ID:OXCA (203) 929-8140
JACKIE TRUDELL
TESTAMERICA CONNECTICUT
12 PROGRESS DRIVE

SHELTON, CT 06484
UNITED STATES US

SHIP DATE: 21MAY19
ACTWGT: 15.45 LB
CAD: 688819/CAFE3211

BILL RECIPIENT

TO SAMPLE RECEIVING
TESTAMERICA BURLINGTON
30 COMMUNITY DRIVE
SUITE 11
SOUTH BURLINGTON VT 054036809

(802) 660-1990 REF:
INV:
PO: DEPT:

FedEx Express

WED - 22 MAY 10:30A
PRIORITY OVERNIGHT

TRK# 0201 4501 3073 5461

NC BTVA

05403
VT-US BTV

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 480-153995-1

Login Number: 153995
List Number: 1
Creator: Wallace, Cameron

List Source: Eurofins TestAmerica, Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time (Excluding tests with immediate HTs)..	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

Login Sample Receipt Checklist

Client: ARCADIS U.S. Inc

Job Number: 480-153995-1

Login Number: 153995
List Number: 2
Creator: McNabb, Robert W

List Source: Eurofins TestAmerica, Burlington
List Creation: 05/24/19 10:08 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	True	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.1°C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	MM
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	N/A	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT D

Data Validation Report

ARCADIS Design & Consultancy for natural and built assets

Orange & Rockland Utilities

DATA USABILTY SUMMARY REPORT (DUSR)

