PARSONS

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September 12, 2019

Mr. Maurice F. Moore
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Ave.
Buffalo, NY 14203-2999

RE: Emerging Contaminants Groundwater Sampling Data Summary Report
Former Sinclair Refinery, Wellsville, NYSDEC Site No. 902003

Dear Mr. Moore:

This letter provides a summary of the emerging contaminant sampling event completed at the referenced site. On March 18, 2019, the New York State Department of Environmental Conservation (NYSDEC) requested that BP Remediation Management (BP) collect site groundwater and analyze for emerging contaminants 1,4-dioxane and per- and polyfluoroalkyl (PFAS) substances and submit a draft work plan for performance of this work. In response, Parsons, on behalf of BP, submitted a work plan on May 16, 2019. At the request of NYSDEC, an additional downgradient well (MW-27) was added, and the work plan was resubmitted to the NYSDEC on May 22, 2019. NYSDEC subsequently approved the revised work plan on June 17, 2019.

Figure 1 (Sampling Locations) identifies the locations of the five monitoring wells analyzed for emerging contaminants. Table 1 summarizes well construction information for each of the sampling locations. Well location MWR-11 is upgradient of the source area while the other four wells are considered downgradient.

Groundwater sampling was completed in compliance with the NYSDEC approved work plan on July 16 and 17, 2019. Field sampling forms which include the low flow sampling logs and the 1,4-dioxane and PFAS daily sampling checklists have been provided in Appendix A. The low flow sampling logs provide well depth, depth to water prior to purge, and data collected while purging the well (time of measurement, depth to water, temperature, pH, conductivity, oxidation-reduction potential, turbidity, and flow rate). In addition to the five groundwater samples from the wells, several quality assurance samples were also collected. A field duplicate sample was collected from MWR-03 along with an equipment blank and two field blanks. Analysis was completed by Pace Analytical Services, LLC in Minneapolis, Minnesota. The analytical data packages have been included as Appendix B. The analytical data has been uploaded to the NYSDEC EIMS analytical database using the database software application EQuIS™ from EarthSoft ® Inc.

The analytical results have been tabulated in Table 2. Analytical results were compared to the New York State Drinking Water Quality Council's recommended (December 18, 2018) maximum contaminant levels (MCLs) for the compounds perfluorooctanoic acid (PFOA),

perfluorooctanesulfonic acid (PFOS), and 1,4-dioxane. The compound 1,4-dioxane was below the analytical detection limits in each of the samples. PFOS exceeded the recommended MCL (10 ng/L) in the sample from downgradient well MWR-01 (39 ng/L). In upgradient well MWR-11, both PFOA (12 ng/L) and PFOS (11 ng/L) exceeded the recommended MCL (10 ng/L for both). In general, PFAS concentrations were highest in the upgradient well MWR-11 and at downgradient well MWR-01, while generally lower concentrations were found in the other three downgradient well locations.

If you have any questions regarding this document, please contact Andrew Shrock at (216) 912-2914.

Sincerely,

Andrew Shrock
Project Manager

cc: John Frankenthal, BP
File

MONITORING WELL AND PIEZOMETER LOCATIONS
FORMER SINCLAIR REFINERY SITE
WELLSVILLE, NEW YORK

N

Notes:
1) Blue labeled locations indicate wells monitored for water level elevation.
2) Boxed labels indicate wells sampled for chemical analysis.
3) Monitoring wells MW-78, OW-04, MW-71 and MW-55R are required to be sampled annually.
4) Monitoring wells MWR-1 through MWR-11 are required to be sampled biennially.

Highlighted wells sampled for PFAs and 1,4-dioxane.

MW-78 MW-11 T-01 T-23 T-36 TPZ-01 T-35 MH-A TPZ-02 MW-69B RW-03 MW-69A MW-25 T-40 RW-02 RW-01 T-34 PZ-16 MW-68A MW-68B T-33 MH-B MW-57 OW-01 T-24 MW-34 TPZ-03 T-06 T-21 MW-92 MW-94 MW-67 T-39 T-22 MW-49 OW-07 OW-02 OW-04 MW-85 MW-72 MW-83 MW-27 MH-C MW-70 OW-03 RW-06 MW-93 OW-06 T-05 MW-71 PZ-02 MW-52 T-04 MW-90 MW-91 T-03 MW-86 TPZ-04 SP-5W MW-35 MH-D PW-02 SP-4E OW-08 T-25 PZ-01 MW-101 PZ-04 T-07 TPZ-05 PW-01 PZ-11 MW-102 PZ-03 T-17 MW-74 PZ-12 MH-E SP-3A SP-3E OW-10 MW-100 T-26 TPZ-06 T-38 OW-09 MW-01 MW-87 MW-55R MW-88 T-18 MH-F SP-2E MW-30 MW-95 T-08 MW-56 T-37 TPZ-07 MW-29 MWR-01 PW-03 PZ-05 MW-97 MH-G PZ-07 PW-04 PZ-06 MW-81 PZ-08 SP-1E PZ-15 MW-08 MW-50 T-27 SP-1W MW-54 MW-76 T-20 T-28 DP-2 MWR-02 MW-53 MW-82 TPZ-08 T-30 T-12 MW-79 T-29 T-11 DP-1 MWR-03 MW-98 MW-89 MH-H T-31 MW-77 T-10 T-32 TPZ-09 T-09 T-16 P-05 P-06 T-13 PZ-09 PW-05 PZ-10 MWR-04 P-01 T-14 T-15 MWR-05 MW-99 P-04 P-02 MWR-10 MWR-06 MWR-09 P-03 MWR-07 MWR-08 MW-21 MWR-11

Genesee River

Legend

- CELA Piezometer (P-)
- Deflection Zone Piezometer (DP-)
- Monitoring Well (MW-, MWR-, OW-)
- Phase I Extraction Well (RW-)
- Piezometer (T-)
- Pump Test Extraction Well (PW-)
- Pump Test Piezometer (PZ-)
- Recovery Trench Piezometer (TPZ-)
- Swale Piezometer (SP-)
- Collection Trench Manhole (MH-)
- Collection Trench
- 2011 Topography & Site Features

175 87.5 0 175 350 Feet

1 inch = 350 feet

ON-SITE TECHNICAL SERVICES, INC.
72 Railroad Avenue Wellsville, NY 14895

FIGURE NO.	1
PROJECT	WELLSVILLE OU2
FILE	FIG_5.MXD
DATE	04.16.15

N:\ARCO_WLSV\COMBINEDANNUALREPORT\2013\FIGURES\FIG_5

Table 1
Former Sinclair Refinery, Wellsville, New York
Proposed Sampling Location Construction Details

Well ID	Well Diameter (inches)	TOC Elevation (ft AMSL)	Total Depth (ft)	Monitored Hydrogeologic Unit	Material of Construction of Monitored Zone and Length
MWR-01	4	1502.04	33.31	Overburden	Stainless Steel Screen, 10 slot, 25'
MWR-03	4	1506.59	29.97	Overburden	Stainless Steel Screen, 10 slot, 20'
MWR-11	4	1511.30	28.33	Overburden	Stainless Steel Screen, 10 slot, 20'
MW-27	2	1498.24	26.00	Overburden	Galvanized Screen, 10 slot, 10'
MW-78	2	1497.79	24.00	Overburden	Sch. 40 PVC, 10 slot, 10'

Table 2
Emerging Contamionant Analytical Results
Former Sinclair Refinery, Wellsville, NY

				Location Description	Upgradient		Downgradient		Downgradient		Field Duplicate		Downgradient		Downgradient		Equipment Blank		Field Blank		Field Blank	
				Location ID	MWR-11		MWR-01		MWR-03		DUP1-0719		MW-27		MW-78		EB1-0719		FB1-0719		FB2-0719	
				Sample ID	MWR11-0719		MWR1-0719		MWR3-0719		DUP1-0719		MW27-0719		MW78-0719		EB1-0719		FB1-0719		FB2-0719	
				Matrix	WQ		WQ		WQ		WQ		WQ		WQ		WQ		WQ		WQ	
				Lab Sample ID	10483659005		10483659006		10483659003		10483659004		10483659009		10483659001		10483659007		10483659002		10483659008	
				Sample Date	7/16/2019		7/16/2019		7/16/2019		7/16/2019		7/17/2019		7/16/2019		7/16/2019		7/16/2019		7/17/2019	
				Sample Type Code	FS		FS		FS		Duplicate		FS		FS		EB		FB		FB	
Analytical Method	Chemical Name	Unit	DWQC																			
E537-LL	Perflurobutanoic acid (PFBA)	ng/l	-		**14**		**12**		**1.8**	**J**	**1.5**	**J**	**7.7**		**9.9**		**1.0**	**J**	2.0	U	2.0	U
E537-LL	Perfloropentanoic acid (PFPeA)	ng/l	-		**17**		**31**		2.0	U	2.0	U	**2.0**	**J**	**1.3**	**J**	2.0	U	2.0	U	2.0	U
E537-LL	Perfluorohexanoic acid (PFHxA)	ng/l	-		**16**		**27**		2.0	U	2.0	U	**2.5**		**1.3**	**J**	2.0	U	2.0	U	2.0	U
E537-LL	Perfluoroheptanoic acid (PFHpA)	ng/l	-		**9.1**		**6.7**		2.0	U	2.0	U	**1.5**	**J**	**0.83**	**J**	2.0	U	2.0	U	2.0	U
E537-LL	Perfluorooctanoic acid (PFOA)	ng/l	10		**12**		**6.1**		2.0	U	2.0	U	**3.1**		**3.5**		2.0	U	2.0	U	2.0	U
E537-LL	Perfluorononanoic acid (PFNA)	ng/l	-		**0.97**	**J**	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	Perfluorodecanoic acid (PFDA)	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	PFUdA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	Perfluorododecanoic acid (PFDoA)	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	PFTrDA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	PFTeDA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	PFOSA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	N-EtFOSAA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	N-MEFOSAA	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	Perfluorobutanesulfonic acid (PFBS)	ng/l	-		**10**		**11**		**1.6**	**J**	**1.6**	**J**	**1.8**		**0.82**	**J**	1.8	U	1.8	U	1.8	U
E537-LL	PFPeS	ng/l	-		**8.2**		**8.7**		**0.97**	**J**	**1.0**	**J**	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
E537-LL	Perfluorohexanesulfonic acid (PFHxS)	ng/l	-		**38**		**42**		**3.9**		**4.4**		1.9	U	**0.89**	**J**	1.8	U	1.9	U	1.8	U
E537-LL	PFHpS	ng/l	-		2.0	U	**0.84**	**J**	1.9	U	1.9	U	1.9	U	2.0	U	1.9	U	1.9	U	1.9	U
E537-LL	Perfluorooctanesulfonic acid (PFOS)	ng/l	10		**11**		**39**		**3.1**		**3.1**		**4.1**		**9.4**		1.9	U	1.9	U	1.8	U
E537-LL	PFNS	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	PFDS	ng/l	-		2.1	U	2.0	U	2.0	U	2.0	U	2.0	U	2.1	U	2.0	U	2.0	U	2.0	U
E537-LL	4:2FTS	ng/l	-		21	UD	40	UD	20.0	UD	**11.0**	**JD**	41	UD	41	UD	2	U	2.0	U	2.0	U
E537-LL	6:2FTS	ng/l	-		21	UD	20	UD	20.0	UD	2.0	U	41	UD	21	UD	**1.1**	**J**	2.0	U	2.0	U
E537-LL	8:2FTS	ng/l	-		2.1	U	20	UD	2.0	U	2.0	U	20	UD	21	UD	2	U	2.0	U	2.0	U
SW8270DSIM	1,4-Dioxane (P-Dioxane)	ug/l	1		0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	NA		NA	

Note: - = no standard exist for this compound
U = compond not detecetd
J = analytic value estimated
D = results obtained from analysis of diluted sample
Bolded values exceed the analytical detection limit.
Shaded cells exceed comparison value.
DWQC = Drinking Water Quality Council recommended maximum contaminant levels (MCLs).

APPENDIX A
FIELD SAMPLING FORMS

Low Flow Ground Water Sampling Log

Date	7-16-19	Personnel	JB, KD, SW, JP	Weather	82 Partly Sunny
Site Name	Sinclair	Evacuation Method	Bladder Pump	Well #	MWR-07
Site Location	Wellsville	Sampling Method	Bladder Pump	Project #	EC Sampling

Well information:

Depth of Well *	33.30	ft.
Depth to Water *	10.28	ft.
Length of Water Column	23.02	ft.
Depth to Intake *	25	ft.