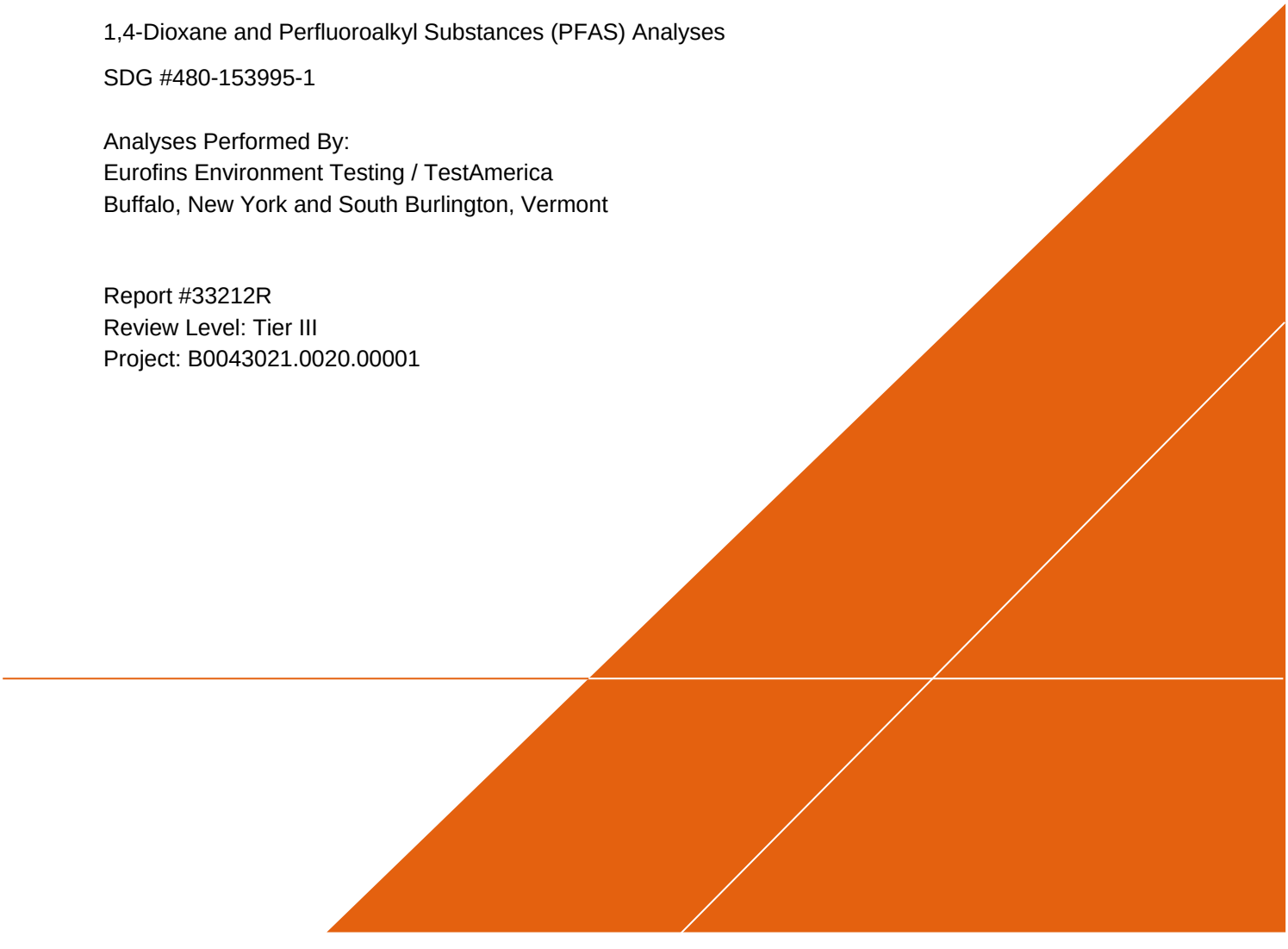
Port Jervis, New York

1,4-Dioxane and Perfluoroalkyl Substances (PFAS) Analyses

SDG #480-153995-1

Analyses Performed By:
Eurofins Environment Testing / TestAmerica
Buffalo, New York and South Burlington, Vermont

Report #33212R
Review Level: Tier III
Project: B0043021.0020.00001



SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #480-153995-1 for samples collected in association with the Orange & Rockland Utilities site located in Port Jervis, New York. The review was conducted as a Tier III evaluation and included review of data package completeness. Analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis	
					1,4-D	PFAS
MW-6-20190520	480-153995-1	Water	5/20/2019		X	X
MW-24-20190520	480-153995-2	Water	5/20/2019		X	X
MW-29-20190520	480-153995-3	Water	5/20/2019		X	X
DUP-20190520	480-153995-4	Water	5/20/2019	MW-24-20190520	X	X
EB-20190520	480-153995-5	Water	5/20/2019		X	X

Note:

1. 1,4-D = 1,4-dioxane; PFAS = perfluoroalkyl substances
2. 1,4-Dioxane analysis was performed by Eurofins TestAmerica, Buffalo and PFAS analysis was performed by Eurofins TestAmerica, Burlington.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 8270D by Selected Ion Monitoring (SIM) and USEPA Method 537 (Modified). Data were reviewed in accordance with USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-2017-002, January 2017 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate); USEPA Method 537; Eurofins TestAmerica, Burlington Standard Operating Procedure Per-and Poly-fluorinated Substances (PFAS) in Drinking Water and Non-Potable Water [Method 537 (Modified)]; and Department of Defense (DoD) Quality Systems Manual (QSM) version 5.1.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound is considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the “R” flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and

provides no information as to whether the compound is present or not. “R” values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

1,4-DIOXANE ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8270D-SIM	Water	7 days from collection to extraction and 40 days from extraction to analysis	Cool to < 6°C

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

1,4-Dioxane was not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable, and all analyses were performed within a 12-hour tune clock.

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

The method specifies percent relative standard deviation (%RSD) and relative response factor (RRF) limits for select compounds only. A technical review of the data applies limits to all compounds with no exceptions.

All target compounds associated with the initial calibration standards must exhibit a %RSD less than the control limit (20%) or a correlation coefficient greater than 0.99 and an RRF value greater than control limit (0.05).

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (20%) and RRF value greater than control limit (0.05).

The initial calibration and continuing calibration verification results were within the specified control limits.

5. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. 1,4-Dioxane analysis requires that 1,4-dioxane-d8 exhibits a recovery within the laboratory-established acceptance limits.

Sample locations associated with surrogates exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Surrogate	Recovery
MW-29-20190520	1,4-Dioxane-d8	< LL but > 10%

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of a surrogate deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

6. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every sample analysis. The criteria requires the internal standard compound associated with 1,4-dioxane exhibit area counts that are not greater than two times (+100%) or less than one-half (-50%) of the area counts of the associated continuing calibration standard.

All internal standard responses were within control limits.

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD performed on sample location MW-24-20190520 exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

8. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

The LCS analysis exhibited a recovery for 1,4-dioxane within the control limits.

9. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result (µg/L)	Duplicate Result (µg/L)	RPD
MW-24-20190520 / DUP-20190520	1,4-Dioxane	0.20 U	0.20 U	AC

Notes:

µg/L Microgram per liter

AC Acceptable

1,4-Dioxane was not detected in the parent sample MW-24-20190520 and field duplicate sample DUP-20190520.

10. Compound Identification

Compounds are identified on the GC/MS by using the analytes relative retention time and ion spectra.

All identified compounds met the specified criteria.

11. System Performance and Overall Assessment

Sample MW-29-20190520 required dilution due to the nature of the sample matrix. The 1,4-dioxane result was reported as not detected at an elevated reporting limit of 2.0µg/L.

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR 1,4-DIOXANE

1,4-Dioxane: SW-846 8270D-SIM	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field Duplicate Precision (RPD)		X		X	
Surrogate Spike Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration RRFs		X		X	
Continuing calibration %Ds		X		X	
Instrument tune and performance check		X		X	
Ion abundance criteria for each instrument used		X		X	
Internal standard		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	

1,4-Dioxane: SW-846 8270D-SIM	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
D. Quantitation transcriptions/calculations		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

PERFLUOROALKYL SUBSTANCES (PFAS) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
USEPA Method 537 (Modified)	Water	14 days from collection to extraction and 28 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

QA blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A BAL of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the MDL. The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Mass Calibration

Mass calibration and system performance were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

The %RSD of the RF must be less than 20%, or for linear calibration, $r^2 \geq 0.99$. Analytes must be within 70-130% of their true value for each calibration standard.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a %D less than the control limit of 30%.

All calibrations were within the specified control limits with the exception of the compounds presented in the following table.

Sample Locations	Initial/Continuing	Compound	Criteria
MW-29-20190520 DUP-20190520 EB-20190520	Continuing Calibration	Perfluorobutanoic acid (PFBA)	+35.4%

The criteria used to evaluate the initial and continuing calibration are presented in the following table. In the case of a calibration deviation, the sample results are qualified.

Initial/Continuing	Criteria	Sample Result	Qualification
Initial Calibration	%RSD > 20% or a correlation coefficient <0.99	Non-detect	UJ
		Detect	J
Continuing Calibration	%D > 30% (increase in sensitivity)	Non-detect	No Action
		Detect	J
	%D > 30% (decrease in sensitivity)	Non-detect	UJ
		Detect	J

5. Isotopically Labelled Standards

5.1. Extracted Internal Standard (EIS)/Surrogate Compounds

Labeled standards must be added to all field samples and QC samples prior to extraction. EIS recoveries must be within DoD QSM 5.1 specified limits of 50% to150%.

Sample locations associated with EIS exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	EIS	Associated Compound	Recovery
MW-6-20190520	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 25% but > 10%
	13C8 FOSA	Perfluorooctanesulfonamidoacetic acid (PFOSA)	< 50% but > 25%
	13C5 PFPeA	Perfluoropentanoic acid (PFPeA)	
	13C2 PFTeDA	Perfluorotetradecanoic acid (PFTeA)	
	d3-NMeFOSAA	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	
	d5-NEtFOSAA	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	
MW-24-20190520	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 50% but > 25%
	13C2 PFTeDA	Perfluorotetradecanoic acid (PFTeA)	
	d3-NMeFOSAA	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	

Sample Locations	EIS	Associated Compound	Recovery
	d5-NEtFOSAA	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	
	13C3 PFBS	Perfluorobutanesulfonic acid (PFBS)	
MW-29-20190520	13C4 PFBA	Perfluorobutanoic acid (PFBA)	< 25% but > 10%
	18O2 PFHxS	Perfluorohexanesulfonic acid (PFHxS)	< 50% but > 25%
	13C PFOS	Perfluorooctanesulfonic acid (PFOS)	
	13C2 PFHxA	Perfluorohexanoic acid (PFHxA)	
	13C5 PFPeA	Perfluoropentanoic acid (PFPeA)	
DUP-20190520	13C4 PFOS	Perfluorooctanesulfonic acid (PFOS)	< 50% but > 25%
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	
	13C2 PFDoA	Perfluorododecanoic acid (PFDoA)	
	13C2 PFTeDA	Perfluorotetradecanoic acid (PFTeA)	
	d3-NMeFOSAA	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	
	d5-NEtFOSAA	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	
	13C PFBS	Perfluorobutanesulfonic acid (PFBS)	
EB-20190520	18O2 PFHxS	Perfluorohexanesulfonic acid (PFHxS)	< 50% but > 25%
	13C4 PFBA	Perfluorobutanoic acid (PFBA)	
	13C8 FOSA	Perfluorooctanesulfonamidoacetic acid (PFOSA)	
	13C2 PFTeDA	Perfluorotetradecanoic acid (PFTeA)	
	d3-NMeFOSAA	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	
	d5-NEtFOSAA	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	