* Measurements taken from

X	Top of Well Casing SS
	Top of Protective Casing
	(Other, Specify)

Start Purge Time: 1200

		10.0%	0.1	3%	10 mV	10%	10%	100-500 ml/min
Elapsed Time (min)	**Depth To Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/l)**	**Turbidity (NTU)**	**Flow Rate (ml/min).**
GAL 45/1245	10.29	12.3	6.21	491.5	41.6	.67	41.9	350
55/1255	10.31	12.3	6.28	487.1	34.6	.69	38.8	
60/1300	10.30	12.3	6.31	485.3	33.8	.66	39.4	
bal 65/1305	10.30	12.4	6.30	486.4	34.0	.67	38.7	

End Purge Time: 1305

Water sample: MWR1-0719

Time collected: 1305

Physical appearance at start

Color Cloudy orange-ish

Odor NONE

Sheen/Free Product NONE

Total volume of purged water removed: 5.1

Physical appearance at sampling

Color Clear/NO color

Odor NONE

Sheen/Free Product NONE

Field Test Results:

Dissolved ferrous iron:

Dissolved total iron:

Dissolved total manganese:

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS	HDPE	2	NO	NO	NA
1,4 Dioxane	Amber Glass	2	NO	NO	NA

Low Flow Ground Water Sampling Log

Date	7-16-19	Personnel	JB, KD, SW & P	Weather	87°F partly cloudy
Site Name	Sinclair	Evacuation Method	Bladder Pump	Well #	MWR-03
Site Location	Wellsville	Sampling Method	Bladder Pump	Project #	E.C. Sampling

Well information:

MWR3-0719

Depth of Well *	29.94	ft.	* Measurements taken from	
Depth to Water *	14.94	ft.	X	Top of Well Casing
Length of Water Column	15.00	ft.		Top of Protective Casing
Depth to Intake *		ft.		(Other, Specify)

9.75 well vol

Start Purge Time: 1005

Elapsed Time (min)	Depth To Water (ft)	10.0% Temperature (celsius)	0.1 pH	3% Conductivity (ms/cm)	10 mV Oxidation Reduction Potential	10% Dissolved Oxygen (mg/l)	10% Turbidity (NTU)	100-500 ml/min Flow Rate (ml/min).
20/1025	14.96	12.2	6.30	428.5	22.2	.78	6.88	300
30/1035	14.96	12.2	6.45	429.4	19.8	.51	4.74	
40/1045	14.96	12.3	6.61	429.1	11.2	.55	4.98	
45/1050	14.96	12.2	6.65	427.5	7.7	.46	4.52	3.0 Purged
50/1055	14.96	12.2	6.69	427.7	0.9	.45	3.87	
-5/1100	14.96	12.2	6.67	428.7	-1.1	.45	3.14	
60/1105	14.96	12.5	6.64	430.9	-1.8	.46	3.00	6.1 Purged

End Purge Time:

Water sample: MWR3-0719 + Dup1-0719

Time collected: 1105

Total volume of purged water removed: 6.1

Physical appearance at start

Color clear/colorless

Odor Slight Hydrocarbon odor

Sheen/Free Product NO

Physical appearance at sampling

Color clear

Odor Slight Hydrocarbon odor

Sheen/Free Product NO

Field Test Results:

Dissolved ferrous iron:

Dissolved total iron:

Dissolved total manganese:

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS	HDPE	2	NO	NO	NA
1,4 Dioxane	Amber Glass	2	NO	NO	NA
Dup1-0719	HDPE Amber Glass	2-2	NO	NO	NA

Low Flow Ground Water Sampling Log

Date	7-16-19	Personnel	JB KD, SW, TP	Weather	80°F Partly Sunny
Site Name	Sinclair	Evacuation Method	Bladder Pump	Well #	MW-11
Site Location	Wellsville	Sampling Method	Bladder Pump	Project #	E.C. Sample

Well information:

Depth of Well *	27.60	ft.
Depth to Water *	10.65	ft.
Length of Water Column	16.95	ft.
Depth to Intake *	22	ft.

* Measurements taken from

X	Top of Well Casing 5.5
	Top of Protective Casing
	(Other, Specify)

Start Purge Time: 1407

		10.0%	0.1	3%	10 mV	10%	10%	100-500 ml/min
Elapsed Time (min)	**Depth To Water (ft)**	**Temperature (celsius)**	**pH**	**Conductivity (ms/cm)**	**Oxidation Reduction Potential**	**Dissolved Oxygen (mg/l)**	**Turbidity (NTU)**	**Flow Rate (ml/min).**
30/1437	11.42	12.7	5.95	473.6	131.9	.53	134.0	300
40/1447	11.42	12.1	6.08	470.9	127.0	.58	86.4	
< 3.5 45/1452	11.41	12.4	6.13	472.5	125.1	.61	70.9	3.5GAL
50/1457	11.42	12.1	6.18	470.6	123.4	.97	51.8	
55/1502	11.42	12.6	6.21	468.4	122.4	.88	44.5	
60/1507	11.41	12.2	6.22	465.6	120.5	.71	31.8	
65/1512	11.42	12.1	6.23	467.9	119.3	.64	29.6	LOCAL

End Purge Time: 15.12

Water sample:

Time collected:

Total volume of purged water removed: 4.5

Physical appearance at start

Color Slight Cloudy Slight orange tint

Odor NONE

Sheen/Free Product NONE

Physical appearance at sampling

Color Clear/No color

Odor NONE

Sheen/Free Product NONE

Field Test Results:

Dissolved ferrous iron:

Dissolved total iron:

Dissolved total manganese:

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS	HDPE	2	NO	NONE	NA
1,4 Dioxane	Amber Glass	2	NO	NONE	NA

Low Flow Ground Water Sampling Log

Date	7-17-19	Personnel	S. Watson - K Dye	Weather	76°F Cloudy light rain
Site Name	Sinclair	Evacuation Method	Peristaltic Pump	Well #	MW-27
Site Location	Wellsville	Sampling Method	Peristalic Pump	Project #	Ex Co Sampling

Well information:

Depth of Well *	13.47	ft.	* Measurements taken from
Depth to Water *	5.94	ft.	X Top of Well ~~Casing~~ PVC
Length of Water Column	7.53	ft.	Top of Protective Casing
Depth to Intake *	12.47	ft.	(Other, Specify)

1.2 well Vol

Start Purge Time: 0955

		10.0%	0.1	3%	10 mV	10%	10%	100-500 ml/min
Elapsed Time (min)	Depth To Water (ft)	Temperature (celsius)	pH	Conductivity (ms/cm)	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
20/1015	7.95	16.5	6.21	955	10 mV = -14.4	2.03	6.00	249
25/1020	7.87	16.5	6.23	955	-13.5	2.16	3.49	
30/1025	7.78	17.0	6.26	956	-13.7	2.16	3.78	
35/1030	7.40	16.4	6.29	955	-15.8	2.11	3.74	
40/1035	7.17		6.31	956	-16.9	2.07	3.30	2.0 Gal

End Purge Time: 1035 / 40 min

Water sample:

Time collected: MW27-0719/1035 (Field Blank FB2-0719/1034)

Physical appearance at start

Color: Clear / No odor

Odor: light Hydrocarbon odor

Sheen/Free Product: None

Total volume of purged water removed: 2.0 Gal

Physical appearance at sampling

Color: Clear / No color

Odor: light Hydrocarbon odor

Sheen/Free Product: None

Field Test Results:

Dissolved ferrous iron:

Dissolved total iron:

Dissolved total manganese:

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS	HDPE	2	NO	NO	NA
1,4 Dioxane	Amber Glass	2	NO	NO	NA
Field Blank	HDPE	1	NO	NO	NA

Low Flow Ground Water Sampling Log

Date	7-16-19	Personnel	JB, KD, SW, JP	Weather	59°F Partly Sunny
Site Name	Sinclair	Evacuation Method	Bladder Pump	Well #	MW-78
Site Location	~~MW-78~~ Wellsville	Sampling Method	Bladder Pump	Project #	EC. Sampling

Well information:

ID MW78-0719

Depth of Well *	25.22	ft.	* Measurements taken from	
Depth to Water *	17.13	ft.	X	Top of Well Casing (PVC)
Length of Water Column	8.09	ft.		Top of Protective Casing
Depth to Intake *	20	ft. Well Vol. 1.3 Gal		(Other, Specify)

Start Purge Time: 0733

		10.0%	0.1	3%	10 mV	10%	10%	100-500 ml/min
Elapsed Time (min)	Depth To Water (ft)	Temperature (celsius)	pH	Conductivity (ms/cm)	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
17/5150	17.26	10.7	5.44	316.2	71.2	4.12	1.16	250
27/0800	17.25	10.7	5.54	318.6	59.7	3.95	1.34	
37/0810	17.25	10.7	5.66	321.0	49.4	4.87	1.85	
47/0820	17.25	10.8	5.74	322.6	~~4.8~~ 49.0	4.74	1.78	3.1 gal Purged
52/0825	Pulled	11.1	5.77	324.9	46.8	4.15	2.22	
57/0830	—	10.9	5.82	321.8	43.0	4.48	1.50	
62/0835	—	10.9	5.84	324.8	41.0	4.06	1.61	
67/0840	—	11.0	5.86	324.6	39.4	4.01	1.48	

End Purge Time: MW78-0719

Water sample:

Time collected: 0840

Physical appearance at start

Color

Odor Clear/colorless/odorless

Sheen/Free Product NO

Total volume of purged water removed: 4.6 gal

Physical appearance at sampling

Color clear

Odor none

Sheen/Free Product none

Field Test Results:

Dissolved ferrous iron:

Dissolved total iron:

Dissolved total manganese:

Analytical Parameters:

Sample	Container Type	# Collected	Field Filtered	Preservative	Container pH
PFAS	HDPE	2	NO	NO	NA
1,4-Dioxane	Amber Glass	2	NO	NO	NA
MS/MSD	Bottle above	6-4	NO	NO	NA
Field Blank	PFAS-Transfer	1	NO	NO	NA

Attachment A

1,4 DIOXANE AND PFAS DAILY SAMPLING CHECKLIST

Site Name: Sinclair Task: EC Sampling

Weather (temp/precip): 59°F, Sunny Date: 7/16/19

Field Clothing and PPE:

☒ Powder-Free Nitrile Gloves ONLY

☒ No clothing or boots containing Gore-Tex™

☒ No clothing or boots treated with water-resistant spray

☒ Safety boots made from polyurethane and PVC or leather boots covered with overboots

☒ No materials containing Tyvek®

☒ Field crew has laundered clothing several times

☒ Field crew has not used fabric softener on clothing

☒ Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning

☒ Field crew has not applied unauthorized sun screen or insect repellant

☒ Samplers don fresh nitrile gloves for each sample collected

Field Equipment:

☒ No Teflon® or LDPE containing materials other than QED or Geotech brand LDPE

☒ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene or QED or Geotech brand LDPE

☒ No waterproof field books, waterproof paper or waterproof bottle labels, waterproof markers/Sharpies®

☒ No plastic clipboards, binders, or spiral hard cover notebooks

☒ No Post-It Notes®

☒ Coolers filled with regular ice only; no chemical (blue) ice packs in possession

Sample Containers:

☒ Containers for PFAS shipped in separate cooler

☒ Sample containers made of HDPE or polypropylene

☒ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

☒ Wet weather gear made of polyurethane and PVC only (none)

Equipment Decontamination:

☒ "PFAS-free" water on-site for decontamination of sample equipment; no other water sources to be used

☒ Alconox® or 7th Generation Free & Clear Dish Soap to be used as decontamination cleaning agents

Food Considerations:

☒ No food or drink on-site with exception of bottled water and/or hydration drinks (*i.e.*, Gatorade® and Powerade®) that is available for consumption only in the staging area

Vehicle Considerations:

☐ Avoid utilizing areas inside vehicle as sample staging areas

If any applicable boxes cannot be checked, the field team leader shall describe the deviations on the back and work with field personnel to address issues prior to commencement work. See additional information on the back of this form.

Sampling Equipment and Supply Summary (include brand names and serial numbers where available)

Decontamination Fluid Source(s): Village of Wellsville tap water, Lab provided PFAS free water

Soap and other fluids used: Alconox

Gloves: Power-Free Nitrile - Sure Care : Rope: None

Sampling Equipment: Geotech PFAS Free Bladder pump, Solonist water level meter

Field Team Names: S. Watson, K. Dye (Primary) J. Palmer, E. Feltor

Field Team Leader Signature: J. Brandes

Attachment A

Deviation Summary:

If possible, materials identified as potentially containing PFAS should be relocated to a separate area of the site as far away as possible from the sampling location(s) and containerized if practicable. Notes should include method of response including type of materials on site and how they were moved and containerized.

None

Field Team Leader Name: J. Bermeles

Field Team Leader Signature: J. Bermeles Time: 7/16/19 0700

Attachment A

1,4 DIOXANE AND PFAS DAILY SAMPLING CHECKLIST

Site Name: Sinclair Task: E.C. Sampling

Weather (temp/precip): 76°F, light Rain Date: 7-17-19

Field Clothing and PPE:

- [x] Powder-Free Nitrile Gloves ONLY
- [x] No clothing or boots containing Gore-Tex™
- [x] No clothing or boots treated with water-resistant spray
- [x] Safety boots made from polyurethane and PVC or leather boots covered with overboots
- [x] No materials containing Tyvek®
- [x] Field crew has laundered clothing several times
- [x] Field crew has not used fabric softener on clothing
- [x] Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
- [x] Field crew has not applied unauthorized sun screen or insect repellant
- [x] Samplers don fresh nitrile gloves for each sample collected

Field Equipment:

- [x] No Teflon® or LDPE containing materials other than QED or Geotech brand LDPE
- [x] All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene or QED or Geotech brand LDPE
- [x] No waterproof field books, waterproof paper or waterproof bottle labels, waterproof markers/Sharpies®
- [x] No plastic clipboards, binders, or spiral hard cover notebooks
- [x] No Post-It Notes®
- [x] Coolers filled with regular ice only; no chemical (blue) ice packs in possession

Sample Containers:

- [x] Containers for PFAS shipped in separate cooler
- [x] Sample containers made of HDPE or polypropylene
- [x] Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

- [x] Wet weather gear made of polyurethane and PVC only

Equipment Decontamination:

- [x] "PFAS-free" water on-site for decontamination of sample equipment; no other water sources to be used
- [x] Alconox® or 7th Generation Free & Clear Dish Soap to be used as decontamination cleaning agents

Food Considerations:

- [x] No food or drink on-site with exception of bottled water and/or hydration drinks (*i.e.*, Gatorade® and Powerade®) that is available for consumption only in the staging area

Vehicle Considerations:

- [x] Avoid utilizing areas inside vehicle as sample staging areas

If any applicable boxes cannot be checked, the field team leader shall describe the deviations on the back and work with field personnel to address issues prior to commencement work. See additional information on the back of this form.

Sampling Equipment and Supply Summary (include brand names and serial numbers where available)

Decontamination Fluid Source(s): Village of Wellsville tap water, Lab provides PFAS Free water

Soap and other fluids used: Liqui Nox

Gloves: Powder free Nitrile - Sure Care : Rope: none

Sampling Equipment: Peristaltic Pump - Solonist DTW meter - HDPE Tubing - Silicone tubing

---

Field Team Names: S. Watson - K Dye

Field Team Leader Signature: 76°F light rain

Attachment A

Deviation Summary:

If possible, materials identified as potentially containing PFAS should be relocated to a separate area of the site as far away as possible from the sampling location(s) and containerized if practicable. Notes should include method of response including type of materials on site and how they were moved and containerized.

none

Field Team Leader Name: Jen Brandes

Field Team Leader Signature: [signature] Time: 1400

APPENDIX B
LABORATORY ANALYTICAL DATA

Pace Analytical Services, LLC.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

www.pacelabs.com

Report Prepared for:

Andrew Shrock
BP-Parsons-OH
29 Alpha Park
Highland Heights OH 44143

REPORT OF LABORATORY ANALYSIS FOR PFAAs

Report Information:

Pace Project #: 10483659
Sample Receipt Date: 07/18/2019
Client Project #: Wellsville-OU2: NY-D98053215
Client Sub PO #: N/A
State Cert #: N/A

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 PFAA Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nathan Boberg, your Pace Project Manager.

This report has been reviewed by:

August 19, 2019

Nathan Boberg, Project Manager
612-360-0728
(612) 607-6444 (fax)
nathan.boberg@pacelabs.com

Report Prepared Date:
August 16, 2019

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

DISCUSSION

This report presents the results from the analyses performed on nine samples, one matrix spike, and one matrix spike duplicate submitted by a representative of BP-Parsons. The samples were analyzed for twenty-four perfluorinated compounds using an isotope dilution based on DoD QSM 5.1.1. Method detection limits were set to the quantitation limits.

A laboratory method blank was prepared and analyzed with the sample batch as part of our routine quality control procedures. The results show the blank was free of the target perfluorinated compounds at the reporting limits. This indicates that the sample processing procedures did not significantly contribute to the analyte content determined for the sample material.

A laboratory spike sample was also prepared with the sample batch using clean reference matrix that had been fortified with native standards. The recovery results were within the method limits. These spikes indicate that the extraction performed as expected.

Matrix spikes were prepared using sample matrix from project samples, however; PFBA was above the method limit in the matrix spike and matrix spike duplicate. The RPDs (relative percent differences) between each designated matrix spike and its duplicate were within the method limits. This deviation may be due to the level of PFBA in the sample material and/or sample inhomogeneity.

13C4 PFOA and 13C4 PFOS are the injection internal standards, of which both passed for each injection in the batch. The passing injection internal standards proves that the instrument detector is working as expected.

Sample 10483659009 had an elevated internal standard recovery (outside the suggested limits) for 13C2_4:2FTS. While the use of the isotope dilution method generally precludes any adverse impact on those individual native compounds that have a directly associated standard, in the case of the FTS compounds, the recoveries are anomalously high, and are adversely impacted by matrix. These compounds are widely considered to be "bad actors" in most matrices. The results for these native compounds should be considered estimated only.

Results for selected analytes were taken from secondary dilutions of the sample extracts in order to reduce the impact of matrix effects. The affected values were flagged "D" on the results tables.

DISCUSSION

It should be noted that Pace Analytical has not yet completed the certification process for all analytes in this method. Therefore, the results have been marked "N2" as qualified.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Minnesota Laboratory Certifications

Authority	Certificate #	Authority	Certificate #
A2LA	2926.01	Minnesota - Pet	1240
Alabama	40770	Mississippi	MN00064
Alaska - DW	MN00064	Missouri - DW	10100
Alaska - UST	17-009	Montana	CERT0092
Arizona	AZ0014	Nebraska	NE-OS-18-06
Arkansas - DW	MN00064	Nevada	MN00064
Arkansas - WW	88-0680	New Hampshire	2081
CNMI Saipan	MP0003	New Jersey (NE	MN002
California	2929	New York	11647
Colorado	MN00064	North Carolina	27700
Connecticut	PH-0256	North Carolina -	27700
EPA Region 8+	via MN 027-053	North Carolina -	530
Florida (NELAP	E87605	North Dakota	R-036
Georgia	959	Ohio - DW	41244
Guam	17-001r	Ohio - VAP	CL101
Hawaii	MN00064	Oklahoma	9507
Idaho	MN00064	Oregon - Primar	MN300001
Illinois	200011	Oregon - Secon	MN200001
Indiana	C-MN-01	Pennsylvania	68-00563
Iowa	368	Puerto Rico	MN00064
Kansas	E-10167	South Carolina	74003
Kentucky - DW	90062	South Dakota	NA
Kentucky - WW	90062	Tennessee	TN02818
Louisiana - DE	03086	Texas	T104704192
Louisiana - DW	MN00064	Utah (NELAP)	MN00064
Maine	MN00064	Virginia	460163
Maryland	322	Washington	C486
Massachusetts	M-MN064	West Virginia -	382
Michigan	9909	West Virginia -	9952C
Minnesota	027-053-137	Wisconsin	999407970
Minnesota - De	via MN 027-053	Wyoming - UST	2926.01

REPORT OF LABORATORY ANALYSIS

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Appendix A

Sample Management

Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Project Name: Wellsville Emerging Contaminants
BP/ARC Facility No: USEPA ID: NY-D98053215
Req Due Date (mm/dd/yy): Standard
Lab Work Order Number:
Rush TAT: Yes ___ No X
Page 1 of 1

Lab Name:	PACE Analytical Services LLC
Lab Address:	575 Broad Hollow Road, Melville NY 11747
Lab PM:	Devon Fox
Lab Phone:	516-370-6041
Lab Shipping Acent:	
Lab Bottle Order	519846/519860
Other Info:	
BP/ARC EBM:	John Frankenthal
EBM Phone:	
EBM Email:	John.Frankenthal@bp.com

BP/ARC Facility Address:	2530 South Brooklyn Avenue
City, State, ZIP Code:	Wellsville, New York 14895
Lead Regulatory Agency:	USEPA
California Global ID No.:	NA
Enfos Proposal No:	D014L-0046
Accounting Mode:	Provision 10 OOC-BU ___ OOC-RM ___
Stage: 60	Activity: 148

Consultant/Contractor:	On-Site Technical Services (On-Site)
Consultant/Contractor Project No:	Wellsville-OU2
Address:	72 Railroad Ave Wellsville, NY 14895
Consultant/Contractor PM:	Jon Brandes
Phone:	585-593-1824
Email EDD To:	jonb@on-sitehs.com
Invoice To:	BP/ARC X Contractor ___

Report Type & QC Level: ~~Standard X~~ (Full Data Package)

WO# : 10483659

10483659

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Requested Analyses: PFAS (see attached list)	1,4-Dioxane	Note "No rike out escription."
	MW78-0719	7/16/19	0840		X		14	14						8	6	MS/MSD 001
	FB1-0719		0845		X		1	1						1		Field Blank 002
	MWR3-0719		1105		X		4	4						2	2	003
	DUP2-0719		1110		X		4	4						2	2	004
	MWR11-0719		1512		X		4	4						2	2	005
	MWR1-0719		1305		X		4	4						2	2	006
	EB1-0719	↓	1545		X		4	4						2	2	007
	FB2-0719	7/17/19	1034		X		1	1						1		Field Blank 008
	MW27-0719	7/17/19	1035		X		4	4						2	2	009

Sampler's Name: Scott Watson / Jon Brandes / Kevin Dye
Sampler's Company: On-Site Technical Services
Shipment Method: FedEx Ship Date:
Shipment Tracking No: 493437315795
Special Instructions: 493437315800

Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
/ On-Site	7/17/19	1200	PACE	7/18/19	0830

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 2.4 2.3 °F/C | Trip Blank: Yes (No) | MS/MSD Sample Submitted: Yes / No

BP/ARC LaMP COC Rev. 6 01/01/2009

Pace Analytical	Document Name: Sample Condition Upon Receipt Form - ESI	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: F-MN-L-210-rev.30	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt – ESI Tech Specs

Client Name: BP- On-Site Tech. **Project #:** WO#: 10483659

PM: NB3 Due Date: 08/08/19

CLIENT: BP-PARSONS

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial **See Exception** ☐

Tracking Number: 4933 3731 5800, 5795

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No **Seals Intact?** ☒ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other: _____ **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☒ T3(0459) ☐ T4(0254) ☐ T5(0048) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 24, 2.3 °C **Average Corrected Temp (no temp blank only):** _____ °C **See Exceptions** ☐

Correction Factor: True **Cooler Temp Corrected w/temp blank:** 2.4, 2.3 °C

USDA Regulated Soil: (☒ N/A, water sample/Other: _____) **Date/Initials of Person Examining Contents:** 7.18.19 CMV

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes ☐ No	1.
Chain of Custody Relinquished?	☒ Yes ☐ No	2.
Sampler Name and/or Signature on COC?	☒ Yes ☐ No ☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes ☐ No	4.
Short Hold Time Analysis (<72 hr)?	☐ Yes ☒ No	5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐ Other
Rush Turn Around Time Requested?	☐ Yes ☒ No	6.
Sufficient Sample Volume?	☒ Yes ☐ No	
Triple Volume Provided for MS/MSD (if more than 10 samples)?	☒ Yes ☐ No ☐ N/A	7.
Correct Containers Used?	☒ Yes ☐ No	8.
-Pace Containers Used?	☒ Yes ☐ No	
Containers Intact?	☐ Yes ☒ No	9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes ☐ No ☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC?	☐ Yes ☐ No	11. **If no, write ID/ Date/Time on Container Below:** **See Exception** ☐
Matrix: ☒ Water ☐ Soil ☐ Oil ☐ Other		
All containers needing acid/base preservation have been checked?	☐ Yes ☐ No ☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes ☐ No ☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS *If adding preservative to a container it must be added to associated field and equipment blanks (verify with PM first)	☒ Yes ☐ No ☐ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** **See Exception** ☐
		Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐ Yes ☐ No ☒ N/A	13. **See Exception** ☐
3 Trip Blanks Present?	☐ Yes ☐ No ☒ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes ☐ No ☒ N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: _____ Date/Time: _____

Comments/Resolution: _____

Temp Log: Temp must be maintained at <6°C during login, record temp every 20 mins			
Opened Time: 15:30	Temp: 2.4, 2.3	Corrected Temp: 2.4, 2.3	
Time: 15:48	put in cooler		
Time:	Temp:	Corrected Temp:	

Project Manager Review: Nathan Boberg **Date:** 7/24/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Labeled by: _____ 7.23.19

Table 3
Former Sinclair Refinery, Wellsville, NY
Emerging Contaminants Analyte List

Analyte	Method
1-4-Dioxane	8270D SIM
Perfluorinated Compounds	**Method**
N-ethyl perfluorooctane sulfonamidoacetic acid	Modified 537
N-methyl perfluorooctane sulfonamidoacetic acid	Modified 537
Perfluorobutanesulfonic acid (PFBS)	Modified 537
Perfluorodecanoic acid (PFDA)	Modified 537
Perfluorododecanoic acid (PFDoA)	Modified 537
Perfluoroheptanoic acid (PFHpA)	Modified 537
Perfluorohexanesulfonic acid (PFHxS)	Modified 537
Perfluorohexanoic acid (PFHxA)	Modified 537
Perfluorononanoic acid (PFNA)	Modified 537
Perfluorooctanesulfonic acid (PFOS)	Modified 537
Perfluorooctanoic acid (PFOA)	Modified 537
Perfluorotetradecanoic acid (PFTeA)	Modified 537
Perfluorotridecanoic Acid (PFTriA)	Modified 537
Perfluoroundecanoic acid (PFUnA)	Modified 537
Perfluoroheptanesulfonic acid (PFHpS)	Modified 537
Perfluorodecanesulfonic acid (PFDS)	Modified 537
Perfluorobutanoic acid (PFBA)	Modified 537
Perfluoropentanoic acid (PFPeA)	Modified 537
6:2 Fluorotelomer sulfonate (6:2 FTS)	Modified 537
8:2 Fluorotelomer sulfonate (8:2 FTS)	Modified 537
Perfluroroctanesulfonamide (FOSA)	Modified 537