The criteria used to evaluate the EIS recoveries are presented in the following table. In the case of an EIS deviation, the sample results associated with the EIS are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> 150%	Non-detect	No Action
	Detect	J
< 50% but > 25%	Non-detect	No Action
	Detect	
< 25% but > 10%	Non-detect	UJ
	Detect	J

Control Limit	Sample Result	Qualification
< 10%	Non-detect	R
	Detect	J

As part of the isotope dilution analysis, the EIS are used for quantitation of the sample results, therefore the calculation of sample concentrations is adjusted for EIS recoveries. The data will not be qualified unless EIS recoveries are less than 25%.

5.2. Injection Internal Standards

Injection internal standards must be added to the aliquot of sample dilutions, QC samples, and standards just prior to analysis. Peak areas must be within 50-150% of the area measured in the ICAL midpoint standard. On days when ICAL is not performed, the peak areas must be within 50-150% of the peak area measured in daily initial CCV.

Internal standard responses were within the control limits with the following exceptions:

- The peak areas for 13C2 PFOA were less than 50% but greater than 10% for samples MW-24-20190520, MW-29-20190520, and DUP-20190520. Since the EIS are used for quantitation of the sample results and the peak areas were greater than 10%, no qualification of the sample results was taken.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The RPD between the MS/MSD recoveries must exhibit an RPD less than 30%.

The MS/MSD performed using sample MW-24-20190520 exhibited recoveries outside of the control limits as presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
MW-24-20190520	Perfluorobutanoic acid (PFBA)	AC	< 10%
	Perfluorobutanoesulfonic acid (PFBS)		> UL

Note:

AC Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below. Qualifiers were also assigned to the associated field duplicate sample DUP-20190520.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J

Control Limit	Sample Result	Qualification
< 10%	Non-detect	R
	Detect	J

Sample locations associated with MS/MSD recoveries exhibiting an RPD greater than of the control limit presented in the following table.

Sample Locations	Compound
MW-24-20190520	Perfluorobutanoic acid (PFBA)
	Perfluoropentanoic acid (PFPeA)
	Perfluorobutanoesulfonic acid (PFBS)
	Perfluorohexanesulfonic acid (PFHxS)
	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)
	1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)

The criteria used to evaluate the RPD between the MS/MSD recoveries are presented in the following table. In the case of an RPD deviation, the sample results are qualified as documented in the table below. Qualifiers were also assigned to the associated field duplicate sample DUP-20190520.

Control Limit	Sample Result	Qualification
> UL	Non-detect	UJ
	Detect	J

7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result (ng/L)	Duplicate Result (ng/L)	RPD
MW-24-20190520 / DUP-20190520	Perfluorobutanoic acid (PFBA)	37	24	AC
	Perfluoropentanoic acid (PFPeA)	8.0 J	17	
	Perfluorohexanoic acid (PFHxA)	13	16	
	Perfluoroheptanoic acid (PFHpA)	5.6 J	6.2 J	
	Perfluorooctanoic acid (PFOA)	11	11	
	Perfluorobutanesulfonic acid (PFBS)	9.6	7.3 J	
	Perfluorohexanesulfonic acid (PFHxS)	9.1	9.0	
	Perfluorooctanesulfonic acid (PFOS)	9.0 U	14	

Notes:

AC Acceptable

ng/L Nanogram per liter

The differences in the results between the parent sample MW-24-20190520 and field duplicate sample DUP-20190520 were acceptable.

9. Compound Identification

PFAS analytes are identified by using the compound's ion abundance ratios, signal-to-noise values, and relative retention times.

All identified compounds met method criteria.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PFAS

PFAS: USEPA Modified 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/TANDEM MASS SPECTROMETRY (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R					X
LCS/LCSD Precision (RPD)					X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X	X		
MS/MSD Precision (RPD)		X	X		
Field Duplicate (RPD)		X		X	
Extracted Internal Standards (EIS) %R		X	X		
Injection Internal Standard %R		X		X	
Dilution Factor		X		X	
Moisture Content	X				X
Tier III Validation					
Instrument tune and performance check		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X	X		
Instrument sensitivity check		X		X	
Ion transitions used		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Transcription/calculations acceptable		X		X	

PFAS: USEPA Modified 537	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
LIQUID CHROMATOGRAPHY/TANDEM MASS SPECTROMETRY (LC/MS/MS)					
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

SAMPLE COMPLIANCE REPORT

SAMPLE COMPLIANCE REPORT

Sample Delivery Groups (SDGs)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]		Noncompliance
					SVOC	PFAS	
480-153995-1	5/20/2019	USEPA Method 537 Modified and SW-846 8270D-SIM	MW-6-20190520	Water	Yes	No	PFAS: EIS
	5/20/2019		MW-24-20190520	Water	Yes	No	PFAS: EIS, MSD %R, MS/MSD RPD
	5/20/2019		MW-29-20190520	Water	No	No	SVOC: Surrogate %R PFAS: CCV %D, EIS
	5/20/2019		DUP-20190520	Water	Yes	No	PFAS: CCV %D, EIS, MSD %R, MS/MSD RPD
	5/20/2019		EB-20190520	Water	Yes	No	PFAS: CCV %D, EIS

Note:

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable.

VALIDATION PERFORMED BY: Jennifer Singer

SIGNATURE: 

DATE: July 2, 2019

PEER REVIEW: Dennis Capria

DATE: July 2, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

Eurofins TestAmerica, Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Phone (716) 691-2600 Fax (716) 691-7991

220-Shelton

Chain of Custody Record

220-Shelton

eurofins | Environment Testing TestAmerica

Client Information	Sampler: M. MacKenzie	Lab PM: Deyo, Melissa L	Carrier Tracking No(s):	COC No: 480-130246-29388.1
Client Contact: Mark Flusche	Phone: 860.471.6180	E-Mail: melissa.deyo@testamericainc.com		Page: Page 1 of 1
Company: ARCADIS U.S. Inc				Job #:
Address: 855 Route 146 Suite 210	Due Date Requested:			Preservation Codes:
City: Clifton Park	TAT Requested (days):			
State, Zip: NY, 12065				480-153995 Chain of Custody
Phone: 518-250-7322(Tel)	PO #: B0043021.0020			
Email: mark.flusche@arcadis-us.com	WO #:			
Project Name: Port Jervis, NY - Groundwater Project	Project #: 48020198			
Site:	SSOW#:			

Analysis Requested

J - DI Water; K - EDTA; L - EDA; V - MCAA; W - pH 4-5; Z - other (specify); Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA - PFAS, Standard List (21 analytes)	8270D_SIM_MS_ID - 1,4 Dioxane	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N		
MW-6 - 20190520	5/20/19	1125	G	Water			X	X	4	
MW-24 - 20190520 (MS/MSD)	5/20/19	1320	G	Water		Y	X	X	12	
MW-29 - 20190520	5/20/19	1445	G	Water			X	X	4	
DUP-20190520	5/20/19		G	Water			X	X	4	
EB-20190520	5/20/19	1200	G	Water			X	X	4	
				Water						
				Water						

Buffalo login

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Marcia J MacKenzie	5/21/19 11:40 am		Dale Gray	5/21/19 11:40am	Test Am
Relinquished by: Dale Gray	Date/Time: 5/21/19 5:00 pm	Company Test Am	Received by:	Date/Time: 5/22/19 7:15	Company TMB
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 3.3 #1

Ver: 01/16/2019

Definitions/Glossary

Client: ARCADIS U.S. Inc
Job ID: 480-153995-1
Project/Site: Orange & Rockland Utilities -Port Jervis

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
E	Result exceeded calibration range.

LCMS

Qualifier	Qualifier Description
*	Isotope Dilution analyte is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: MW-6-20190520
Lab Sample ID: 480-153995-1