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612- 607-6444

Reporting Flags

A = Reporting Limit based on signal to noise

B = Less than 10x higher than method blank level

C = Result obtained from confirmation analysis

D = Result obtained from analysis of diluted sample

E = Exceeds calibration range

I = Interferencepresent

J = Estimated value

L = Suppressive interference, analyte may be biased low

Nn = Value obtained from additional analysis

P = PCDEInterference

R = Recovery outside target range

S = Peak saturated

U = Analyte not detected

V = Result verified by confirmation analysis

X = %D Exceeds limits

Y = Calculated using average of daily RFs

* = SeeDiscussion

REPORT OF LABORATORY ANALYSIS

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Appendix B

Sample Analysis Summary

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MW78-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659001	Total Amount Extracted	241 mL
Filename	Q190806A_049	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	9.9		2.1	0.86	1	08/07/201907:18	375-22-4	N2
PFPeA	1.3	J	2.1	0.53	1	08/07/201907:18	2706-90-3	N2
PFHxA	1.3	J	2.1	0.54	1	08/07/201907:18	307-24-4	N2
PFHpA	0.83	J	2.1	0.57	1	08/07/201907:18	375-85-9	N2
PFOA	3.5		2.1	0.58	1	08/07/201907:18	335-67-1	N2
PFNA	ND		2.1	0.60	1	08/07/201907:18	375-95-1	N2
PFDA	ND		2.1	0.63	1	08/07/201907:18	335-76-2	N2
PFUdA	ND		2.1	0.45	1	08/07/201907:18	2058-94-8	N2
PFDoA	ND		2.1	0.60	1	08/07/201907:18	307-55-1	N2
PFTrDA	ND		2.1	0.62	1	08/07/201907:18	72629-94-8	N2
PFTeDA	ND		2.1	0.42	1	08/07/201907:18	376-06-7	N2
PFOSA	ND		2.1	0.36	1	08/07/201907:18	754-91-6	N2
N-EtFOSAA	ND		2.1	0.60	1	08/07/201907:18	2991-50-6	N2
N-MeFOSAA	ND		2.1	0.69	1	08/07/201907:18	2355-31-9	N2
PFBS	0.82	J	1.8	0.56	1	08/07/201907:18	375-73-5	N2
PFPeS	ND		1.9	0.69	1	08/07/201907:18	2706-91-4	N2
PFHxS	0.89	J	1.9	0.61	1	08/07/201907:18	355-46-4	N2
PFHpS	ND		2.0	0.72	1	08/07/201907:18	375-92-8	N2
PFOS	9.4		1.9	0.42	1	08/07/201907:18	1763-23-1	N2
PFNS	ND		2.1	1.0	1	08/07/201907:18	68259-12-1	N2
PFDS	ND		2.1	0.92	1	08/07/201907:18	335-77-3	N2
4:2FTS	ND	D	41	15	20	08/07/201917:32	757124-72-4	N2
6:2FTS	ND	D	21	10	10	08/07/201901:57	27619-97-2	N2
8:2FTS	ND	D	21	7.8	10	08/07/201901:57	39108-34-4	N2

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Pace Analytical Services, LLC
1700 Elm Street, Suite 200
Minneapolis, MN 55414
(612) 607-1700

PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	MW78-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659001	Total Amount Extracted	241 mL
Filename	Q190806A_049	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	21	13	64	50-150	Pass	802904
13C5_PFPeA	21	18	88	50-150	Pass	754361
13C5_PFHxA	21	21	103	50-150	Pass	793921
13C4_PFHpA	21	23	111	50-150	Pass	961092
13C8_PFOA	21	26	124	50-150	Pass	754645
13C9_PFNA	21	26	125	50-150	Pass	769338
13C6_PFDA	21	26	125	50-150	Pass	445033
13C7_PFUdA	21	23	112	50-150	Pass	493179
13C2_PFDoA	21	24	114	50-150	Pass	639556
13C2_PFTeDA	21	18	88	50-150	Pass	204897
d5-EtFOSAA	21	26	127	50-150	Pass	87827
d3-MeFOSAA	21	26	126	50-150	Pass	105419
13C3_PFBS	21	25	123	50-150	Pass	651384
13C3_PFHxS	21	22	106	50-150	Pass	505959
13C8_PFOS	21	22	104	50-150	Pass	308216
13C8_FOSA	21	21	100	50-150	Pass	527176
13C2_4:2FTS	21	26	126	50-150	Pass	6530
13C6_6:2FTS	21	23	111	50-150	Pass	10965
13C6_8:2FTS	21	17	82	50-150	Pass	7746

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	747632	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	371575	129476 - 388429	132238 - 396714	Pass

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Pace Analytical Services, LLC
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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	FB1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659002	Total Amount Extracted	246 mL
Filename	Q190807A_010	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_065
Collected	07/16/2019	Ending CCal	Q190807A_012
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	ND	2.0	0.85	1	08/07/2019 18:52	375-22-4	N2
PFPeA	ND	2.0	0.52	1	08/07/2019 18:52	2706-90-3	N2
PFHxA	ND	2.0	0.53	1	08/07/2019 18:52	307-24-4	N2
PFHpA	ND	2.0	0.56	1	08/07/2019 18:52	375-85-9	N2
PFOA	ND	2.0	0.57	1	08/07/2019 18:52	335-67-1	N2
PFNA	ND	2.0	0.59	1	08/07/2019 18:52	375-95-1	N2
PFDA	ND	2.0	0.62	1	08/07/2019 18:52	335-76-2	N2
PFUdA	ND	2.0	0.44	1	08/07/2019 18:52	2058-94-8	N2
PFDoA	ND	2.0	0.59	1	08/07/2019 18:52	307-55-1	N2
PFTrDA	ND	2.0	0.61	1	08/07/2019 18:52	72629-94-8	N2
PFTeDA	ND	2.0	0.41	1	08/07/2019 18:52	376-06-7	N2
PFOSA	ND	2.0	0.35	1	08/07/2019 18:52	754-91-6	N2
N-EtFOSAA	ND	2.0	0.59	1	08/07/2019 18:52	2991-50-6	N2
N-MeFOSAA	ND	2.0	0.67	1	08/07/2019 18:52	2355-31-9	N2
PFBS	ND	1.8	0.55	1	08/07/2019 18:52	375-73-5	N2
PFPeS	ND	1.9	0.67	1	08/07/2019 18:52	2706-91-4	N2
PFHxS	ND	1.9	0.60	1	08/07/2019 18:52	355-46-4	N2
PFHpS	ND	1.9	0.71	1	08/07/2019 18:52	375-92-8	N2
PFOS	ND	1.9	0.42	1	08/07/2019 18:52	1763-23-1	N2
PFNS	ND	2.0	1.0	1	08/07/2019 18:52	68259-12-1	N2
PFDS	ND	2.0	0.91	1	08/07/2019 18:52	335-77-3	N2
4:2FTS	ND	2.0	0.74	1	08/07/2019 18:52	757124-72-4	N2
6:2FTS	ND	2.0	0.99	1	08/07/2019 18:52	27619-97-2	N2
8:2FTS	ND	2.0	0.76	1	08/07/2019 18:52	39108-34-4	N2

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	FB1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659002	Total Amount Extracted	246 mL
Filename	Q190807A_010	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_065
Collected	07/16/2019	Ending CCal	Q190807A_012
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	20	26	128	50-150	Pass	912135
13C5_PFPeA	20	26	128	50-150	Pass	617262
13C5_PFHxA	20	26	130	50-150	Pass	563233
13C4_PFHpA	20	26	130	50-150	Pass	634881
13C8_PFOA	20	25	125	50-150	Pass	429523
13C9_PFNA	20	22	109	50-150	Pass	397321
13C6_PFDA	20	23	114	50-150	Pass	239928
13C7_PFUdA	20	27	132	50-150	Pass	343373
13C2_PFDoA	20	24	119	50-150	Pass	394267
13C2_PFTeDA	20	28	138	50-150	Pass	190335
d5-EtFOSAA	20	21	105	50-150	Pass	43078
d3-MeFOSAA	20	24	117	50-150	Pass	58191
13C3_PFBS	20	28	140	50-150	Pass	421159
13C3_PFHxS	20	22	109	50-150	Pass	310268
13C8_PFOS	20	24	119	50-150	Pass	207893
13C8_FOSA	20	18	91	50-150	Pass	284023
13C2_4:2FTS	20	24	120	50-150	Pass	75775
13C6_6:2FTS	20	26	126	50-150	Pass	57999
13C6_8:2FTS	20	18	88	50-150	Pass	44771

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	423483	293835 - 881505	256304 - 768912	Pass
13C4_PFOS	220111	129476 - 388429	122234 - 366702	Pass

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MWR3-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659003	Total Amount Extracted	244 mL
Filename	Q190806A_051	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	1.8	J	2.0	0.85	1	08/07/2019 08:11	375-22-4	N2
PFPeA	ND		2.0	0.52	1	08/07/2019 08:11	2706-90-3	N2
PFHxA	ND		2.0	0.53	1	08/07/2019 08:11	307-24-4	N2
PFHpA	ND		2.0	0.56	1	08/07/2019 08:11	375-85-9	N2
PFOA	ND		2.0	0.57	1	08/07/2019 08:11	335-67-1	N2
PFNA	ND		2.0	0.59	1	08/07/2019 08:11	375-95-1	N2
PFDA	ND		2.0	0.63	1	08/07/2019 08:11	335-76-2	N2
PFUdA	ND		2.0	0.45	1	08/07/2019 08:11	2058-94-8	N2
PFDoA	ND		2.0	0.59	1	08/07/2019 08:11	307-55-1	N2
PFTrDA	ND		2.0	0.61	1	08/07/2019 08:11	72629-94-8	N2
PFTeDA	ND		2.0	0.41	1	08/07/2019 08:11	376-06-7	N2
PFOSA	ND		2.0	0.36	1	08/07/2019 08:11	754-91-6	N2
N-EtFOSAA	ND		2.0	0.59	1	08/07/2019 08:11	2991-50-6	N2
N-MeFOSAA	ND		2.0	0.68	1	08/07/2019 08:11	2355-31-9	N2
PFBS	1.6	J	1.8	0.55	1	08/07/2019 08:11	375-73-5	N2
PFPeS	0.97	J	1.9	0.68	1	08/07/2019 08:11	2706-91-4	N2
PFHxS	3.9		1.9	0.61	1	08/07/2019 08:11	355-46-4	N2
PFHpS	ND		1.9	0.71	1	08/07/2019 08:11	375-92-8	N2
PFOS	3.1		1.9	0.42	1	08/07/2019 08:11	1763-23-1	N2
PFNS	ND		2.0	1.0	1	08/07/2019 08:11	68259-12-1	N2
PFDS	ND		2.0	0.91	1	08/07/2019 08:11	335-77-3	N2
4:2FTS	ND	D	20	7.5	10	08/07/2019 02:24	757124-72-4	N2
6:2FTS	ND	D	20	10.0	10	08/07/2019 02:24	27619-97-2	N2
8:2FTS	ND		2.0	0.77	1	08/07/2019 08:11	39108-34-4	N2

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MWR3-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659003	Total Amount Extracted	244 mL
Filename	Q190806A_051	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards	Known	Conc.		Recovery		
Compound	Conc.	Found	%Recovery	Limits	Pass/Fail	Area
13C4_PFBA	20	19	94	50-150	Pass	1138876
13C5_PFPeA	20	22	108	50-150	Pass	892482
13C5_PFHxA	20	22	105	50-150	Pass	780538
13C4_PFHpA	20	24	115	50-150	Pass	959386
13C8_PFOA	20	25	123	50-150	Pass	721624
13C9_PFNA	20	26	125	50-150	Pass	695163
13C6_PFDA	20	24	116	50-150	Pass	376018
13C7_PFUdA	20	23	114	50-150	Pass	455880
13C2_PFDoA	20	19	93	50-150	Pass	473131
13C2_PFTeDA	20	17	81	50-150	Pass	170688
d5-EtFOSAA	20	18	89	50-150	Pass	56002
d3-MeFOSAA	20	21	104	50-150	Pass	79122
13C3_PFBS	20	23	114	50-150	Pass	583572
13C3_PFHxS	20	22	110	50-150	Pass	479060
13C8_PFOS	20	22	110	50-150	Pass	294905
13C8_FOSA	20	16	80	50-150	Pass	383496
13C2_4:2FTS	20	23	114	50-150	Pass	11316
13C6_6:2FTS	20	22	108	50-150	Pass	7831
13C6_8:2FTS	20	22	108	50-150	Pass	85163

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	721975	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	338027	129476 - 388429	132238 - 396714	Pass