Date Collected: 05/20/19 11:25
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 08:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*19*		*15 - 110*	*05/24/19 16:11*	*05/30/19 08:25*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**24**	J	1.8	0.88	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoropentanoic acid (PFPeA)	**75**	J	1.8	0.56	ng/L		05/29/19 11:37	06/13/19 18:08	1
Perfluorohexanoic acid (PFHxA)	**93**		1.8	0.67	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroheptanoic acid (PFHpA)	**11**		1.8	0.80	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanoic acid (PFOA)	**20**		1.8	0.56	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorononanoic acid (PFNA)	ND		1.8	0.24	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorodecanoic acid (PFDA)	ND		1.8	0.68	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroundecanoic acid (PFUnA)	ND		1.8	0.47	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorododecanoic acid (PFDoA)	ND		1.8	0.52	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorotridecanoic acid (PFTriA)	ND		1.8	0.53	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorotetradecanoic acid (PFTeA)	ND	UJ	1.8	0.81	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorobutanesulfonic acid (PFBS)	**6.8**		1.8	0.43	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorohexanesulfonic acid (PFHxS)	**4.3**		1.8	0.71	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.8	0.84	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanesulfonic acid (PFOS)	**7.7**		1.8	0.54	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.8	0.79	ng/L		05/29/19 11:37	06/07/19 18:55	1
Perfluorooctanesulfonamide (PFOSA)	ND	UJ	1.8	0.56	ng/L		05/29/19 11:37	06/07/19 18:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	UJ	18	1.5	ng/L		05/29/19 11:37	06/07/19 18:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	UJ	18	1.3	ng/L		05/29/19 11:37	06/07/19 18:55	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		18	4.1	ng/L		05/29/19 11:37	06/07/19 18:55	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		18	2.6	ng/L		05/29/19 11:37	06/07/19 18:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFHpA	*67*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFOA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFOS	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C5 PFNA	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C4 PFBA	*22*	*	*25 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFHxA	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFDA	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFUnA	*53*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C2 PFDoA	*50*		*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C8 FOSA	*43*		*25 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
13C5 PFPeA	*45*		*25 - 150*	*05/29/19 11:37*	*06/13/19 18:08*	*1*
13C2 PFTeDA	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
d3-NMeFOSAA	*36*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*
d5-NEtFOSAA	*40*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 18:55*	*1*

Client Sample ID: MW-6-20190520
Lab Sample ID: 480-153995-1
Date Collected: 05/20/19 11:25
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-6:2 FTS	103		25 - 150	05/29/19 11:37	06/07/19 18:55	1
M2-8:2 FTS	85		25 - 150	05/29/19 11:37	06/07/19 18:55	1
13C3 PFBS	53		50 - 150	05/29/19 11:37	06/07/19 18:55	1

Client Sample ID: MW-24-20190520
Lab Sample ID: 480-153995-2
Date Collected: 05/20/19 13:20
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 04:02	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	18		15 - 110	05/24/19 16:11	05/30/19 04:02	1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**37**	J	9.0	4.5	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoropentanoic acid (PFPeA)	**8.0**	J F2	9.0	2.8	ng/L		05/29/19 11:37	06/13/19 18:23	5
Perfluorohexanoic acid (PFHxA)	**13**		9.0	3.4	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroheptanoic acid (PFHpA)	**5.6**	J	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanoic acid (PFOA)	**11**		9.0	2.8	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorononanoic acid (PFNA)	ND		9.0	1.2	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorodecanoic acid (PFDA)	ND		9.0	3.5	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroundecanoic acid (PFUnA)	ND		9.0	2.4	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorododecanoic acid (PFDoA)	ND		9.0	2.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorotridecanoic acid (PFTriA)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorotetradecanoic acid (PFTeA)	ND	UJ	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorobutanesulfonic acid (PFBS)	**9.6**	F2 J	9.0	2.2	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorohexanesulfonic acid (PFHxS)	**9.1**	F2 J	9.0	3.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		9.0	4.3	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanesulfonic acid (PFOS)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorodecanesulfonic acid (PFDS)	ND		9.0	4.0	ng/L		05/29/19 11:37	06/07/19 19:11	5
Perfluorooctanesulfonamide (PFOSA)	ND		9.0	2.9	ng/L		05/29/19 11:37	06/07/19 19:11	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	F2 UJ	90	7.6	ng/L		05/29/19 11:37	06/07/19 19:11	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	UJ	90	6.7	ng/L		05/29/19 11:37	06/07/19 19:11	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND	F2 UJ	90	21	ng/L		05/29/19 11:37	06/07/19 19:11	5
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND	UJ	90	13	ng/L		05/29/19 11:37	06/07/19 19:11	5

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	50		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFHpA	81		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFOA	77		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFOS	57		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C5 PFNA	61		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C4 PFBA	41		25 - 150	05/29/19 11:37	06/07/19 19:11	5