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	DUP1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659004	Total Amount Extracted	246 mL
Filename	Q190806A_052	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	1.5	J	2.0	0.85	1	08/07/2019 08:38	375-22-4	N2
PFPeA	ND		2.0	0.52	1	08/07/2019 08:38	2706-90-3	N2
PFHxA	ND		2.0	0.53	1	08/07/2019 08:38	307-24-4	N2
PFHpA	ND		2.0	0.56	1	08/07/2019 08:38	375-85-9	N2
PFOA	ND		2.0	0.57	1	08/07/2019 08:38	335-67-1	N2
PFNA	ND		2.0	0.59	1	08/07/2019 08:38	375-95-1	N2
PFDA	ND		2.0	0.62	1	08/07/2019 08:38	335-76-2	N2
PFUdA	ND		2.0	0.44	1	08/07/2019 08:38	2058-94-8	N2
PFDoA	ND		2.0	0.59	1	08/07/2019 08:38	307-55-1	N2
PFTrDA	ND		2.0	0.61	1	08/07/2019 08:38	72629-94-8	N2
PFTeDA	ND		2.0	0.41	1	08/07/2019 08:38	376-06-7	N2
PFOSA	ND		2.0	0.35	1	08/07/2019 08:38	754-91-6	N2
N-EtFOSAA	ND		2.0	0.59	1	08/07/2019 08:38	2991-50-6	N2
N-MeFOSAA	ND		2.0	0.68	1	08/07/2019 08:38	2355-31-9	N2
PFBS	1.6	J	1.8	0.55	1	08/07/2019 08:38	375-73-5	N2
PFPeS	1.0	J	1.9	0.67	1	08/07/2019 08:38	2706-91-4	N2
PFHxS	4.4		1.9	0.60	1	08/07/2019 08:38	355-46-4	N2
PFHpS	ND		1.9	0.71	1	08/07/2019 08:38	375-92-8	N2
PFOS	3.1		1.9	0.42	1	08/07/2019 08:38	1763-23-1	N2
PFNS	ND		2.0	1.0	1	08/07/2019 08:38	68259-12-1	N2
PFDS	ND		2.0	0.91	1	08/07/2019 08:38	335-77-3	N2
4:2FTS	ND	D	20	7.4	10	08/07/2019 02:51	757124-72-4	N2
6:2FTS	11	JD	20	9.9	10	08/07/2019 02:51	27619-97-2	N2
8:2FTS	ND		2.0	0.76	1	08/07/2019 08:38	39108-34-4	N2

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	DUP1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659004	Total Amount Extracted	246 mL
Filename	Q190806A_052	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards	Known	Conc.		Recovery		
Compound	Conc.	Found	%Recovery	Limits	Pass/Fail	Area
13C4_PFBA	20	18	87	50-150	Pass	1090417
13C5_PFPeA	20	20	100	50-150	Pass	851480
13C5_PFHxA	20	21	104	50-150	Pass	796894
13C4_PFHpA	20	22	108	50-150	Pass	929071
13C8_PFOA	20	24	117	50-150	Pass	708360
13C9_PFNA	20	25	122	50-150	Pass	647082
13C6_PFDA	20	26	127	50-150	Pass	389890
13C7_PFUdA	20	26	128	50-150	Pass	484065
13C2_PFDoA	20	24	120	50-150	Pass	577049
13C2_PFTeDA	20	22	107	50-150	Pass	214265
d5-EtFOSAA	20	24	116	50-150	Pass	68981
d3-MeFOSAA	20	24	120	50-150	Pass	86811
13C3_PFBS	20	22	108	50-150	Pass	569373
13C3_PFHxS	20	22	110	50-150	Pass	454227
13C8_PFOS	20	24	118	50-150	Pass	299523
13C8_FOSA	20	15	76	50-150	Pass	344204
13C2_4:2FTS	20	22	107	50-150	Pass	10045
13C6_6:2FTS	20	20	97	50-150	Pass	6581
13C6_8:2FTS	20	22	110	50-150	Pass	81927

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	745187	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	320051	129476 - 388429	132238 - 396714	Pass

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MWR11-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659005	Total Amount Extracted	243 mL
Filename	Q190806A_053	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	14		2.1	0.86	1	08/07/2019 09:04	375-22-4	N2
PFPeA	17		2.1	0.53	1	08/07/2019 09:04	2706-90-3	N2
PFHxA	16		2.1	0.53	1	08/07/2019 09:04	307-24-4	N2
PFHpA	9.1		2.1	0.57	1	08/07/2019 09:04	375-85-9	N2
PFOA	12		2.1	0.58	1	08/07/2019 09:04	335-67-1	N2
PFNA	0.97	J	2.1	0.60	1	08/07/2019 09:04	375-95-1	N2
PFDA	ND		2.1	0.63	1	08/07/2019 09:04	335-76-2	N2
PFUdA	ND		2.1	0.45	1	08/07/2019 09:04	2058-94-8	N2
PFDoA	ND		2.1	0.60	1	08/07/2019 09:04	307-55-1	N2
PFTrDA	ND		2.1	0.62	1	08/07/2019 09:04	72629-94-8	N2
PFTeDA	ND		2.1	0.42	1	08/07/2019 09:04	376-06-7	N2
PFOSA	ND		2.1	0.36	1	08/07/2019 09:04	754-91-6	N2
N-EtFOSAA	ND		2.1	0.60	1	08/07/2019 09:04	2991-50-6	N2
N-MeFOSAA	ND		2.1	0.68	1	08/07/2019 09:04	2355-31-9	N2
PFBS	10		1.8	0.55	1	08/07/2019 09:04	375-73-5	N2
PFPeS	8.2		1.9	0.68	1	08/07/2019 09:04	2706-91-4	N2
PFHxS	38		1.9	0.61	1	08/07/2019 09:04	355-46-4	N2
PFHpS	ND		2.0	0.72	1	08/07/2019 09:04	375-92-8	N2
PFOS	11		1.9	0.42	1	08/07/2019 09:04	1763-23-1	N2
PFNS	ND		2.1	1.0	1	08/07/2019 09:04	68259-12-1	N2
PFDS	ND		2.1	0.92	1	08/07/2019 09:04	335-77-3	N2
4:2FTS	ND	D	21	7.5	10	08/07/2019 03:44	757124-72-4	N2
6:2FTS	ND	D	21	10	10	08/07/2019 03:44	27619-97-2	N2
8:2FTS	ND		2.1	0.77	1	08/07/2019 09:04	39108-34-4	N2

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	MWR11-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659005	Total Amount Extracted	243 mL
Filename	Q190806A_053	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_040
Collected	07/16/2019	Ending CCal	Q190806A_054
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	21	19	91	50-150	Pass	1112939
13C5_PFPeA	21	21	102	50-150	Pass	850321
13C5_PFHxA	21	21	103	50-150	Pass	772076
13C4_PFHpA	21	23	113	50-150	Pass	953368
13C8_PFOA	21	25	119	50-150	Pass	707904
13C9_PFNA	21	25	121	50-150	Pass	629826
13C6_PFDA	21	25	123	50-150	Pass	370590
13C7_PFUdA	21	25	120	50-150	Pass	446662
13C2_PFDoA	21	22	108	50-150	Pass	511143
13C2_PFTeDA	21	23	112	50-150	Pass	221381
d5-EtFOSAA	21	22	107	50-150	Pass	62984
d3-MeFOSAA	21	23	109	50-150	Pass	77698
13C3_PFBS	21	23	112	50-150	Pass	582051
13C3_PFHxS	21	23	113	50-150	Pass	459503
13C8_PFOS	21	24	117	50-150	Pass	293913
13C8_FOSA	21	20	96	50-150	Pass	430674
13C2_4:2FTS	21	24	116	50-150	Pass	10150
13C6_6:2FTS	21	23	112	50-150	Pass	7108
13C6_8:2FTS	21	22	105	50-150	Pass	76789

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	729444	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	314967	129476 - 388429	132238 - 396714	Pass

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MWR1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659006	Total Amount Extracted	249 mL
Filename	Q190806A_055	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/16/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	12		2.0	0.84	1	08/07/201909:58	375-22-4	N2
PFPeA	31		2.0	0.51	1	08/07/201909:58	2706-90-3	N2
PFHxA	27		2.0	0.52	1	08/07/201909:58	307-24-4	N2
PFHpA	6.7		2.0	0.55	1	08/07/201909:58	375-85-9	N2
PFOA	6.1		2.0	0.56	1	08/07/201909:58	335-67-1	N2
PFNA	ND		2.0	0.58	1	08/07/201909:58	375-95-1	N2
PFDA	ND		2.0	0.61	1	08/07/201909:58	335-76-2	N2
PFUdA	ND		2.0	0.44	1	08/07/201909:58	2058-94-8	N2
PFDoA	ND		2.0	0.58	1	08/07/201909:58	307-55-1	N2
PFTrDA	ND		2.0	0.60	1	08/07/201909:58	72629-94-8	N2
PFTeDA	ND		2.0	0.41	1	08/07/201909:58	376-06-7	N2
PFOSA	ND		2.0	0.35	1	08/07/201909:58	754-91-6	N2
N-EtFOSAA	ND		2.0	0.58	1	08/07/201909:58	2991-50-6	N2
N-MeFOSAA	ND		2.0	0.67	1	08/07/201909:58	2355-31-9	N2
PFBS	11		1.8	0.54	1	08/07/201909:58	375-73-5	N2
PFPeS	8.7		1.9	0.67	1	08/07/201909:58	2706-91-4	N2
PFHxS	42		1.8	0.60	1	08/07/201909:58	355-46-4	N2
PFHpS	0.84	J	1.9	0.70	1	08/07/201909:58	375-92-8	N2
PFOS	39		1.9	0.41	1	08/07/201909:58	1763-23-1	N2
PFNS	ND		2.0	0.99	1	08/07/201909:58	68259-12-1	N2
PFDS	ND		2.0	0.90	1	08/07/201909:58	335-77-3	N2
4:2FTS	ND	D	40	15	20	08/07/201917:58	757124-72-4	N2
6:2FTS	ND	D	20	9.8	10	08/07/201904:11	27619-97-2	N2
8:2FTS	ND	D	20	7.5	10	08/07/201904:11	39108-34-4	N2

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	MWR1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659006	Total Amount Extracted	249 mL
Filename	Q190806A_055	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/16/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards	Known	Conc.		Recovery		
Compound	Conc.	Found	%Recovery	Limits	Pass/Fail	Area
13C4_PFBA	20	16	80	50-150	Pass	949063
13C5_PFPeA	20	19	95	50-150	Pass	761900
13C5_PFHxA	20	20	100	50-150	Pass	717203
13C4_PFHpA	20	22	110	50-150	Pass	893250
13C8_PFOA	20	24	118	50-150	Pass	670951
13C9_PFNA	20	26	128	50-150	Pass	663444
13C6_PFDA	20	25	122	50-150	Pass	366429
13C7_PFUdA	20	23	116	50-150	Pass	427613
13C2_PFDoA	20	21	102	50-150	Pass	482327
13C2_PFTeDA	20	18	92	50-150	Pass	180068
d5-EtFOSAA	20	21	107	50-150	Pass	62188
d3-MeFOSAA	20	24	118	50-150	Pass	83016
13C3_PFBS	20	23	115	50-150	Pass	573021
13C3_PFHxS	20	23	112	50-150	Pass	452814
13C8_PFOS	20	24	118	50-150	Pass	293112
13C8_FOSA	20	16	81	50-150	Pass	358510
13C2_4:2FTS	20	28	140	50-150	Pass	5360
13C6_6:2FTS	20	27	134	50-150	Pass	9512
13C6_8:2FTS	20	13	65	50-150	Pass	5376

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	701165	293835 - 881505	283801 - 851404	Pass
13C4_PFOS	312967	129476 - 388429	126223 - 378669	Pass

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	EB1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659007	Total Amount Extracted	249 mL
Filename	Q190806A_056	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/16/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	1.0	J	2.0	0.84	1	08/07/2019 10:24	375-22-4	N2
PFPeA	ND		2.0	0.51	1	08/07/2019 10:24	2706-90-3	N2
PFHxA	ND		2.0	0.52	1	08/07/2019 10:24	307-24-4	N2
PFHpA	ND		2.0	0.55	1	08/07/2019 10:24	375-85-9	N2
PFOA	ND		2.0	0.56	1	08/07/2019 10:24	335-67-1	N2
PFNA	ND		2.0	0.58	1	08/07/2019 10:24	375-95-1	N2
PFDA	ND		2.0	0.61	1	08/07/2019 10:24	335-76-2	N2
PFUdA	ND		2.0	0.44	1	08/07/2019 10:24	2058-94-8	N2
PFDoA	ND		2.0	0.58	1	08/07/2019 10:24	307-55-1	N2
PFTrDA	ND		2.0	0.60	1	08/07/2019 10:24	72629-94-8	N2
PFTeDA	ND		2.0	0.41	1	08/07/2019 10:24	376-06-7	N2
PFOSA	ND		2.0	0.35	1	08/07/2019 10:24	754-91-6	N2
N-EtFOSAA	ND		2.0	0.58	1	08/07/2019 10:24	2991-50-6	N2
N-MeFOSAA	ND		2.0	0.67	1	08/07/2019 10:24	2355-31-9	N2
PFBS	ND		1.8	0.54	1	08/07/2019 10:24	375-73-5	N2
PFPeS	ND		1.9	0.67	1	08/07/2019 10:24	2706-91-4	N2
PFHxS	ND		1.8	0.60	1	08/07/2019 10:24	355-46-4	N2
PFHpS	ND		1.9	0.70	1	08/07/2019 10:24	375-92-8	N2
PFOS	ND		1.9	0.41	1	08/07/2019 10:24	1763-23-1	N2
PFNS	ND		2.0	0.99	1	08/07/2019 10:24	68259-12-1	N2
PFDS	ND		2.0	0.90	1	08/07/2019 10:24	335-77-3	N2
4:2FTS	ND		2.0	0.73	1	08/07/2019 10:24	757124-72-4	N2
6:2FTS	1.1	J	2.0	0.98	1	08/07/2019 10:24	27619-97-2	N2
8:2FTS	ND		2.0	0.75	1	08/07/2019 10:24	39108-34-4	N2