Client Sample ID: MW-24-20190520
Lab Sample ID: 480-153995-2
Date Collected: 05/20/19 13:20
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	63		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C2 PFDA	64		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C2 PFUnA	56		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C2 PFDoA	53		50 - 150	05/29/19 11:37	06/07/19 19:11	5
13C8 FOSA	51		25 - 150	05/29/19 11:37	06/07/19 19:11	5
13C5 PFPeA	53		25 - 150	05/29/19 11:37	06/13/19 18:23	5
13C2 PFTeDA	48	*	50 - 150	05/29/19 11:37	06/07/19 19:11	5
d3-NMeFOSAA	44	*	50 - 150	05/29/19 11:37	06/07/19 19:11	5
d5-NEtFOSAA	46	*	50 - 150	05/29/19 11:37	06/07/19 19:11	5
M2-6:2 FTS	103		25 - 150	05/29/19 11:37	06/07/19 19:11	5
M2-8:2 FTS	81		25 - 150	05/29/19 11:37	06/07/19 19:11	5
13C3 PFBS	39	*	50 - 150	05/29/19 11:37	06/07/19 19:11	5

Client Sample ID: MW-29-20190520
Lab Sample ID: 480-153995-3
Date Collected: 05/20/19 14:45
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND	UJ	2.0	1.0	ug/L		05/24/19 16:11	05/30/19 08:49	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,4-Dioxane-d8	12	*	15 - 110	05/24/19 16:11	05/30/19 08:49	10

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND	UJ	8.5	4.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoropentanoic acid (PFPeA)	ND	UJ	8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorohexanoic acid (PFHxA)	**15**	J	8.5	3.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroheptanoic acid (PFHpA)	**5.6**	J	8.5	3.9	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanoic acid (PFOA)	**21**		8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorononanoic acid (PFNA)	ND		8.5	1.1	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorodecanoic acid (PFDA)	ND		8.5	3.3	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroundecanoic acid (PFUnA)	ND		8.5	2.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorododecanoic acid (PFDoA)	ND		8.5	2.5	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorotridecanoic acid (PFTriA)	ND		8.5	2.5	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorotetradecanoic acid (PFTeA)	ND		8.5	3.9	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorobutanesulfonic acid (PFBS)	**24**		8.5	2.1	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorohexanesulfonic acid (PFHxS)	**15**	J	8.5	3.4	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		8.5	4.0	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanesulfonic acid (PFOS)	**18**	J	8.5	2.6	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorodecanesulfonic acid (PFDS)	ND		8.5	3.8	ng/L		05/29/19 11:37	06/07/19 20:15	5
Perfluorooctanesulfonamide (PFOSA)	ND		8.5	2.7	ng/L		05/29/19 11:37	06/07/19 20:15	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND		85	7.2	ng/L		05/29/19 11:37	06/07/19 20:15	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND		85	6.3	ng/L		05/29/19 11:37	06/07/19 20:15	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		85	19	ng/L		05/29/19 11:37	06/07/19 20:15	5

Client Sample ID: MW-29-20190520
Lab Sample ID: 480-153995-3
Date Collected: 05/20/19 14:45
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		85	12	ng/L		05/29/19 11:37	06/07/19 20:15	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*36*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFHpA	*51*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFOA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFOS	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C5 PFNA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C4 PFBA	*21*	*	*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFHxA	*42*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFDA	*72*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFUnA	*76*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFDoA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C8 FOSA	*55*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C5 PFPeA	*27*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C2 PFTeDA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
d3-NMeFOSAA	*56*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
d5-NEtFOSAA	*54*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
M2-6:2 FTS	*108*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
M2-8:2 FTS	*91*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*
13C3 PFBS	*73*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:15*	*5*

Client Sample ID: DUP-20190520
Lab Sample ID: 480-153995-4
Date Collected: 05/20/19 00:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 09:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*15*		*15 - 110*	*05/24/19 16:11*	*05/30/19 09:13*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	**24**	J	9.0	4.5	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoropentanoic acid (PFPeA)	**17**	J	9.0	2.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorohexanoic acid (PFHxA)	**16**		9.0	3.4	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroheptanoic acid (PFHpA)	**6.2**	J	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorooctanoic acid (PFOA)	**11**		9.0	2.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorononanoic acid (PFNA)	ND		9.0	1.2	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorodecanoic acid (PFDA)	ND		9.0	3.5	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroundecanoic acid (PFUnA)	ND		9.0	2.4	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorododecanoic acid (PFDoA)	ND	UJ	9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorotridecanoic acid (PFTriA)	ND		9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorotetradecanoic acid (PFTeA)	ND	UJ	9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorobutanesulfonic acid (PFBS)	**7.3**	J	9.0	2.2	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorohexanesulfonic acid (PFHxS)	**9.0**	J	9.0	3.6	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluoroheptanesulfonic Acid (PFHpS)	ND		9.0	4.3	ng/L		05/29/19 11:37	06/07/19 20:31	5