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	EB1-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659007	Total Amount Extracted	249 mL
Filename	Q190806A_056	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/16/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	20	22	108	50-150	Pass	1130684
13C5_PFPeA	20	22	110	50-150	Pass	782423
13C5_PFHxA	20	22	108	50-150	Pass	690165
13C4_PFHpA	20	22	111	50-150	Pass	800577
13C8_PFOA	20	24	118	50-150	Pass	595240
13C9_PFNA	20	23	112	50-150	Pass	570140
13C6_PFDA	20	24	120	50-150	Pass	353193
13C7_PFUdA	20	19	95	50-150	Pass	346402
13C2_PFDoA	20	21	106	50-150	Pass	491530
13C2_PFTeDA	20	27	136	50-150	Pass	262552
d5-EtFOSAA	20	27	135	50-150	Pass	77563
d3-MeFOSAA	20	29	144	50-150	Pass	99746
13C3_PFBS	20	24	119	50-150	Pass	528023
13C3_PFHxS	20	21	106	50-150	Pass	423386
13C8_PFOS	20	23	115	50-150	Pass	280400
13C8_FOSA	20	22	108	50-150	Pass	473669
13C2_4:2FTS	20	20	102	50-150	Pass	94982
13C6_6:2FTS	20	24	118	50-150	Pass	80347
13C6_8:2FTS	20	26	127	50-150	Pass	90952

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	623469	293835 - 881505	283801 - 851404	Pass
13C4_PFOS	308189	129476 - 388429	126223 - 378669	Pass

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	FB2-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659008	Total Amount Extracted	250 mL
Filename	Q190806A_057	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/17/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	ND	2.0	0.83	1	08/07/2019 10:51	375-22-4	N2
PFPeA	ND	2.0	0.51	1	08/07/2019 10:51	2706-90-3	N2
PFHxA	ND	2.0	0.52	1	08/07/2019 10:51	307-24-4	N2
PFHpA	ND	2.0	0.55	1	08/07/2019 10:51	375-85-9	N2
PFOA	ND	2.0	0.56	1	08/07/2019 10:51	335-67-1	N2
PFNA	ND	2.0	0.58	1	08/07/2019 10:51	375-95-1	N2
PFDA	ND	2.0	0.61	1	08/07/2019 10:51	335-76-2	N2
PFUdA	ND	2.0	0.44	1	08/07/2019 10:51	2058-94-8	N2
PFDoA	ND	2.0	0.58	1	08/07/2019 10:51	307-55-1	N2
PFTrDA	ND	2.0	0.60	1	08/07/2019 10:51	72629-94-8	N2
PFTeDA	ND	2.0	0.40	1	08/07/2019 10:51	376-06-7	N2
PFOSA	ND	2.0	0.35	1	08/07/2019 10:51	754-91-6	N2
N-EtFOSAA	ND	2.0	0.58	1	08/07/2019 10:51	2991-50-6	N2
N-MeFOSAA	ND	2.0	0.67	1	08/07/2019 10:51	2355-31-9	N2
PFBS	ND	1.8	0.54	1	08/07/2019 10:51	375-73-5	N2
PFPeS	ND	1.9	0.66	1	08/07/2019 10:51	2706-91-4	N2
PFHxS	ND	1.8	0.59	1	08/07/2019 10:51	355-46-4	N2
PFHpS	ND	1.9	0.70	1	08/07/2019 10:51	375-92-8	N2
PFOS	ND	1.8	0.41	1	08/07/2019 10:51	1763-23-1	N2
PFNS	ND	2.0	0.99	1	08/07/2019 10:51	68259-12-1	N2
PFDS	ND	2.0	0.89	1	08/07/2019 10:51	335-77-3	N2
4:2FTS	ND	2.0	0.73	1	08/07/2019 10:51	757124-72-4	N2
6:2FTS	ND	2.0	0.98	1	08/07/2019 10:51	27619-97-2	N2
8:2FTS	ND	2.0	0.75	1	08/07/2019 10:51	39108-34-4	N2

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	FB2-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659008	Total Amount Extracted	250 mL
Filename	Q190806A_057	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/17/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards	Known	Conc.		Recovery		
Compound	Conc.	Found	%Recovery	Limits	Pass/Fail	Area
13C4_PFBA	20	26	130	50-150	Pass	1095617
13C5_PFPeA	20	26	132	50-150	Pass	753751
13C5_PFHxA	20	26	132	50-150	Pass	680851
13C4_PFHpA	20	26	130	50-150	Pass	751776
13C8_PFOA	20	25	124	50-150	Pass	503752
13C9_PFNA	20	26	129	50-150	Pass	482064
13C6_PFDA	20	22	111	50-150	Pass	241100
13C7_PFUdA	20	25	127	50-150	Pass	339969
13C2_PFDoA	20	22	108	50-150	Pass	366807
13C2_PFTeDA	20	21	106	50-150	Pass	150590
d5-EtFOSAA	20	18	91	50-150	Pass	38170
d3-MeFOSAA	20	20	102	50-150	Pass	51844
13C3_PFBS	20	28	142	50-150	Pass	503339
13C3_PFHxS	20	27	133	50-150	Pass	387453
13C8_PFOS	20	26	130	50-150	Pass	233470
13C8_FOSA	20	19	97	50-150	Pass	312586
13C2_4:2FTS	20	24	121	50-150	Pass	90434
13C6_6:2FTS	20	24	118	50-150	Pass	64553
13C6_8:2FTS	20	18	89	50-150	Pass	46549

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	501198	293835 - 881505	283801 - 851404	Pass
13C4_PFOS	226208	129476 - 388429	126223 - 378669	Pass

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PFAS by Isotope Dilution

Sample Analysis Summary

Client's Sample ID	MW27-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659009	Total Amount Extracted	245 mL
Filename	Q190806A_058	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/17/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Compound	Concentration (ng/L)		PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	7.7		2.0	0.85	1	08/07/2019 11:18	375-22-4	N2
PFPeA	2.0	J	2.0	0.52	1	08/07/2019 11:18	2706-90-3	N2
PFHxA	2.5		2.0	0.53	1	08/07/2019 11:18	307-24-4	N2
PFHpA	1.5	J	2.0	0.56	1	08/07/2019 11:18	375-85-9	N2
PFOA	3.1		2.0	0.57	1	08/07/2019 11:18	335-67-1	N2
PFNA	ND		2.0	0.59	1	08/07/2019 11:18	375-95-1	N2
PFDA	ND		2.0	0.62	1	08/07/2019 11:18	335-76-2	N2
PFUdA	ND		2.0	0.45	1	08/07/2019 11:18	2058-94-8	N2
PFDoA	ND		2.0	0.59	1	08/07/2019 11:18	307-55-1	N2
PFTrDA	ND		2.0	0.61	1	08/07/2019 11:18	72629-94-8	N2
PFTeDA	ND		2.0	0.41	1	08/07/2019 11:18	376-06-7	N2
PFOSA	ND		2.0	0.35	1	08/07/2019 11:18	754-91-6	N2
N-EtFOSAA	ND		2.0	0.59	1	08/07/2019 11:18	2991-50-6	N2
N-MeFOSAA	ND		2.0	0.68	1	08/07/2019 11:18	2355-31-9	N2
PFBS	1.8		1.8	0.55	1	08/07/2019 11:18	375-73-5	N2
PFPeS	ND		1.9	0.68	1	08/07/2019 11:18	2706-91-4	N2
PFHxS	ND		1.9	0.60	1	08/07/2019 11:18	355-46-4	N2
PFHpS	ND		1.9	0.71	1	08/07/2019 11:18	375-92-8	N2
PFOS	4.1		1.9	0.42	1	08/07/2019 11:18	1763-23-1	N2
PFNS	ND		2.0	1.0	1	08/07/2019 11:18	68259-12-1	N2
PFDS	ND		2.0	0.91	1	08/07/2019 11:18	335-77-3	N2
4:2FTS	ND	D	41	15	20	08/07/2019 18:25	757124-72-4	N2
6:2FTS	ND	D	41	20	20	08/07/2019 18:25	27619-97-2	N2
8:2FTS	ND	D	20	7.6	10	08/07/2019 05:04	39108-34-4	N2

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PFAS by Isotope Dilution
Sample Analysis Summary

Client's Sample ID	MW27-0719	Date Extracted	07/29/2019
Lab Sample ID	10483659009	Total Amount Extracted	245 mL
Filename	Q190806A_058	ICAL ID	190802B01
Matrix	Non_Potable_Wat	Starting CCal	Q190806A_054
Collected	07/17/2019	Ending CCal	Q190806A_065
Received	07/18/2019	Method Blank Filename	Q190806A_045

Internal Standards	Known	Conc.		Recovery		
Compound	Conc.	Found	%Recovery	Limits	Pass/Fail	Area
13C4_PFBA	20	13	63	50-150	Pass	709113
13C5_PFPeA	20	17	81	50-150	Pass	619242
13C5_PFHxA	20	18	87	50-150	Pass	594788
13C4_PFHpA	20	22	107	50-150	Pass	825100
13C8_PFOA	20	26	129	50-150	Pass	698393
13C9_PFNA	20	27	131	50-150	Pass	678989
13C6_PFDA	20	24	116	50-150	Pass	346902
13C7_PFUdA	20	21	103	50-150	Pass	382076
13C2_PFDoA	20	17	86	50-150	Pass	405185
13C2_PFTeDA	20	16	77	50-150	Pass	151412
d5-EtFOSAA	20	20	100	50-150	Pass	58353
d3-MeFOSAA	20	23	111	50-150	Pass	78335
13C3_PFBS	20	27	132	50-150	Pass	623504
13C3_PFHxS	20	24	117	50-150	Pass	474321
13C8_PFOS	20	24	118	50-150	Pass	295384
13C8_FOSA	20	13	62	50-150	Pass	275302
13C2_4:2FTS	20	43	211	50-150	Fail	8815
13C6_6:2FTS	20	23	113	50-150	Pass	3454
13C6_8:2FTS	20	16	79	50-150	Pass	6518

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	666046	293835 - 881505	283801 - 851404	Pass
13C4_PFOS	313968	129476 - 388429	126223 - 378669	Pass

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PFAS by Isotope DilutionBlank Analysis Summary

Lab Sample ID	BLANK-72276	Total Amount Extracted	248 mL
Filename	Q190806A_045	ICAL ID	190802B01
Matrix	Water	Starting CCal	Q190806A_040
Date Extracted	07/29/2019	Ending CCal	Q190806A_054

Compound	Concentration (ng/L)	PQL (ng/L)	MDL (ng/L)	Dilution	Analyzed	CAS No.	Qual.
PFBA	ND	2.0	0.84	1	08/07/201905:31	375-22-4	N2
PFPeA	ND	2.0	0.52	1	08/07/201905:31	2706-90-3	N2
PFHxA	ND	2.0	0.52	1	08/07/201905:31	307-24-4	N2
PFHpA	ND	2.0	0.55	1	08/07/201905:31	375-85-9	N2
PFOA	ND	2.0	0.57	1	08/07/201905:31	335-67-1	N2
PFNA	ND	2.0	0.58	1	08/07/201905:31	375-95-1	N2
PFDA	ND	2.0	0.62	1	08/07/201905:31	335-76-2	N2
PFUdA	ND	2.0	0.44	1	08/07/201905:31	2058-94-8	N2
PFDoA	ND	2.0	0.59	1	08/07/201905:31	307-55-1	N2
PFTrDA	ND	2.0	0.60	1	08/07/201905:31	72629-94-8	N2
PFTeDA	ND	2.0	0.41	1	08/07/201905:31	376-06-7	N2
PFOSA	ND	2.0	0.35	1	08/07/201905:31	754-91-6	N2
N-EtFOSAA	ND	2.0	0.59	1	08/07/201905:31	2991-50-6	N2
N-MeFOSAA	ND	2.0	0.67	1	08/07/201905:31	2355-31-9	N2
PFBS	ND	1.8	0.54	1	08/07/201905:31	375-73-5	N2
PFPeS	ND	1.9	0.67	1	08/07/201905:31	2706-91-4	N2
PFHxS	ND	1.8	0.60	1	08/07/201905:31	355-46-4	N2
PFHpS	ND	1.9	0.70	1	08/07/201905:31	375-92-8	N2
PFOS	ND	1.9	0.41	1	08/07/201905:31	1763-23-1	N2
PFNS	ND	2.0	1.00	1	08/07/201905:31	68259-12-1	N2
PFDS	ND	2.0	0.90	1	08/07/201905:31	335-77-3	N2
4:2FTS	ND	2.0	0.74	1	08/07/201905:31	757124-72-4	N2
6:2FTS	ND	2.0	0.98	1	08/07/201905:31	27619-97-2	N2
8:2FTS	ND	2.0	0.76	1	08/07/201905:31	39108-34-4	N2

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

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PFAS by Isotope DilutionBlank Analysis Summary

Client's Sample ID	BLKOU	Date Extracted	07/29/2019
Lab Sample ID	BLANK-72276	Total Amount Extracted	248 mL
Filename	Q190806A_045	ICAL ID	190802B01
Matrix	Water	Starting CCal	Q190806A_040
Collected	07/29/2019	Ending CCal	Q190806A_054
Received	07/29/2019	Method Blank Filename	

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	20	26	127	50-150	Pass	1164413
13C5_PFPeA	20	26	129	50-150	Pass	804539
13C5_PFHxA	20	27	134	50-150	Pass	748617
13C4_PFHpA	20	28	138	50-150	Pass	867344
13C8_PFOA	20	27	136	50-150	Pass	600058
13C9_PFNA	20	26	127	50-150	Pass	517504
13C6_PFDA	20	25	124	50-150	Pass	292763
13C7_PFUdA	20	27	134	50-150	Pass	391841
13C2_PFDoA	20	24	118	50-150	Pass	440965
13C2_PFTeDA	20	24	119	50-150	Pass	183626
d5-EtFOSAA	20	20	98	50-150	Pass	45276
d3-MeFOSAA	20	24	117	50-150	Pass	65253
13C3_PFBS	20	28	139	50-150	Pass	538628
13C3_PFHxS	20	27	135	50-150	Pass	429086
13C8_PFOS	20	26	131	50-150	Pass	257281
13C8_FOSA	20	22	108	50-150	Pass	380172
13C2_4:2FTS	20	24	117	50-150	Pass	95247
13C6_6:2FTS	20	25	126	50-150	Pass	74923
13C6_8:2FTS	20	19	96	50-150	Pass	54960

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	544331	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	247058	129476 - 388429	132238 - 396714	Pass

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

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PFAS by Isotope DilutionLaboratory Control Sample (LCS)

LCS Lab Sample ID	LCS-72277		
LCS Filename	Q190806A_046	Matrix	Water
Total Amount Extracted	246mL	Dilution	1
ICAL ID	190802B01	Extracted	07/29/2019
Start CCal Filename	Q190806A_040	Analyzed	08/07/2019 05:58
End CCal Filename	Q190806A_054	Injected By	QL
Method Blank Filename	Q190806A_045		

Compound	Spiked (ng/L)	Recovered (ng/L)	Recovery %	Limits
PFBA	20	21	105	70.0 - 130.0
PFPeA	20	22	111	70.0 - 130.0
PFHxA	20	24	120	70.0 - 130.0
PFHpA	20	23	115	70.0 - 130.0
PFOA	20	23	116	70.0 - 130.0
PFNA	20	21	103	70.0 - 130.0
PFDA	20	22	106	70.0 - 130.0
PFUdA	20	22	109	70.0 - 130.0
PFDoA	20	22	106	70.0 - 130.0
PFTrDA	20	24	120	70.0 - 130.0
PFTeDA	20	24	116	70.0 - 130.0
PFOSA	20	23	114	70.0 - 130.0
N-EtFOSAA	20	21	105	70.0 - 130.0
N-MeFOSAA	20	24	120	70.0 - 130.0
PFBS	18	20	110	70.0 - 130.0
PFPeS	19	23	119	70.0 - 130.0
PFHxS	19	20	108	70.0 - 130.0
PFHpS	19	22	112	70.0 - 130.0
PFOS	19	21	112	70.0 - 130.0
PFNS	20	22	110	70.0 - 130.0
PFDS	20	22	110	70.0 - 130.0
4:2FTS	20	22	110	70.0 - 130.0
6:2FTS	20	21	105	70.0 - 130.0
8:2FTS	20	23	114	70.0 - 130.0

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PFAS by Isotope DilutionLaboratory Control Sample (LCS)

LCS Lab Sample ID LCS-72277
LCS Filename Q190806A_046 Matrix Water

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	20	20	96	50-150	Pass	1010067
13C5_PFPeA	20	20	99	50-150	Pass	704310
13C5_PFHxA	20	20	98	50-150	Pass	628527
13C4_PFHpA	20	19	95	50-150	Pass	684009
13C8_PFOA	20	19	96	50-150	Pass	485840
13C9_PFNA	20	20	98	50-150	Pass	461930
13C6_PFDA	20	20	101	50-150	Pass	274664
13C7_PFUdA	20	20	99	50-150	Pass	334135
13C2_PFDoA	20	19	95	50-150	Pass	409428
13C2_PFTeDA	20	23	115	50-150	Pass	204905
d5-EtFOSAA	20	20	97	50-150	Pass	51236
d3-MeFOSAA	20	18	87	50-150	Pass	55607
13C3_PFBS	20	21	102	50-150	Pass	449841
13C3_PFHxS	20	20	97	50-150	Pass	357478
13C8_PFOS	20	20	96	50-150	Pass	217894
13C8_FOSA	20	17	83	50-150	Pass	335633
13C2_4:2FTS	20	20	97	50-150	Pass	90231
13C6_6:2FTS	20	20	99	50-150	Pass	67435
13C6_8:2FTS	20	16	81	50-150	Pass	53569

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	623272	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	284820	129476 - 388429	132238 - 396714	Pass

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PFAS by Isotope DilutionMatrix Spike Sample (MS)

MS Lab Sample ID	10483659001-MS		
MS Filename	Q190806A_047	Matrix	Non_Potable_Water
Total Amount Extracted	243mL	Dilution	1
ICAL ID	190802B01	Extracted	07/29/2019
Start CCal Filename	Q190806A_040	Analyzed	08/07/2019 06:24
End CCal Filename	Q190806A_054	Injected By	QL
Method Blank Filename	Q190806A_045		

Compound	Spike (ng/L)	Sample (ng/L)	Recovered (ng/L)	Recovery %	Limits	Flags
PFBA	21	9.9	29	138	70.0 - 130.0	
PFPeA	21	1.3	19	91	70.0 - 130.0	
PFHxA	21	1.3	21	102	70.0 - 130.0	
PFHpA	21	0.83	21	100	70.0 - 130.0	
PFOA	21	3.5	22	107	70.0 - 130.0	
PFNA	21	0	18	88	70.0 - 130.0	
PFDA	21	0	21	102	70.0 - 130.0	
PFUdA	21	0	21	101	70.0 - 130.0	
PFDoA	21	0	20	99	70.0 - 130.0	
PFTrDA	21	0	17	83	70.0 - 130.0	
PFTeDA	21	0	21	104	70.0 - 130.0	
PFOSA	21	0	20	98	70.0 - 130.0	
N-EtFOSAA	21	0	21	101	70.0 - 130.0	
N-MeFOSAA	21	0	18	90	70.0 - 130.0	
PFBS	18	0.82	16	89	70.0 - 130.0	
PFPeS	19	0	20	106	70.0 - 130.0	
PFHxS	19	0.89	19	99	70.0 - 130.0	
PFHpS	20	0	16	82	70.0 - 130.0	
PFOS	19	9.4	25	130	70.0 - 130.0	
PFNS	21	0	18	86	70.0 - 130.0	
PFDS	21	0	18	88	70.0 - 130.0	
4:2FTS	21	0	21	102	70.0 - 130.0	JD
6:2FTS	21	0	20	97	70.0 - 130.0	JD
8:2FTS	21	0	23	109	70.0 - 130.0	D

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PFAS by Isotope DilutionMatrix Spike Sample (MS)

Compound	Spike (ng/L)	Sample (ng/L)	Recovered (ng/L)	Recovery %	Limits	Flags

MS Lab Sample ID 10483659001-MS
MS Filename Q190806A_047 Matrix Non_Potable_Water

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	21	12	59	50-150	Pass	774479
13C5_PFPeA	21	17	81	50-150	Pass	719379
13C5_PFHxA	21	18	89	50-150	Pass	713194
13C4_PFHpA	21	21	100	50-150	Pass	898155
13C8_PFOA	21	24	118	50-150	Pass	746219
13C9_PFNA	21	25	123	50-150	Pass	736644
13C6_PFDA	21	23	113	50-150	Pass	392223
13C7_PFUdA	21	22	104	50-150	Pass	448030
13C2_PFDoA	21	19	93	50-150	Pass	509491
13C2_PFTeDA	21	11	52	50-150	Pass	118236
d5-EtFOSAA	21	25	120	50-150	Pass	81092
d3-MeFOSAA	21	25	120	50-150	Pass	97833
13C3_PFBS	21	24	117	50-150	Pass	648556
13C3_PFHxS	21	22	106	50-150	Pass	495632
13C8_PFOS	21	23	110	50-150	Pass	318231
13C8_FOSA	21	16	76	50-150	Pass	394109
13C2_4:2FTS	21	28	135	50-150	Pass	7490
13C6_6:2FTS	21	23	111	50-150	Pass	7926
13C6_8:2FTS	21	17	82	50-150	Pass	5345

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	778723	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	363137	129476 - 388429	132238 - 396714	Pass

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PFAS by Isotope DilutionMatrix Spike Sample Duplicate (MSD)

MSD Lab Sample ID	10483659001-MSD		
MSD Filename	Q190806A_048	MS Filename	Q190806A_047
Total Amount Extracted	241mL	Matrix	Non_Potable_Water
ICAL ID	190802B01	Dilution	1
Start CCal Filename	Q190806A_040	Extracted	07/29/2019
End CCal Filename	Q190806A_054	Analyzed	08/07/2019 06:51
Method Blank Filename	Q190806A_045	Injected By	QL

Compound	Spike (ng/L)	Sample (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	Flags	RPD %
PFBA	21	9.9	28	136	70.0 - 130.0		2
PFPeA	21	1.3	19	90	70.0 - 130.0		0
PFHxA	21	1.3	19	92	70.0 - 130.0		11
PFHpA	21	0.83	20	95	70.0 - 130.0		4
PFOA	21	3.5	22	104	70.0 - 130.0		3
PFNA	21	0	16	78	70.0 - 130.0		11
PFDA	21	0	19	90	70.0 - 130.0		12
PFUdA	21	0	18	88	70.0 - 130.0		13
PFDoA	21	0	21	101	70.0 - 130.0		2
PFTrDA	21	0	20	94	70.0 - 130.0		13
PFTeDA	21	0	19	92	70.0 - 130.0		12
PFOSA	21	0	20	97	70.0 - 130.0		0
N-EtFOSAA	21	0	18	88	70.0 - 130.0		13
N-MeFOSAA	21	0	18	89	70.0 - 130.0		0
PFBS	18	0.82	16	90	70.0 - 130.0		2
PFPeS	19	0	20	103	70.0 - 130.0		2
PFHxS	19	0.89	19	99	70.0 - 130.0		0
PFHpS	20	0	15	77	70.0 - 130.0		5
PFOS	19	9.4	24	126	70.0 - 130.0		4
PFNS	21	0	16	79	70.0 - 130.0		9
PFDS	21	0	16	80	70.0 - 130.0		9
4:2FTS	21	0	18	88	70.0 - 130.0	JD	14
6:2FTS	21	0	19	91	70.0 - 130.0	JD	6
8:2FTS	21	0	21	101	70.0 - 130.0	D	7

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PFAS by Isotope DilutionMatrix Spike Sample Duplicate (MSD)

Compound	Spike (ng/L)	Sample (ng/L)	Recovered (ng/L)	Recovery %	Recovery Limits	Flags	RPD %

MSD Lab Sample ID 10483659001-MSD
MSD Filename Q190806A_048
MS Filename Q190806A_047
Matrix Non_Potable_Water

Internal Standards Compound	Known Conc.	Conc. Found	%Recovery	Recovery Limits	Pass/Fail	Area
13C4_PFBA	21	13	64	50-150	Pass	768014
13C5_PFPeA	21	18	87	50-150	Pass	706651
13C5_PFHxA	21	21	102	50-150	Pass	743587
13C4_PFHpA	21	22	107	50-150	Pass	878014
13C8_PFOA	21	26	123	50-150	Pass	708665
13C9_PFNA	21	26	126	50-150	Pass	766464
13C6_PFDA	21	22	107	50-150	Pass	376535
13C7_PFUdA	21	25	118	50-150	Pass	514967
13C2_PFDoA	21	22	108	50-150	Pass	600727
13C2_PFTeDA	21	21	101	50-150	Pass	232614
d5-EtFOSAA	21	28	135	50-150	Pass	93072
d3-MeFOSAA	21	25	121	50-150	Pass	100716
13C3_PFBS	21	25	122	50-150	Pass	612221
13C3_PFHxS	21	21	101	50-150	Pass	478188
13C8_PFOS	21	23	109	50-150	Pass	320322
13C8_FOSA	21	21	101	50-150	Pass	527678
13C2_4:2FTS	21	29	141	50-150	Pass	3136
13C6_6:2FTS	21	28	136	50-150	Pass	13114
13C6_8:2FTS	21	19	93	50-150	Pass	8177

Injection Internal Standards

IS Compound	Area	Ical Limits	CCV Limits	Pass/Fail
13C4_PFOA	708683	293835 - 881505	294709 - 884128	Pass
13C4_PFOS	368627	129476 - 388429	132238 - 396714	Pass

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August 26, 2019

Mr. Andrew Shrock
BP-Parsons
29 Alpha Park
Highland Heights, OH 44143

RE: Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Dear Mr. Shrock:
Enclosed are the analytical results for sample(s) received by the laboratory on July 18, 2019. The results relate only to the samples included in this report. Results contained within this report conform to the most current version of the TNI standards, BP LaMP Technical Requirements Revision 12.1, and any applicable Quality Assurance Project Plan (QAPP), or Work Plan unless otherwise narrated in the body of this report.