Client Sample ID: DUP-20190520
Lab Sample ID: 480-153995-4
Date Collected: 05/20/19 00:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**14**	J	9.0	2.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorodecanesulfonic acid (PFDS)	ND		9.0	4.1	ng/L		05/29/19 11:37	06/07/19 20:31	5
Perfluorooctanesulfonamide (PFOSA)	ND		9.0	2.9	ng/L		05/29/19 11:37	06/07/19 20:31	5
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	UJ	90	7.7	ng/L		05/29/19 11:37	06/07/19 20:31	5
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	UJ	90	6.8	ng/L		05/29/19 11:37	06/07/19 20:31	5
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND	UJ	90	21	ng/L		05/29/19 11:37	06/07/19 20:31	5
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND	UJ	90	13	ng/L		05/29/19 11:37	06/07/19 20:31	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFHpA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFOA	*74*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFOS	*33*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C5 PFNA	*57*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C4 PFBA	*39*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFHxA	*64*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFDA	*58*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFUnA	*55*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFDoA	*45*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C8 FOSA	*56*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C5 PFPeA	*56*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C2 PFTeDA	*44*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
d3-NMeFOSAA	*39*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
d5-NEtFOSAA	*47*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
M2-6:2 FTS	*100*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
M2-8:2 FTS	*90*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*
13C3 PFBS	*41*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:31*	*5*

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5
Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 8270D SIM ID - Semivolatile Organic Compounds (GC/MS SIM / Isotope Dilution)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dioxane	ND		0.20	0.10	ug/L		05/24/19 16:11	05/30/19 09:37	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,4-Dioxane-d8	*25*		*15 - 110*	*05/24/19 16:11*	*05/30/19 09:37*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	ND	UJ	1.7	0.87	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoropentanoic acid (PFPeA)	ND		1.7	0.55	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorohexanoic acid (PFHxA)	ND		1.7	0.66	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoroheptanoic acid (PFHpA)	ND		1.7	0.80	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanoic acid (PFOA)	ND		1.7	0.55	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorononanoic acid (PFNA)	ND		1.7	0.24	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorodecanoic acid (PFDA)	ND		1.7	0.67	ng/L		05/29/19 11:37	06/07/19 20:46	1

Client Sample ID: EB-020190520
Lab Sample ID: 480-153995-5
Date Collected: 05/20/19 12:00
Matrix: Water
Date Received: 05/22/19 09:15

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroundecanoic acid (PFUnA)	ND		1.7	0.46	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorododecanoic acid (PFDoA)	ND		1.7	0.52	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorotridecanoic acid (PFTriA)	ND		1.7	0.52	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorotetradecanoic acid (PFTeA)	ND	UJ	1.7	0.80	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorobutanesulfonic acid (PFBS)	ND		1.7	0.43	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorohexanesulfonic acid (PFHxS)	ND	UJ	1.7	0.70	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		1.7	0.83	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanesulfonic acid (PFOS)	ND		1.7	0.53	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorodecanesulfonic acid (PFDS)	ND		1.7	0.79	ng/L		05/29/19 11:37	06/07/19 20:46	1
Perfluorooctanesulfonamide (PFOSA)	ND	UJ	1.7	0.56	ng/L		05/29/19 11:37	06/07/19 20:46	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	ND	UJ	17	1.5	ng/L		05/29/19 11:37	06/07/19 20:46	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	ND	UJ	17	1.3	ng/L		05/29/19 11:37	06/07/19 20:46	1
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)	ND		17	4.0	ng/L		05/29/19 11:37	06/07/19 20:46	1
1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)	ND		17	2.5	ng/L		05/29/19 11:37	06/07/19 20:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*49*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFHpA	*71*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFOA	*66*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFOS	*53*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C5 PFNA	*63*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C4 PFBA	*39*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFHxA	*72*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFDA	*65*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFUnA	*62*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFDoA	*51*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C8 FOSA	*42*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C5 PFPeA	*62*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C2 PFTeDA	*45*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
d3-NMeFOSAA	*43*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
d5-NEtFOSAA	*48*	*	*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
M2-6:2 FTS	*84*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
M2-8:2 FTS	*77*		*25 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*
13C3 PFBS	*52*		*50 - 150*	*05/29/19 11:37*	*06/07/19 20:46*	*1*