This report was revised on August 26, 2019, to correct project manager signature on front page.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Nathan Boberg
nathan.boberg@pacelabs.com
(612)360-0728
Project Manager

Enclosures

cc: Jon Brandes, On-Site
Eric Felter, Parsons

REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Minnesota Certification IDs

1700 Elm Street SE, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #: MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Minnesota Dept of Ag Certifcation #: via MN 027-053-137
Minnesota Petrofund Certification #: 1240
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Vermont Certification #: VT-027053137
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01

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SAMPLE SUMMARY

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10483659001	**MW78-0719**	Water	07/16/19 08:40	07/18/19 08:50
10483659002	**FB1-0719**	Water	07/16/19 08:45	07/18/19 08:50
10483659003	**MWR3-0719**	Water	07/16/19 11:05	07/18/19 08:50
10483659004	**DUP1-0719**	Water	07/16/19 11:10	07/18/19 08:50
10483659005	**MWR11-0719**	Water	07/16/19 15:12	07/18/19 08:50
10483659006	**MWR1-0719**	Water	07/16/19 13:05	07/18/19 08:50
10483659007	**EB1-0719**	Water	07/16/19 15:45	07/18/19 08:50
10483659008	**FB2-0719**	Water	07/17/19 10:34	07/18/19 08:50
10483659009	**MW27-0719**	Water	07/17/19 10:35	07/18/19 08:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10483659001	**MW78-0719**	EPA 8270D by SIM	STB	2
10483659003	**MWR3-0719**	EPA 8270D by SIM	STB	2
10483659004	**DUP1-0719**	EPA 8270D by SIM	STB	2
10483659005	**MWR11-0719**	EPA 8270D by SIM	STB	2
10483659006	**MWR1-0719**	EPA 8270D by SIM	STB	2
10483659007	**EB1-0719**	EPA 8270D by SIM	STB	2
10483659009	**MW27-0719**	EPA 8270D by SIM	STB	2

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PROJECT NARRATIVE

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Method: **EPA 8270D by SIM**
Description: 8270D MSSV 14 Dioxane By SIM
Client: BP-Parsons-OH
Date: August 26, 2019

General Information:
7 samples were analyzed for EPA 8270D by SIM. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Sample: MW78-0719 **Lab ID: 10483659001** Collected: 07/16/19 08:40 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 14:43	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	61	%.	30-125	1	07/23/19 15:29	08/02/19 14:43		

Sample: MWR3-0719 **Lab ID: 10483659003** Collected: 07/16/19 11:05 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 15:42	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	46	%.	30-125	1	07/23/19 15:29	08/02/19 15:42		

Sample: DUP1-0719 **Lab ID: 10483659004** Collected: 07/16/19 11:10 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 16:02	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	48	%.	30-125	1	07/23/19 15:29	08/02/19 16:02		

Sample: MWR11-0719 **Lab ID: 10483659005** Collected: 07/16/19 15:12 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 16:21	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	52	%.	30-125	1	07/23/19 15:29	08/02/19 16:21		

Sample: MWR1-0719 **Lab ID: 10483659006** Collected: 07/16/19 13:05 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 16:41	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	49	%.	30-125	1	07/23/19 15:29	08/02/19 16:41		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Sample: EB1-0719 **Lab ID: 10483659007** Collected: 07/16/19 15:45 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 17:01	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	69	%.	30-125	1	07/23/19 15:29	08/02/19 17:01		

Sample: MW27-0719 **Lab ID: 10483659009** Collected: 07/17/19 10:35 Received: 07/18/19 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270D MSSV 14 Dioxane By SIM	Analytical Method: EPA 8270D by SIM Preparation Method: EPA 3510							
1,4-Dioxane (SIM)	ND	ug/L	0.25	1	07/23/19 15:29	08/02/19 17:20	123-91-1	
Surrogates								
1,4-Dioxane-d8 (S)	38	%.	30-125	1	07/23/19 15:29	08/02/19 17:20		

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QUALITY CONTROL DATA

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

QC Batch: 621355 Analysis Method: EPA 8270D by SIM
QC Batch Method: EPA 3510 Analysis Description: 8270D Water 14 Dioxane by SIM
Associated Lab Samples: 10483659001, 10483659003, 10483659004, 10483659005, 10483659006, 10483659007, 10483659009

METHOD BLANK: 3354425 Matrix: Water
Associated Lab Samples: 10483659001, 10483659003, 10483659004, 10483659005, 10483659006, 10483659007, 10483659009

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,4-Dioxane (SIM)	ug/L	ND	0.25	08/02/19 12:45	
1,4-Dioxane-d8 (S)	%.	35	30-125	08/02/19 12:45	

LABORATORY CONTROL SAMPLE: 3354426

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,4-Dioxane (SIM)	ug/L	10	9.4	94	40-125	
1,4-Dioxane-d8 (S)	%.			45	30-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3354427 3354428

Parameter	Units	10483659001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,4-Dioxane (SIM)	ug/L	ND	10	10	7.8	9.0	77	89	70-130	14	30	
1,4-Dioxane-d8 (S)	%.						53	46	30-125			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Wellsville-OU2: NY-D98053215-Revised Report
Pace Project No.: 10483659

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10483659001	**MW78-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659003	**MWR3-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659004	**DUP1-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659005	**MWR11-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659006	**MWR1-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659007	**EB1-0719**	EPA 3510	621355	EPA 8270D by SIM	623883
10483659009	**MW27-0719**	EPA 3510	621355	EPA 8270D by SIM	623883

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Atlantic Richfield Company
A BP affiliated company

Laboratory Management Program LaMP Chain of Custody Record

BP/ARC Project Name: Wellsville Emerging Contaminants
BP/ARC Facility No: USEPA ID: NY-D98053215
Req Due Date (mm/dd/yy): Standard
Rush TAT: Yes ___ No X
Lab Work Order Number:

Lab Name: PACE Analytical Services LLC	BP/ARC Facility Address: 2530 South Brooklyn Avenue
Lab Address: 575 Broad Hollow Road, Melville NY 11747	City, State, ZIP Code: Wellsville, New York 14895
Lab PM: Devon Fox	Lead Regulatory Agency: USEPA
Lab Phone: 516-370-6041	California Global ID No.: NA
Lab Shipping Acct:	Enfos Proposal No: D014L-0046
Lab Bottle Order 519846/519860	Accounting Mode: Provision 10 OOC-BU ___ OOC-RM ___
Other Info:	Stage: 60 Activity: 148
BP/ARC EBM: John Frankenthal	
EBM Phone:	
EBM Email: John.Frankenthal@bp.com	

Consultant/Contractor: On-Site Technical Services (On-Site)	
Consultant/Contractor Project No: Wellsville-OU2	
Address: 72 Railroad Ave Wellsville, NY 14895	
Consultant/Contractor PM: Jon Brandes	
Phone: 585-593-1824	
Email EDD To: jonb@on-sitehs.com	
Invoice To: BP/ARC X Contractor ___	

WO# : 10483659

10483659

Lab No.	Sample Description	Date	Time	Matrix: Soil / Solid	Matrix: Water / Liquid	Matrix: Air / Vapor	No. Containers / Preservative: Total Number of Containers	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Requested Analyses: PFAS (see attached list)	Requested Analyses: 1,4-Dioxane	Report Type & QC Level
	MW78-0719	7/16/19	0840		X		14	14						8	6	MS/MSD 001
	FB1-0719		0845		X		1	1						1		Field Blank 002
	MW83-0719		1105		X		4	4						2	2	003
	DUP2-0719		1110		X		4	4						2	2	004
	MW77-0719		1512		X		4	4						2	2	005
	MW1-0719		1305		X		4	4						2	2	006
	EB1-0719	↓	1545		X		4	4						2	2	007
	FB2-0719	7/17/19	1034		X		1	1						1		Field Blank 008
	MW27-0719	7/17/19	1035		X		4	4						2	2	009

Sampler's Name: Scott Watson / Jon Brandes / Kevin Dye
Sampler's Company: On-Site Technical Services
Shipment Method: FedEx Ship Date:
Shipment Tracking No: 493437315795
Special Instructions: 493437315800

Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
/ On-Site	7/17/19	1200	PACE	7/18/19	850

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 2.4 2.3 °F/C | Trip Blank: Yes (No) | MS/MSD Sample Submitted: Yes / No

BP/ARC LaMP COC Rev. 6 01/01/2009

Pace Analytical	Document Name: Sample Condition Upon Receipt Form - ESI	Document Revised: 05Apr2019 Page 1 of 1
	Document No.: F-MN-L-210-rev.30	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt – ESI Tech Specs

Client Name: BP- On-Site Tech. **Project #:** WO#: 10483659

PM: NB3 Due Date: 08/08/19

CLIENT: BP-PARSONS

Courier: ☒Fed Ex ☐UPS ☐USPS ☐Client ☐Pace ☐SpeeDee ☐Commercial See Exception ☐

Tracking Number: 4937 3731 5800,5795

Custody Seal on Cooler/Box Present? ☒Yes ☐No **Seals Intact?** ☒Yes ☐No **Biological Tissue Frozen?** ☐Yes ☐No ☒N/A

Packing Material: ☐Bubble Wrap ☒Bubble Bags ☐None ☐Other: _____ **Temp Blank?** ☒Yes ☐No

Thermometer: ☐T1(0461) ☐T2(1336) ☒T3(0459) ☐T4(0254) ☐T5(0048) **Type of Ice:** ☒Wet ☐Blue ☐None ☐Dry ☐Melted

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 2.4, 2.3 °C **Average Corrected Temp (no temp blank only):** ____ °C See Exceptions ☐

Correction Factor: True **Cooler Temp Corrected w/temp blank:** 2.4, 2.3 °C

USDA Regulated Soil: (☒ N/A, water sample/Other: _____) **Date/Initials of Person Examining Contents:** 7.18.19 CMV

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐Yes ☐No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐Yes ☐No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

		COMMENTS:
Chain of Custody Present and Filled Out?	☒Yes ☐No	1.
Chain of Custody Relinquished?	☒Yes ☐No	2.
Sampler Name and/or Signature on COC?	☒Yes ☐No ☐N/A	3.
Samples Arrived within Hold Time?	☒Yes ☐No	4.
Short Hold Time Analysis (<72 hr)?	☐Yes ☒No	5. ☐Fecal Coliform ☐HPC ☐Total Coliform/E coli ☐BOD/cBOD ☐Hex Chrome ☐Turbidity ☐Nitrate ☐Nitrite ☐Orthophos ☐Other
Rush Turn Around Time Requested?	☐Yes ☒No	6.
Sufficient Sample Volume?	☒Yes ☐No	
Triple Volume Provided for MS/MSD (if more than 10 samples)?	☒Yes ☐No ☐N/A	7.
Correct Containers Used?	☒Yes ☐No	8.
-Pace Containers Used?	☒Yes ☐No	
Containers Intact?	☐Yes ☒No	9.
Field Filtered Volume Received for Dissolved Tests?	☐Yes ☐No ☒N/A	10. Is sediment visible in the dissolved container? ☐Yes ☐No
Is sufficient information available to reconcile the samples to the COC?	☐Yes ☐No	11. **If no, write ID/ Date/Time on Container Below:** See Exception ☐
Matrix: ☒Water ☐Soil ☐Oil ☐Other		
All containers needing acid/base preservation have been checked?	☐Yes ☐No ☒N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>12 Cyanide)	☐Yes ☐No ☒N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS *If adding preservative to a container it must be added to associated field and equipment blanks (verify with PM first)	☒Yes ☐No ☐N/A	Positive for Res. Chlorine? ☐Yes ☐No **pH Paper Lot#** See Exception ☐
		Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Headspace in VOA Vials (greater than 6mm)?	☐Yes ☐No ☒N/A	13. See Exception ☐
3 Trip Blanks Present?	☐Yes ☐No ☒N/A	14.
Trip Blank Custody Seals Present?	☐Yes ☐No ☒N/A	Pace Trip Blank Lot # (if purchased): _____

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐Yes ☐No

Person Contacted: _____ Date/Time: _____

Comments/Resolution:

Temp Log: Temp must be maintained at <6°C during login, record temp every 20 mins			
Opened Time: 15:30	Temp: 2.4, 2.3	Corrected Temp: 2.4, 2.3	
Time: 15:45	put in cooler		
Time:	Temp:	Corrected Temp:	

Project Manager Review: Nathan Boberg **Date:** 7/24/19

Note: Whenever there is a discrepancy affecting North Carolina compliance samples a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Labeled by: _____ 7.23.19

Table 3
Former Sinclair Refinery, Wellsville, NY
Emerging Contaminants Analyte List

Analyte	Method
1-4-Dioxane	8270D SIM
Perfluorinated Compounds	**Method**
N-ethyl perfluorooctane sulfonamidoacetic acid	Modified 537
N-methyl perfluorooctane sulfonamidoacetic acid	Modified 537
Perfluorobutanesulfonic acid (PFBS)	Modified 537
Perfluorodecanoic acid (PFDA)	Modified 537
Perfluorododecanoic acid (PFDoA)	Modified 537
Perfluoroheptanoic acid (PFHpA)	Modified 537
Perfluorohexanesulfonic acid (PFHxS)	Modified 537
Perfluorohexanoic acid (PFHxA)	Modified 537
Perfluorononanoic acid (PFNA)	Modified 537
Perfluorooctanesulfonic acid (PFOS)	Modified 537
Perfluorooctanoic acid (PFOA)	Modified 537
Perfluorotetradecanoic acid (PFTeA)	Modified 537
Perfluorotridecanoic Acid (PFTriA)	Modified 537
Perfluoroundecanoic acid (PFUnA)	Modified 537
Perfluoroheptanesulfonic acid (PFHpS)	Modified 537
Perfluorodecanesulfonic acid (PFDS)	Modified 537
Perfluorobutanoic acid (PFBA)	Modified 537
Perfluoropentanoic acid (PFPeA)	Modified 537
6:2 Fluorotelomer sulfonate (6:2 FTS)	Modified 537
8:2 Fluorotelomer sulfonate (8:2 FTS)	Modified 537
Perfluroroctanesulfonamide (FOSA)	Modified 537